

Louvain School of Management

Is Corporate Social Responsibility Priced? An Approach towards Open-End Equity Investment Funds

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1 - Introduction

This master thesis aims at answering whether corporate social responsibility (CSR) is priced at the portfolio level. According to Gregory et al. (1997), the empirical academic literature has developed along three paths. A first line has been dedicated to studying the performance of home-made portfolios of stocks, while a second one has rather relied on analyzing the performance of ethical market indexes such as the Domini Social Index. Finally, another line of research concentrates on investigating the performance of actively managed investment funds. This research belongs to the latter one. The European Sustainable Investment Forum¹ defines Sustainable and Responsible Investment as, “a generic term covering any type of investment process that combines investors’ financial objectives with their concerns about Environmental, Social and Governance (ESG) issues” (Eurosif, 2010, p.8). Thus, I refer to either ethical or sustainable and responsible investment (SRI) funds² by considering those portfolios as a homogeneous population, unless I mention otherwise as in section 4.3.3 and 5.

Section 2 provides a general overview of the SRI industry and a theoretical review of the arguments, issuing either from the modern portfolio theory or the stakeholder theory, which would justify any outperformance or underperformance of SRI funds vis-à-vis their conventional peers. Section 3 aims at covering the main necessary statistical tools so that anyone should be able to properly apprehend the performance indicators originating from modern portfolio theory and capital asset pricing model. Section 4 is a literature review of past empirical evidence from studies that rely on the use of market data. As previously mentioned, three subfields are usually distinguished from one another. Since this master thesis mostly articulates around professionally managed portfolios, the section “4.3 – Real poled investment vehicles” is the most developed one. Therefore, section 4 and particularly section 4.3 provide an in-depth covering on the question whether CSR is priced at the portfolio level. Naturally, the review of section 3 becomes essential in order to truly understand past empirical evidence. Finally, section 5 is the practical part of this

¹ Eurosif; see <http://www.eurosif.org> for details.

² SRI indifferently refers to sustainable and responsible investment or socially responsible investment in most studies. Yet, socially responsible investment funds may also be a subset of a broader ethical or sustainable and responsible fund population. Such a nuance is mentioned if required (section 4.3.3, 5.1.1 and 5.2.3).

master thesis. I collected data from a Bloomberg terminal in order to analyze SRI fund performance using state-of-the-art asset-pricing models and best practices learnt from section 4.3.

The Louvain School of Management strongly emphasizes on the need for students to understand the challenges and possibilities carried by corporate social responsibility. On the other hand, the curriculum in business engineering comes with a great skill set in analytics and statistics. Consequently, conducting a master thesis on the risk-adjusted performance of SRI funds appears as the ideal setting combining both perspectives. In addition, it may be of real use to any investor eager to deepen her or his comprehension of the SRI phenomenon. Finally, the question whether CSR brings additional value or financial return is still an open one. Hence, I hope to bring further empirical evidence regarding this debate.

2 - Theoretical perspectives on socially responsible investments

2.1 - Financial markets and the SRI industry

An open-end fund exhibits specific features, which are not shared by other financial pooled investment vehicles. Indeed, it is distinguishable by its self-liquidating feature and its absence of leverage in its capital structure (Ciccotello, 2009). The self-liquidating characteristic implies that the open-end fund stands ready to buy and sell shares at its net asset value, which means that shares are exchanged in a primary market only; whereas, shares in closed-end funds may be exchange in a secondary market (Anderson & Ahmed, 2005, p. 11-12). Then, an open-end fund shows a very simple capital structure because it must be almost exclusively unlevered: it relies on equity capital and not debt capital (Ciccotello, 2009). Thus, it offers a low-risk investment structure, regardless of the underlying assets (Ciccotello, 2009). On the other hand, closed-end investment funds may rely on debt capital. By the year 1920, speculative closed-end funds became highly popular in the United States, so that investors faced unprecedented losses when the market crashed in 1929 (Anderson & Ahmed, 2005, p. 5-6). After the crash, investors legitimately started to look for safer investment vehicles such as open-end funds. In the Bloomberg terminal system, the open-end fund category includes different subcategories such as mutual fund, investment trust, SICAV¹ or FCP².

¹ Société d'investissement à capital variable.

² Fond commun de placement.

Even if those legal structures may be country specific¹, they still belong to the broader category of open-end fund. Therefore, they also exhibit a self-liquidating feature, as well as a simple capital structure. Finally, two main missions are devolved to portfolio analysts according to Sharpe (1996): assuring a sufficient level of diversification and selecting assets so that the portfolio belongs to the right asset class given its level of risk.

The Massachusetts Investors Trust emerged in 1924 and it is identified as the first open-end fund (Anderson & Ahmed, 2005, p. 6), while the Pax World Fund, is recognized as the first modern *sustainable and responsible* investment fund or SRI fund, which was founded in 1971 (Renneboog et al., 2008.a). Nowadays, SRI funds screen companies based on a multitude of criteria, as it shall be detailed in section 2.2. However, the SRI trend takes roots essentially in the old religious traditions: the first form of sustainable and responsible investment was rather ethical than sustainable and responsible, because it relied on investing according to religious believes exclusively (Renneboog et al. 2008.a). Hence, it is not unusual to consider the Pioneer Fund, which was founded in 1928, as the first modern *ethical* investment fund (Renneboog et al., 2008).

Because of the Southern-African Apartheid and the Vietnam War, ethical investors started to invest based on highly personal believes other than religion-imposed ones (Renneboog et al., 2008.a). Then, SRI considerations kept being enlarged. For example, the SRI fund performance study of Hamilton et al. (1993), which is among the first eminent study on the subject², is mainly motivated by its authors' wish to investigate the SRI problematic, to funds that do not exclude companies because of their connections to the Apartheid only; but also because of other criteria. Next, the Chernobyl accident and the Exxon Valdez oil disaster forced investors to incorporate environmental considerations along with ethical and personal believes (Renneboog et al., 2008.a). Recently, raising concerns about human rights, labor relations, transparency, governance and sustainability has impacted investors in their asset allocation scheme (Renneboog et al., 2008.a). In conclusion, SRI relies on a large set of personal, societal and ethical believes, meaning that sustainable and responsible investors do not invest according to financial criteria only. One could therefore legitimately believe in a paradigm shift, as depicted by the figure 1 below. Consequently,

¹ When I retrieved my sample of investment funds from a Bloomberg terminal, only Belgian funds were labeled as SICAV, while only French funds were labeled as FCP. On the other hand, the term mutual fund seems to designate US open-end funds mostly, whereas investment trust is UK specific.

² See prelude of section 4.3 and section 4.3.1 for further details.

one of the main empirical question nowadays is whether SRI/ethical investors may be doing well while doing good.

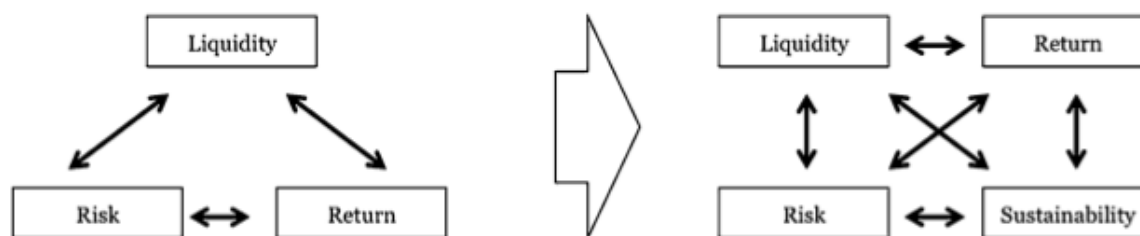


Figure 1 - Source : Cengiz et al. (2010), as cited by Von Wallis & Klein (2015, p.64).
Paradigm shift from a conventional investment scheme to sustainable and responsible investment scheme.

While the US market for ethical funds rose from \$12 billion in 1995 to \$153 billion at the end of 2000, the European market was still very young by the beginning of 2000 (Bauer et al., 2005). “According to the Social and Investment Forum¹, about one out of every nine dollars under professional management in the United States in 2007 was involved in socially responsible investing SRI (SRI)” (Climent & Soriano, 2011, p.275). As of today, “Europe accounts for two-thirds of global SRI funds and Europe and North America combined, 96% of global SRI funds” (KPMG, 2013, as cited by Lean et al., 2015, p.256). In addition, analyzing most recent statistics from Eurosif and US SIF, Cortez et al. (2012) state, “Roughly 11% and 17% of assets under professional management in the USA and Europe, respectively, are involved in socially responsible investments” (Cortez et al., 2012, p..254). Overall, there has been a growing demand in SRI financial assets in developed countries. Hence, one could be wondering if the investment fund industry had been undergoing major changes or if the investors themselves have been changing? Using a survey of 4 000 investors in two mutual funds that incorporate SRI strategies, Rosen et al. (1991) find that ethical investors are younger and better educated. Schueth (2003) also seems to believe that both education and gender play a role in the development of the SRI industry.

In section 5, I empirically investigate SRI funds domiciled either in Belgium, the Netherlands, France or Germany. Hence anyone should have a glimpse of the legislation changes that each country undertook. The table below is directly retrieved from Renneboog et al. (2008.a):

¹ US SIF; see <http://www.ussif.org> for details.

<i>Country</i>	<i>SRI related regulations</i>
Belgium	In 2001, Belgium passed the “Vandebroucke” law, which requires pension funds to report the degree to which their investments take into account social, ethical and environmental aspects.
The Netherlands	In 1995, the Dutch Tax Office introduced a “Green Savings and Investment Plan”, which applies a tax deduction for green investments, such as wind and solar energy, and organic farming.
France	In May 2001, the legislation “New Economic Regulations” came into force requiring listed companies to publish social and environmental information in their annual reports. Since February 2001 managers of the Employee Savings Plans are required to consider social, environmental or ethical considerations when buying and selling shares.
Germany	Since 1991, the Renewable Energy Act gives a tax advantage to closed-end funds to invest in wind energy. Since January 2002, certified private pension schemes and occupational pension schemes “must inform the members in writing, whether and in what form ethical, social, or ecological aspects are taken into consideration when investing the paid-in contributions”.

*Table 1 - Source : Renneboog et al. (2008.a, p.1727)
SRI related regulation in Belgium, the Netherlands, France and Germany.*

2.2 - SRI screening process

SRI screens are multiple and can be categorized into two main groups, negative/exclusionary and positive/inclusionary screens (Renneboog et al., 2008.a). The table 2 below is obtained from Renneboog et al. (2008.a); it summarizes the main SRI screens on which investment funds rely to choose their stocks and more broadly how ethical investors behave:

<i>Screens</i>	<i>Definitions</i>	<i>Type</i>
Tobacco	Avoid manufacturers of tobacco products	-
Alcohol	Avoid firms that produce, market, or otherwise promote the consumption of alcoholic beverages	-
Gambling	Avoid casinos and suppliers of gambling equipment	-
Defense/ weapons	Avoid firms producing weapons for domestic or foreign militaries, or firearms for personal use	-
Nuclear Power	Avoid manufacturers of nuclear reactors or related equipment and companies that operate nuclear power plants	-
Irresponsible foreign operations	Avoid firms with investments in government-controlled or private firms located in oppressive regimes such as Burma or China, or firms which mistreat the indigenous peoples of developing countries	-
Pornography /adult entertainment	Avoid publishers of pornographic magazines; production studios that produce offensive video and audio tapes; companies that are major sponsors of graphic sex and violence on television	-
Abortion/birth control	Avoid providers of abortion; manufacturers of abortion drugs and birth control products; insurance companies that pay for elective abortions (where not mandated by law); companies that provide financial support to Planned Parenthood	-
Labor relations and workplace conditions	Seek firms with strong union relationships, employee empowerment, and/or employee profit sharing Avoid firms exploiting their workforce and sweatshops	+ -
Environment	Seek firms with proactive involvement in recycling, waste reduction, and environmental cleanup Avoid firms producing toxic products, and contributing to global warming	+ -
Corporate governance	Seek companies demonstrating “best practices” related to board independence and elections, auditor independence, executive compensation, expensing of options, voting rights and/or other governance issues Avoid firms with antitrust violations, consumer fraud, and marketing scandals	+ -
Business practice	Seek companies committed to sustainability through investments in R&D, quality assurance, product safety	+
Employment diversity	Seek firms pursuing an active policy related to the employment of minorities, women, gays/lesbians, and/ or disabled persons who ought to be represented amongst senior management	+
Human rights	Seek firms promoting human rights standards Avoid firms which are complicit in human rights violations	+ -
Animal testing	Seek firms promoting the respectful treatment of animals Avoid firms with animal testing and firms producing hunting/trapping equipment or using animals in end products	+ -
Renewable energy	Seek firms producing power derived from renewable energy sources	+
Biotechnology	Seek firms that support sustainable agriculture, biodiversity, local farmers, and industrial applications of biotechnology Avoid firms involved in the promotion or development of genetic engineering for agricultural applications	+ -

Community involvement	Seek firms with proactive investments in the local community by sponsoring charitable donations, employee volunteerism, and/or housing and educational programs	+
Shareholder activism	The SRI funds that attempt to influence company actions through direct dialogue with management and/ or voting at Annual General Meetings	+
Non-married	Avoid insurance companies that give coverage to non-married couples	-
Healthcare/ pharmaceuticals	Avoid healthcare industries (used by funds targeting the “Christian Scientist” religious group)	-
Interest-based financial institutions	Avoid financial institutions that derive a significant portion of their income from interest earnings (on loans or fixed income securities). (Used by funds managed according to Islamic principles)	-
Pork producers	Avoid companies that derive a significant portion of their income from the manufacturing or marketing of pork products. (Used by funds managed according to Islamic principles)	-

*Table 2 - Source : Renneboog et al. (2008.a, p.1729)
SRI screens used by mutual funds; (-) denotes a negative/exclusionary screen, while (+) indicates a positive/inclusionary screen.*

Overall, four generations of SRI screen are distinguished (Renneboog et al., 2008.a). Negative and positive screens refer to the first and second generation of ethical screens (Renneboog et al., 2008.a). Next,

The third generation of screens refers to an integrated approach of selecting companies based on economic, environmental and social criteria comprised by both negative and positive screens. This approach is often called “sustainability” or “triple bottom line” (due to its focus on People, Planet and Profit). (Renneboog et al., 2008.a, p.1728)

Finally, the fourth generation designates funds that engage in ethical investing along with shareholder activism (Renneboog et al., 2008.a).

The European Sustainable Investment Forum (Eurosif) defines 7 strategies among which SRI screens may be integrated. The table below is obtained from Eurosif (2016) and does not only depict the 7 identified strategies but also the GSIA (Global Sustainable Investment Alliances¹), PRI

¹ See <http://www.gsi-alliance.org> for further details.

(Principle for Responsible Investment¹) and EFAMA (European Fund and Asset Management Association²) equivalents:

Eurosif	GSIA-equivalent	PRI-equivalent	EFAMA-equivalent
Exclusion of holdings from investment universe	Negative/exclusionary screening	Negative/exclusionary screening	Negative screening or Exclusion
Norms-based screening	Norms-based screening	Norms-based screening	Norms based approach (type of screening)
Best-in-Class investment selection	Positive/best-in-class screening	Positive/best-in-class screening	Best-in-Class policy (type of screening)
Sustainability themed investment	Sustainability-themed investing	Sustainability themed investing	Thematic investment (type of screening)
ESG integration	ESG integration	Integration of ESG issues	-
Engagement and voting on sustainability matters	Corporate engagement and shareholder action	Active ownership and engagement (three types): Active ownership Engagement (Proxy) voting and shareholder resolutions	Engagement (voting)
Impact investing	Impact/community investing	-	-

*Table 3 - Source : Eurosif (2016, p.9)
SRI screening strategies as defined by the Eurosif, GSIA, PRI and EFAMA.*

In 2013 and 2015, exclusion strategies were the most popular in both Belgium and the Netherlands (Eurosif, 2016). At the same time, Germany witnessed an unprecedented growth in this kind of strategy between 2013 and 2015, which led to the exclusion (product-specific) screening approach being the most used one in 2015 (Eurosif, 2016). On the other hand, norm-based screening is the most famous strategy for French fund asset managers: the usage of this kind of strategy increased by more than 135% between 2013 and 2015 (Eurosif, 2016). The complete description of the changes in screening strategies for Belgium, the Netherlands, France and Germany is provided in appendix 1. Overall, the Belgian SRI market is singular because the retail sector has been developing more rapidly than the institutional sector (Eurosif, 2016), while the French SRI industry is the market in which best-in-class methodologies are the most widely used in Europe (Eurosif, 2016 and Leite & Cortez, 2015). Since this last kind of strategy is likely to

¹ See <https://www.unpri.org> for further details.

² See <http://www.efama.org> for further details.

affect how SRI and conventional funds can be distinguished from one another, it is of primary interest¹.

2.3 - Debate on firm value and portfolio performance: arguments from modern portfolio and stakeholder theories

If SRI equity investment funds could perform any differently than conventional funds, the primary source of such a difference in performance would rely on the underlying assets of the funds, the firms. In a meta-analysis about firm value, Orlitzky et al. (2003) cover 52 studies, which investigate whether Corporate Social/Environment Performance (CSP) and Corporate Financial Performance (CFP) are correlated. They find that CSP and CSF are positively correlated and this relation appears to be stronger with accounting-based measures than with market based indicators. Unfortunately, the authors cannot conclude on the directionality of the relation; namely, does a firm do well because it does good or does a firm do good because it does well?

Next, at the heart of the CSR problematic² is whether firms should aim at maximizing shareholder or stakeholder value (Renneboog et al., 2008.a). The well-known Friedman's critique argues that executive managers (the agents) should concentrate on shareholder value maximization only, because they are not receiving any mandate from the shareholders (the principles) to pursue social and environmental goals (Friedman, 2007). Assuming that CSR harms the profit-maximization process, Friedman warns against an illegitimate tax collection by the executive managers if pursuing CSR strategies: only Governments have been tasked to collect taxes and appropriately spend money on the social and common good, whereas the additional costs carried by CSR should not be supported by the firm capital owners (Friedman, 2007). Yet, Besley & Ghatak (2007) shows that shareholder value maximization is not necessarily in conflict with stakeholder value maximization:

When firms sell products ('ethical' brands - defined as products branded as organic, environmentally friendly, durable or sustainable, and neutral brands), only those consumers who care about CSR are willing to buy ethical products such that there is no adverse welfare effect on

¹ See section 4.3 and most especially 4.3.2.

² And the SRI problematic by extension.

those who do not care. Hence, CSR creates a Pareto improvement for the economy as a whole. (Renneboog et al., 2008.a, p.1731).

Other firm-level evidence exhibits some contrast regarding the cost/reward of implementing CSR strategies. First, Barnea & Rubin (2010) show that CSR can increase agency costs because of managers and large blockholders seeking to over-invest in CSR to benefit their own reputation as good global citizens. On the other hand, Brekke & Nyborg (2004) developed a model, which is consistent with the idea that CSR-compliant companies attract highly motivated workers. Third, reviewing past empirical evidence about environmental and financial performance, Stefan & Paul (2008) aim at determining whether better environmental performance can lead to an increase in revenue because of three advantages, a better access to certain markets, differentiating products and selling pollution-control technology. Similarly, they also seek to establish if better environmental performance can reduce cost in four categories, risk management and relations with external stakeholders, cost of material; energy; and services, cost of capital and cost of labor. If Stefan & Paul (2008) do not blindly concentrate on proving that better environment performance always happens with a better financial performance, they still provide concrete examples, along each one of the 7 dimensions, proving that the former may induce the latter. Hence, the old paradigm implying that environmental concerns come at the cost of profit maximization inefficiency does not seem to be entirely true. In addition, Martí-Ballester (2015) claims, “Companies that engage in corporate social responsibility strategies for cleaner production could benefit from increased productivity due to operational efficiencies, lower costs of attracting top talents to the company, and offering more attractive products to customers” (Silva & Cortez, 2016, p.559).

Even though there is some evidence supporting the idea that CSR may generate superior value, there is no guarantee that investment funds can adequately select those firm. Yet, some believe that the SRI screening process, as explained in section 2.2.2, might generate value-relevant information not available to other investors (Renneboog et al., 2008.a). Of course, if investment funds were being rewarded of an additional excess return because of SRI screens, it would be at the odds with the semi-strong form of the Efficient Market Hypothesis¹. In addition, some argue that SRI screening strategies imply higher monitoring costs, which reduce fund performance. By

¹ See appendix 2 for a brief review on the EMH.

comparing the returns of the Domini Social Index and the returns of an index fund that is created to mimic the Domini Social Index, Schröder (2004) conclude that there is little evidence of such an additional cost. Then, the fiercest argument standing against the possibility for SRI funds to outperform unconstrained equity portfolios takes roots in the modern portfolio theory. One of the component of this theory distinguishes systematic risk from unsystematic risk: by appropriately diversifying a portfolio of stocks, any managers should be able to remove the unsystematic, while facing the remaining risk associated to the stock market only, the systematic risk. The figure 2 below is obtained from (Van Der Wijst, 2013) and depicts the diversification phenomenon:

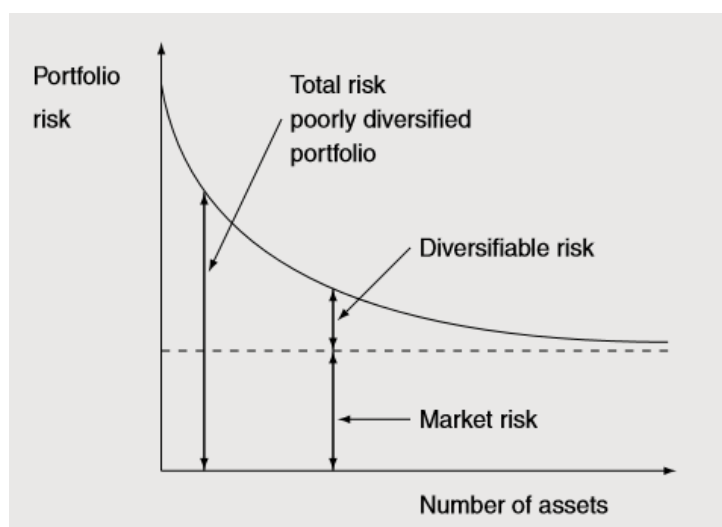


Figure 2 - Source : Van Der Wijst (2013, p.57)
Diversification effect

From figure 2, it appears that a portfolio that is not well-diversified carries an additional source of risk for which investors are not rewarded. The main argument against SRI portfolio outperformance accounts for SRI screens being a barrier to achieve a proper diversification and thus SRI portfolios cannot be mean-varient efficient in the Markowitz sense of the term (Renneboog et al., 2008.a).

Arguments yielded by the stakeholder theory and the modern portfolio theory seems to support different outcomes regarding ethical fund performance. However, findings from Barnett & Salomon (2006) would suggest that this dichotomy has a middle ground on which to stand. Indeed, they empirically verify that the relation between risk-adjusted performance and the intensity of SRI

screens¹ is rather curvilinear (U-shaped) than linear. The figure 3 below depicts their main outcome:

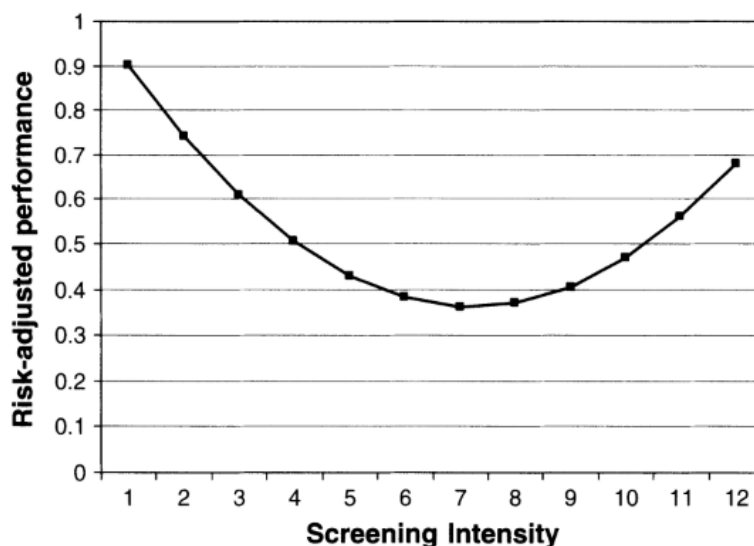


Figure 3 - Source : Barnett & Salomon (2006, p.1115)
Curvilinear relationship between performance and screening intensity

Barnett & Salomon (2006) provide a theoretical explanation about this phenomenon, which perfectly reconciles the modern portfolio and the stakeholder perspectives. According to the author, the screening intensity affects both the diversification and the selectivity, as depicted by the figure 4 below. Thus, increasing the screening intensity comes at the cost of poorer diversification and less mean-variance efficient portfolios, whereas a stringent selection process is simultaneously more likely to induce the portfolio manager to select stocks that are in the right-hand tail of the return distribution (Barnett & Salomon, 2006). Consequently, it appears to be feasible to face a poor diversification while increasing its chance to select high performing stocks or to be ethical without harming the beneficial side effects of diversification; given that the investment portfolio is not “stuck in the middle”, as plausibly depicted by figure 3 (Barnett & Salomon, 2006).

¹ Being proxied by the number of screens that a fund conducts in its selection process.

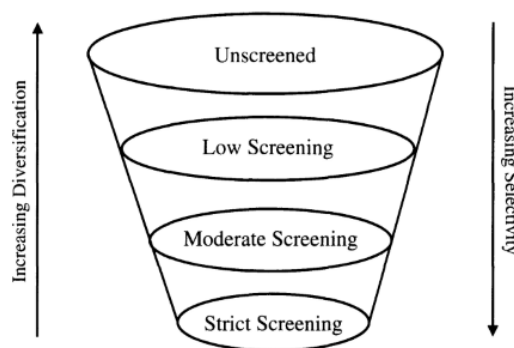


Figure 4 - Source : Barnett & Salomon (2006, p.1106)
Effects of ethical screens on stock selection universe

3 - Performance and econometric insights

3.1 - Performance indicators derived from the CAPM

3.1.1 - Relative indicators

Sharpe (1966) is among the first research to evaluate the performance of mutual funds using concepts derived from modern portfolio theory and capital asset pricing model¹. As prelude of his research paper, the author emphasizes on three fields that had been granted unprecedented advances:

- Theory of portfolio selection (Markowitz, 1952)
- Asset pricing theory under condition of risk (Sharpe, 1964)
- Behavior of stock market prices (Fama, 1965)

From those studies emerged a need to build empirical material from which one could evaluate portfolio performance. Hence, Sharpe developed a performance indicator still known today as the Sharpe ratio: it constitutes a measure of risk-adjusted return for systematic and unsystematic risk. This ratio is often used along with a complementary one, the Treynor ratio, which is adjusted for systematic risk only. Let us write those indicators formally (Van Der Wijst, 2013, pp 76-77):

¹ Or CAPM in its short version.

Sharpe or reward-to-variability ratio	Information or Treynor ratio
$SR_p = \frac{\bar{r}_p - \bar{r}_f}{\hat{\sigma}_p}$	$TR_p = \frac{\bar{r}_p - \bar{r}_f}{\hat{\beta}_p}$
\bar{r}_p is the average portfolio return and \bar{r}_f the average risk-free rate over a fixed time horizon.	
$\hat{\sigma}_p$ is the standard deviation of the portfolio return and it measures both systematic and unsystematic risk.	$\hat{\beta}_p$ measures the portfolio sensitivity to a benchmark portfolio and it therefore measures the systematic risk only.

Table 4 - Source: Van Der Wijst (2013, pp.76-77)
Sharpe and Treynor ratios

An alternative does exist for the Sharpe ratio, the new Sharpe performance measure (Reilly & Norton, 2003, as cited by Bello, 2005), in which the risk-free rate is switched with the average return on a benchmark portfolio. To the best of my knowledge, Bello (2005) is the only research paper belonging to the SRI academic literature employing it. Given that diversification is one of the most important fund manager's mandate, one may assume this task as being fulfilled. Hence, the Treynor ratio might somehow appear to be a better indicator, since an investor would not need to worry about idiosyncratic risk being part of the total risk (Sharpe, 1966). Though, both were very popular among studies investigating the SRI performance problematic based on market data: it is especially true until the schism of 2005 initiated by the work of Bauer et al. (2005), as it shall be seen later¹. Finally, another performance indicator has also been used among SRI empirical studies, the eSDAR indicator (see Bello, 2005 and Statman, 2000), but to a lesser extent than the Sharpe and Treynor ratios. It may be interpreted as "the excess return of a portfolio over the return of a benchmark portfolio, in a situation where the portfolio is leveraged to have the benchmark's standard deviation" (Bello, 2005, p.49). Using the same formulation as in Bello (2005, p.49), eSDAR is defined as follows:

$$eSDAR = \bar{r}_f + \left(\frac{\bar{r}_p - \bar{r}_f}{S_p} \right) * S_m - \bar{r}_m$$

¹ Prelude of section 4.3.

where

\bar{r}_f = average past return on a risk-free asset

\bar{r}_p = average past return on a pooled investment portfolio

\bar{r}_m = average past return on a market benchmark pooled investment portfolio

S_p = standard deviation of portfolio p 's average return

S_m = standard deviation of average return on the market benchmark portfolio

3.1.2 - Stock picking and market timing

The eSDAR metric, the Sharpe ratio and the Treynor ratio are relative measures of performance because they all rely on ranking portfolios against one another but not against a commonly defined standard, whereas the Jensen's alpha does (Jensen, 1968). Hence, the measure of average excess return as defined by Jensen (1968) is an absolute risk-adjusted metric of performance. Each study I review in section 4 uses the original Jensen's alpha or one of its extension to measure the performance of SRI portfolios; and to compare it against the performance of conventional portfolios. It is sometimes used along with the performance indicators of section 3.1.1. However, while the relative indicators are mostly employed by articles published before 2005¹, the Jensen's alpha constitutes the common measure to all those studies. Therefore, I review the main and most important points of Jensen (1968) in this section.

In a second time, I present the work of Treynor & Mazuy (1966) and Henriksson & Merton (1981), which both built methodologies to distinguish stock picking from market timing abilities within their model of performance. The distinction between those two components of performance is explained because they constitute two different sources of performance. Indeed, it is reasonable to assume that a fund performance might either be driven by the value of its underlying assets or by the willingness of the manager to increase its systematic risk, if she or he is expecting the market return to increase in the future. For example, let us assume a balanced fund expecting the stock exchange market to increase over the next months. Then, if the fund manager believes in her or his ability to predict such a market movement, it would be legitimate for her or him to reallocate part of the fund's assets from bonds to stocks. Therefore, the fund's systematic risk would be higher

¹ See section 4.3.

than before along with the expected return. Of course, the opposite reasoning would hold if the manager was assuming a drop in the stock exchange market.

Jensen's alpha

The measure of average excess return developed by Jensen (1968) is a direct consequence of the work on capital asset pricing theory, conducted by William Sharpe, Jack Treynor and John Lintner (Jensen, 1968). The original CAPM model is a single period model; however, Jensen (1968) extends it to a multi-period model:

$$E(r_{jt}) = r_{ft} + \beta_j * [E(r_{mt}) - r_{ft}] \quad (1)$$

where

$E(r_{jt})$ is the expected return on the portfolio or security j during time t .

$E(r_{mt})$ is the expected return on the efficient market portfolio during time t .

r_{ft} is the return on the risk-free asset at time t .

β_j is the stationary measure of risk.

It is also proven that the measure of risk β_j can be approximated by the coefficient b_j in the market model of Fama (1968):

$$r_{jt} = E(r_{jt}) + b_j * \pi_t + e_{jt} \quad (2)$$

where

b_j varies from one portfolio or security to another and it measures the sensitivity of the portfolio/security to an unobservable market factor π_t that affects the return on all portfolios/securities.

$$E(\pi_t) = 0$$

$$E(e_{jt}) = 0 ; j = 1, 2, \dots, N$$

$$cov(\pi_t, e_{jt}) = 0 ; j = 1, 2, \dots, N$$

$$cov(e_{jt}, e_{it}) = 0 \text{ if } j \neq i ; j = 1, 2, \dots, N$$

$$cov(e_{jt}, e_{it}) = \sigma^2(e_j) \text{ if } j = i ; j = 1, 2, \dots, N$$

By using (2) to recast (1) in terms of ex post returns, Jensen (1968) shows that:

$$r_{jt} - r_{ft} = \beta_j * [r_{mt} - r_{ft}] + e_{jt} \quad (3)$$

Equation 3 can be estimated by Ordinary Least Squares to obtain the sensitivity to the efficient market portfolio of an individual security or an unmanaged portfolio. However, a portfolio manager might be a superior forecaster. Therefore, “he will tend to systematically select securities which realize $e_{jt} > 0$. Hence, his portfolio will earn more than normal risk premium for its level of risk” (Jensen, 1968, p.393). Equation 3 needs then to be adapted to account for this possibility by incorporating an intercept as in Jensen (1968):

$$r_{jt} - r_{ft} = \alpha_j + \beta_j * [r_{mt} - r_{ft}] + u_{jt} \quad (4)$$

where

α_j is the average excess return of the managed portfolio j in respect to the market portfolio m , or the Jensen’s alpha.

and

u_{jt} is the new error term and $E(u_{jt}) = 0$.

If the portfolio manager attempts to maintain a constant level of risk β_j then the Ordinary Least Squares (OLS) $\hat{\beta}_j$ estimate should be unbiased because β_j is assumed to be stationary through time (Jensen, 1968). Formally:

$$\beta_{jt} = \beta_j + e_{jt} \quad (5)$$

where

β_j is the target level of risk.

and

e_{jt} is a normally distributed random variable with $E(e_{jt}) = 0$.

Given the term π_t presented in equation 2, if the fund manager believes that the return on the market factor π_t will increase during the next period, then she or he would be tempted to increase the return on her or his portfolio by increasing its risk. Of course, if the manager is expecting a

decrease in the market factor return, then she or he would certainly aim at reducing the risk of the portfolio. Consequently, one should expect a positive relationship between e_{jt} and π_t , if the portfolio manager is able to forecast market movement (Jensen, 1968). The relation may formally be represented as follows (Jensen, 1968):

$$e_{jt} = a_j * \pi_t + w_{jt} \quad (6)$$

where

$$E(w_{jt}) = 0$$

and

one can rule out $a_j < 0$ (see Jensen, 1968, p. 395)

Replacing (5) and (6) in (4), the expectation of the OLS estimate $\hat{\beta}_j$ is equal to (Jensen, 1968):

$$E(\hat{\beta}_j) = \frac{cov [(r_{jt} - r_{ft}), (r_{mt} - r_{ft})]}{\sigma^2(r_m)} = \beta_j - a_j * E(r_m) \quad (7)$$

As described in Jensen (1968), if the manager does not possess any market timing ability, a_j will be equal to 0 and the estimate will not be biased. However, if the manager does show some forecasting ability, the risk parameter estimate of β_j will be biased downward, which means that the Jensen's alpha estimate $\hat{\alpha}_j$ will be biased upward (Jensen, 1968). In conclusion, the Jensen's alpha estimate is an adequate risk-adjusted performance measure for managed portfolios if one assumes that the fund manager does not time the market or that she or he attempts to maintain a constant level of risk. Following his theoretical development, Jensen (1968) estimates the average excess return on a set of 115 mutual funds and concludes that fund managers on average does not exhibit superior stock picking skills.

Market timing

The Jensen's alpha may strictly be interpreted as a measure of a fund manager's stock picking performance. Treynor & Mazuy (1966) as well as Henriksson & Merton (1981) constructed models in which the performance is decomposed into market timing and stock selection. Not only, those methodologies aim at better understanding the different sources of performance but also to correct the bias in the Jensen's alpha estimate, if the manger can forecast the market.

When developing their model, Treynor & Mazuy (1966) aim at answering whether “there is evidence that the volatility of the fund was higher in years when the market did well than in years when the market did badly”. Overall, they find no statistical evidence of fund managers outguessing the market (Treynor & Mazuy, 1966, p.132). To the best of my knowledge, Schröder (2004) is the first open-end fund study within the SRI literature to incorporate such an approach. Besides, Muñoz et al. (2014) and Leite & Cortez (2015) follow similar methodologies to Treynor & Mazuy (1966) but combined to the advance model of Carhart (1997). Renneboog et al. (2008.b) also follow this path as a robustness check for their main results but do not include the estimates within their article. Although the original model does only use a single quadratic factor, Schröder (2004) employs two quadratic factors in their formulation because its original CAPM is a 2-factor model. Here is the single quadratic factor model inspired from Schröder (2004):

$$R_{jt} = \alpha_j + \beta_j * R_{mt} + \gamma_j * (R_{mt})^2 + u_{jt} \quad (8)$$

where

R_{jt} is the excess return of fund j over the risk-free rate at time t .

R_{mt} is the excess return of the market index m over the risk-free rate at time t .

α_j is the average excess return of fund j or the Jensen’s alpha.

β_j is the sensitivity of fund j to the market index.

γ_j is the quadratic factor estimate of fund j on the market index.

u_{jt} is the error term.

From Jensen (1968), one knows that a positive and significant Jensen’s alpha estimate $\hat{\alpha}_j$ should be seen as the fund manager j exhibiting superior skills at stock selection. Similarly, a positive OLS $\hat{\gamma}_j$ “means that the fund manager is able to time the market, whereas a negative estimate shows that the manager invests less in upward markets and more in downward markets” (Schröder, 2004, p.128).

In their research paper, Henriksson & Merton (1981) also distinguish stock picking performance from market timing performance. According to the authors, it is common in the specification of the CAPM, when dedicated at measuring performance, to partition forecasting skills into two components: “microforecasting, which forecasts price movements of individual

stocks relative to stocks generally; and macroforecasting which forecasts price movements of the general stock market relative to fixed income securities” (Henriksson & Merton, 1981, p.514). To the best of my knowledge, Kreander et al. (2005) is the only paper which belongs to the SRI mutual fund academic literature relying on the formal approach of Henriksson & Merton (1981). Here is the formulation as presented in Kreander et al. (2005):

$$r_{jt} - r_{ft} = \alpha_j + \beta_j * (r_{mt} - r_{ft}) + D_j * [(r_{mt} - r_{ft})] + u_{jt} \quad (9)$$

where

D_j is a dummy variable with a value of 0 when $r_{mt} > r_{ft}$ and -1 when $r_{mt} < r_{ft}$.

Simply, “the coefficient D_j captures the market timing ability of the fund manager; if D_j is positive, it suggests that the manager is increasing the risk profile of the portfolio when a bull market occurs” (Kreander et al., 2005, p.1478).

3.1.3 - Conditional performance

Beta time-varying coefficient

Market timing models such as those of Treynor & Mazuy (1966) and Henriksson & Merton (1981) support strong assumptions regarding the form of the market timing performance. Another stream emerged within the academic literature which led to the development of conditional performance models. Indeed, Ferson & Schadt (1996) built a CAPM-based model, consistent with the semi-strong form of the Efficiency Market Hypothesis, conditioning the returns based on predetermined lagged information variables.

From a practical point of view, the conditional model of Ferson & Schadt (1996) allows for the market beta β_j to vary over time. The authors recognize three sources of non-stationarity in market beta that are captured by their model (Ferson & Schadt, 1996):

- Betas of the underlying assets changing over time
- Weights of a passive strategy changing over time because of a change in relative value
- Weights of an actively managed portfolio changing over time because of the manager

If market timing models enable to separate stock selection from market forecasting, the conditional model of Ferson & Schadt (1996) only corrects for the bias in the Jensen's alpha estimate, which is discussed in section 3.1.2. Empirical results on a sample of 67 open-end funds strongly suggest that market timing models as developed by Treynor & Mazuy (1966) and Henriksson & Merton (1981) could be misleading when estimating average excess return of funds (Ferson & Schadt, 1996). Comparative results lead to fewer significant alpha estimates, as expected by the semi-strong form of the Efficiency Market Hypothesis; and most of the perverse market timing abilities are even removed when conditioning the model of Treynor & Mazuy (1966) and Henriksson & Merton (1981) to predetermined lagged information variables. Presented below is the conditional single index model as built in Ferson & Schadt (1996); the market beta β_{jt} is conditioned on a lagged vector of variables Z_{t-1} through a linear relationship given by:

$$\beta_{jt} = \beta_{j0} + B_j' * Z_{t-1} \quad (10)$$

(as opposed to equation 4 and 5 where β_{jt} is assumed to be stationary through time)

Recasting (10) in (4), the conditional single index model takes shape:

$$r_{jt} - r_{ft} = \alpha_j + \beta_{j0} * (r_{mt} - r_{ft}) + B_j' * Z_{t-1} * (r_{mt} - r_{ft}) + u_{jt} \quad (11)$$

where

β_{j0} is the unconditional mean of the conditional market beta or the average beta.

Z_{t-1} is the lagged vector of information variables.

B_j is the coefficient vector of same length as Z_{t-1} .

u_{jt} is the error term.

The model can be interpreted considering several backgrounds from either the CAPM framework or even the Arbitrage Pricing Theory framework (see Ferson & Schadt, 1996). Maybe the easiest way to see it would be to consider the model as “an unconditional multiple factor model, in which the market index is the first factor and the product of the market and the lagged information variables are additional factors” (Ferson & Schadt, 1996, p.430). Moreover, α_j in equation 11 is “the average difference between the managed portfolio excess return and the excess return to the dynamic strategies which replicate its time-varying exposures” (Ferson & Schadt, 1996, p.431). Of course, the OLS estimate of α_j constitutes a bias-adjusted measure of the Jensen's

alpha; it corrects for the bias explained in section 3.1.2 (Ferson & Schadt, 1996). Next, the coefficient estimates of vector B_j may be seen as the deviations of the original variable, R_{mt} or $(r_{mt} - r_{ft})$, from its unconditional mean β_{j0} (Schröder, 2004). Finally, the main difference between the conditional model and the market timing models lies in the fact that Ferson & Schadt (1996) rather than assuming a restrictive form of selectivity and market timing, extend the assumptions of the original multi-period CAPM allowing for the market beta to vary over time.

Last, several publicly available information variables have been of interest when trying to predict security returns and risks over time. Thus, they constitute appropriate proxy for the vector of lagged information variables Z_{t-1} when estimating equation 11 by OLS (Ferson & Schadt, 1996). Among the SRI open-end fund academic literature, most studies rely on 4 variables (see Bauer et al., 2006, Bauer et al., 2007 and Renneboog et al., 2008.b):

- Short term interest rate
- Dividend yield on an equity market index
- Slope of the term structure also called term spread (yield spread between a short-term government bond and a long-term government bond)
- Corporate bond spread also called quality spread (yield spread between firms with middle-range ratings and high rated firms)

Alpha time-varying coefficient

In the previous section, I review the original paper of Ferson & Schadt (1996) about time-varying market beta or conditional beta. Christopherson et al. (1998) extend this approach by considering not only time-varying market beta but also time-varying average excess return. Now, in addition to equation 10, it follows:

$$\alpha_{jt} = \alpha_{j0} + A'_j * Z_{t-1} \quad (12)$$

Recasting (12) in (11), the conditional single index model allowing for both market beta and the Jensen's alpha to vary over time is given by:

$$r_{jt} - r_{ft} = \alpha_{j0} + A'_j * Z_{t-1} + \beta_{j0} * (r_{mt} - r_{ft}) + B'_j * Z_{t-1} * (r_{mt} - r_{ft}) + u_{jt} \quad (13)$$

where

α_{j0} is the unconditional mean of the conditional average excess return, or the average alpha.

Z_{t-1} is the lagged vector of information variables.

A_j is the coefficient vector of same length as Z_{t-1} .

u_{jt} is the error term.

If Ferson & Schadt (1996) give some economics background for their conditional model, Christopherson et al. (1998) do not explicitly state any motivation for implementing their approach. However, they show among a set of pension funds that the constant-alpha null hypothesis can be rejected at the 5% level for 24% of the growth managers and 48% of the value managers¹. The authors also conclude that “some pension fund managers have time-varying conditional alphas; and these are not an artifact of using the conditional CAPM as the benchmark model” (Christopherson et al., 1998, p.130).

In the literature review of section 4.3, Cortez et al. (2012) and Leite & Cortez (2014) both rely on the conditional model of Christopherson et al. (1998). Thus, they incorporate both alpha and beta time-varying coefficients among a SRI mutual fund framework. Some of their conclusion are therefore based on the Jensen’s alpha, computed as the unconditional mean of the average excess return with the OLS coefficient vectors \hat{A}_j and \hat{B}_j standing as the deviations of the original variables from their unconditional mean. Cortez et al. (2012) rely on using two information variables only, a short-term interest rate and a dividend yield proxy; while Leite et Cortez (2014) focus on three variables, the dividend yield, a term spread and a quality spread.

3.2 - Size, book-to-market and momentum risk premia

Reviews derived in section 3.1 most exclusively rely on the single index multi-period CAPM as expressed in equation 1. It follows that estimating equation 4 by OLS is the most direct way to obtain a reliable risk-adjusted performance measure for a single portfolio, the Jensen’s alpha estimate. Yet, a breakthrough line of research in asset-pricing theory arose with eminent representatives such as Eugene Fama, Kenneth French and Mark Carhart. Fama & French (1992), Fama & French (1993) and Carhart (1997) are probably the most famous studies demonstrating

¹ As given by heteroscedasticity consistent Wald tests on the joint significance of the additional variables resulting from the conditional CAPM of Christopherson et al. (1998).

that the average cross-sectional excess return of equity assets is better explained by a set of several variables than the market sensitivity β alone. Those findings have unprecedented consequences in terms of fund performance measure because they suggest that the Jensen's alpha should not be estimated from single index time-series regressions but from multivariate time-series regressions. To the best of my knowledge, Bauer et al. (2005) is the first SRI study to fully incorporate the findings from French (1992), Fama & French (1993) and Carhart (1997) when evaluating ethical fund performance. I review here the main developments of multivariate asset-pricing theory before presenting the Carhart 4-factor model and its conditional extension in the spirit of Ferson & Schadt (1996) and Christopherson et al. (1998).

Several empirical contradictions have harmed the compactness of the Sharpe-Lintner-Black formulation of the CAPM over the years; especially the assumption that market betas alone would suffice to explain the cross-section of expected returns (Fama & French, 1992). First, firms with small market capitalizations are found to outperform big size firms (Banz, 1981, as cited by Fama & French, 1992). Then, a positive relation seems to stand between leverage and average return (Bhandari, 1988). Third, the ratio of a firm's book value of common equity appears to be positively correlated to average return (Stattman, 1980 and Rosenberg et al., 1985, as cited by Fama & French, 1992). In, addition, the book-to-market equity ratio, BE/ME, shows strong abilities in explaining cross-section of average returns on Japanese stocks (Chan et al., 1991). Finally, a similar conclusion is drawn from the earnings-price ratio, E/P, on US stocks (Basu, 1983). From their empirical investigation, Fama & French (1992) and Fama & French (1993) find that the size and book-to-market equity ratio englobe all effects described above when measuring performance.

Fama & French (1993) show that any abnormal return, which are obtained from forming portfolios based on the previously mentioned phenomena, disappear once the asset-pricing model controls for stock size and book-to-market ratio. Yet, one investment strategy remains generating abnormal returns, even when risk-adjusted performance is controlled for size and book-to-market ratio, the one-year momentum strategy (Jegadeesh & Titman, 1993). As stated in their abstract, "this paper documents that strategies which buy stocks that have performed well in the past and sell stocks that have performed poorly in the past generate significant positive returns over 3- to 12-months holding periods" (Jegadeesh & Titman, 1993, p.65). When controlling risk-adjusted performance with size, book-to-market ratio and a factor that mimics a momentum strategy,

Carhart (1997) shows that a fund manager exhibiting any persistence in performance is more likely to be caused by luck than by a superior stock selection skill. Here is the Carhart 4-factor model formulated as in Bauer et al. (2006):

$$R_{jt} = \alpha_j + \beta_j^a * R_{mt} + \beta_j^b * SMB_t + \beta_j^c * HML_t + \beta_j^d * Mom_t + u_{jt} \quad (14)$$

where

α_j is the Jensen's alpha measure for fund j .

R_{jt} is the excess return of fund j over the risk-free rate in time t .

R_{mt} is the excess return of the market index over the risk-free rate in time t .

SMB_t is the difference in return between a small cap portfolio and a large cap portfolio at time t – SMB stands for small minus big.

HML_t is the difference in return between a portfolio of high book-to-market stocks (value stocks) and one of low book-to-market stocks (growth stocks) at time t – HML stand for high minus low.

Mom_t is the difference in return between a portfolio of past 12 months winners and a portfolio of past 12 months losers at time t – Mom stands for momentum.

u_{jt} is the error term.

The SMB, HML and Mom factors are usually value-weighted stock portfolios, even though some studies consider the difference in return between appropriate market indexes (see for example Leite & Cortez, 2014 or Leite & Cortez, 2015). Kenneth French's website¹ maintains and updates the value of those factors according to the country/region of interest. The common way to interpret positive beta estimates along with significant heteroscedasticity and/or autocorrelation consistent t-tests on those estimates is straightforward: such an estimate on the SMB, HML and Mom factors - namely the OLS $\hat{\beta}_j^b, \hat{\beta}_j^c, \hat{\beta}_j^d$ - would indicate that fund or portfolio j is biased towards small caps, value stocks and past winners respectively. On the other hand, negative and significant coefficient estimates would be interpreted as a bias towards big stocks, growth stocks and past losers. Finally, believers of the Efficient Market Hypothesis would argue that those factors are not at the odds with the semi-strong form of the Hypothesis because that simply controls for additional source of risk than the market beta; whereas some scholars believe that they stand as proofs against the semi-

¹ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

strong form of the EMH (Derwall et al., 2005). This debate is beyond the scope of this master thesis and I do not investigate whether SRI portfolios could serve as a mean to contribute to it.

Next, the Carhart 4-factor model as presented in equation 14 can be extended to incorporate the conditional performance models of Ferson & Schadt (1996) and Christopherson et al. (1998). The conditional version of Carhart (1997), allowing for both alpha and betas to vary over time is given by:

$$R_{jt} = \alpha_{j0} + A_j' * Z_{t-1} + \beta_{j0}^a * R_{mt} + \beta_{j0}^b * SMB_t + \beta_{j0}^c * HML_t + \beta_{j0}^d * Mom_t + (B_j^a)' * Z_{t-1} * R_{mt} + (B_j^b)' * Z_{t-1} * SMB_t + (B_j^c)' * Z_{t-1} * HML_t + (B_j^d)' * Z_{t-1} * Mom_t + u_{jt} \quad (15)$$

Using 4 information variables would result in estimating 5 unconditional mean parameters (α_{j0} , β_{j0}^a , β_{j0}^b , β_{j0}^c , β_{j0}^d) and 20 (5 X 4) parameters accounting for the deviation of the original variables from their unconditional mean (A_j , B_j^a , B_j^b , B_j^c , B_j^d ; given that those parameters are all vectors of same length as Z_{t-1} , which is 4 in my example). Of course, the unconditional mean parameter estimates are of primary interest when studying fund performance because they should not be biased by the fund manager's attempts to time both the market and the style investment strategies.

4 - Empirical evidence: a literature review

4.1 - General overview

In their literature review, Gregory et al. (1997) adequately categorize the different studies that have tried to determine whether investing into ethical financial assets brings any cost or advantage, in respect to investing into conventional financial assets. The authors state that a first line of study has focused on analyzing performance from portfolios of individual stocks, whereas a second line prefers scrutinizing the performance of ethical equity indexes such as the Domini Social Index. Finally, another line has capitalized on comparing the average excess return between ethical and traditional investment funds. Section 4.3 deeply reviews this last line of research because the empirical investigation that is conducted in section 5 originates from this subfield. On the other hand, section 4.2 covers the two other subfields. As it shall be detailed, regression analysis on artificially pooled investment vehicles (section 4.2) rather than on real ones, such as open-end funds (section 4.3), happens with intrinsic methodological advantages. Nonetheless, the results

produced by this kind of experiment might be of weaker interest to investors because the financial assets of sections 4.2 can hardly be built in real life. Hence, my choice to focus on real pooled investment vehicles was motivated by a personal wish to determine if CSR could concretely bring a premium to ethical investors. Furthermore, conducting a matched pair analysis of funds overcomes some of the methodological biases attributable to studies of section 4.3; as it shall be explained in the prelude of the section.

Although differences subsite between the studies, they all partially or entirely rely on conducting time-series regression from a CAPM framework. Thus, all of them are subject to Roll's critique (Roll, 1977, as cited by Van Der Wijst, 2013). It argues that, in a state of market equilibrium where investors hold only a fraction of the mean-variance efficient portfolio and a fraction of the risk-free asset, the efficient market portfolio is unobservable in practice because such a portfolio would need to include all investments from stocks to metals and vintage wines; or real estates and old masters' paintings (Van Der Wijst, 2013, pp 81). Thus, if the efficient market portfolio is truly unobservable, any abnormal performance of real or artificially pooled investment vehicles is de facto questionable. Next, Lehmann & Modest (1987) empirically show that the Jensen's alpha parameter is quite sensitive to the benchmark against which the estimate is computed. In fact, they present results issued from the Arbitrage Pricing Theory framework with parameters being estimated according to four different approaches maximum likelihood, restricted maximum likelihood, instrumental variables and principal component analysis. It follows that estimates on the same model but from different estimation methods lead to very different conclusions about abnormal performance. In addition, comparing those previous results to the usual Jensen's alpha estimate, which is based on the CAPM, also yields quite different conclusions about abnormal performance.

4.2 - Artificially pooled investment vehicles

4.2.1 - Methodological perspective

When evaluating the performance of social market indexes against the performance of unconstrained market indexes, Sauer (1997) and Schröder (2004) denote that this approach is free of several methodological biases whose SRI fund studies suffer. Sauer (1997) states,

The nature of mutual funds inhibits our ability to use a comparison of mutual fund performance as a means for isolating the additional costs that results from applying social responsibility screens.

To illustrate the nature of this problem further, recognize that mutual fund performance does not merely reflect the return to its underlying securities. but rather, also reflects differences in management fees and transaction costs which can vary widely across mutual fund families and stated investment objectives. In addition, mutual fund performance reflects a fund manager's ability to make appropriate decisions concerning asset allocation, sector allocation, and security selection within each sector. Together, these confounding effects make it extremely difficult to rely upon the differences in mutual fund performance to establish the impact that application of social responsibility screens has on investment performance. (Sauer, 1997, p.140)

Simply said, performance evaluation of open-end fund is not only about testing the financial performance of its underlying assets, but also about testing its management quality (Schröder, 2004). Therefore, index analysis is de facto not altered by management fees, transaction costs and management style. Furthermore, such an approach is easier to implement than fund regression analysis because there is no need to control for survivorship-bias and market timing (Schröder, 2004). Finally, it is legitimate to assume that a home-made portfolio of stocks would be methodologically close to the index analysis approach. Yet, by forming eco-efficient portfolios of stocks (Derwall et al., 2005) or selecting firms based on their corporate governance mechanisms (Gompers et al., 2003, Bauer et al., 2004 and Cremers & Nair, 2005) still happens with a supplementary advantage over index analysis. Indeed, the investment universes of SRI and conventional market indexes are not mutually exclusive, whereas constructing portfolios of stocks may contribute to the adjustment of such a bias.

4.2.2 - Social index, eco-efficiency and governance screens

Statman (2000) defines the Domini Social Index (DSI) as

A capitalization-weighted index modeled on the S&P 500 Index. It consists of 400 stocks: approximately 250 S&P 500 companies, approximately 100 non-S&P 500 companies selected to provide industry representation, and approximately 50 non-S&P 500 companies with particularly strong social characteristics. (Statman, 2000, p.30)

Results from comparing the DSI and the S&P 500 based on the Jensen's alpha lead to the conclusion that there is no significant difference in performance between the two market indexes. In addition, comparing the Sharpe ratio between the DSI and the S&P 500 (Sauer, 1997), or between the DSI and the MSCI World Index (Schröder, 2004), also indicates that there is no

significant difference in performance. Results from the Sharpe ratio in Sauer (1997) are even robust to some inference deficiencies; by following the approach of Jobson & Korkie (1981). Yet, estimating the eSDAR¹ on the DSI during the 1990-1998 period, in respect to the S&P 500, yields a negative measure of 0.58% a year, which means that “the DSI’s higher standard deviation detracted from its performance more than its higher returns added to it” (Statman, 2000, p.31). Finally, Schröder (2004) extends the index analysis to 9 other social indexes than the DSI. Overall, only the Calvin Index significantly underperform its 1 and 2-factor CAPM benchmarks, while the other SRI indexes do not exhibit statistically significant difference in the Jensen’s alpha estimate. In conclusion, evidence from analyzing social index performance would suggest that CSR is not priced by financial markets.

Next, Derwall et al. (2005) focus on forming portfolio of US stocks based on their eco-efficiency score. Eco-efficiency can be defined as “the ratio of the value a company adds (e.g., by producing products) to the waste the company generates by creating that value” (see Schaltegger et al., 2003, as cited by Derwall et al., 2005, p.53): this indicator comprises no less than 60 dimensions and it is factor-weighted (Derwall et al., 2005). Results are striking as the average excess return, which is based on a Carhart (1997) time-series regression from a zero-investment portfolio, yields a significant superior performance of 5.06% a year at the 10% level (over the 1995-2003 period): the zero-investment portfolio, or also called difference portfolio, is constructed by taking the difference in return between a portfolio composed of highly eco-efficient firms and a portfolio of low eco-efficient ones. In addition, the significant abnormal performance remains once the sample is controlled for the 2000 technology bubble. Results are also checked for robustness by adjusting the 4-factor model so that industry effects are controlled: the findings remain the same and hence,

Overall, we found that companies that perform relatively well along environmental dimensions collectively provide superior returns. The average return on the Difference portfolio is economically large and statistically significant on a risk-, style-, and industry-neutral basis. In terms of statistical significance, the premium estimate is relatively robust to variations in methodology. Therefore, the results as a whole corroborate the notion that environmentally responsible investing provides benefits. (Derwall et al., 2005, p.58)

¹ See section 3.1.1 for further details.

Of course, those findings raise questions regarding the semi-strong form of the Efficiency Market Hypothesis. In respect to Asset Pricing Theory, the Carhart 4-factor would hence need to be adjusted by an eco-efficiency risk premium in order to adequately price highly eco-efficient firms (Derwall et al., 2005).

Further evidence, which originates from portfolios of stocks that are constructed on other SRI screens than environmental screens only (as defined in Derwall et al., 2005¹), supports the idea that CSR may be priced by financial market. Indeed, it appears that US portfolios built upon discriminating firms with weak shareholder power or high management power (Dictatorship Portfolio), over companies with high shareholder power or weak management power (Democracy Portfolio) tends to produce statistically significant abnormal performances (Gompers et al., 2003). The balance of power between shareholders and managers is proxied by a Governance Index: the higher is the number of anti-takeover provisions adopted by the firm, the higher is the Governance Index for that firm. Companies with a score below 6 belong to the Democracy Portfolio, while firms with a score above 13 belong to the Dictatorship Portfolio. Overall, the Democracy Portfolio yields an alpha estimate, which is computed from a Carhart (1997) time-series regression, significant and positive by 0.29% a month at the 5% level; whereas, the Dictatorship Portfolio does suffer from a significant and negative alpha performance of 0.42% a month at the 5% cutoff. Unfortunately, the authors cannot conclude on the causality of the phenomenon: namely, does the difference in financial performance results from a difference in corporate governance regime, or the opposite? According to Renneboog et al. (2008.a), one may interpret these results as follows:

- Agency costs from the growing adoption of anti-takeover provisions were underestimated by financial market during the 1990-1999 period in the US.
- Managers had access to private information indicating poor future performance, which led the managers to adopt anti-takeover provisions.
- The abnormal performance is due to market inefficiency, as partially assumed in Derwall et al. (2005).

¹ I invite the reader to refer to the original article of Derwall et al. (2005) so that no misinterpretation of the term environmental screen may exist: the authors do refer to a specific form of environmental screen, which is the eco-efficiency.

Finally, Bauer et al. (2004) build upon the study of Gompers et al. (2003) but on a set of European firms instead of US ones. Overall, they find that a similar zero-investment portfolio as in Gompers et al. (2003) also yields an economically superior alpha return performance; however, this performance is neither statistically significant at the 1% or 5% cutoff, regardless of the region of domicile¹.

Last, Cremers & Nair (2005) further extends the work of Gompers et al. (2003) by dividing corporate governance mechanisms into internal governance (shareholder activism) and external governance (corporate control). In their attempt to quantify the degree of development that a firm demonstrates in terms of external governance mechanisms, Cremers & Nair (2005) use two indexes including the Governance Index developed by Gompers et al. (2005). On the other hand, internal governance is measured by the share ownership percentage of institutional blockholders and pension funds. The main findings lead to the conclusion that external and internal mechanisms are complement to one another. In fact, Cremers & Nair (2005) state,

We find that a portfolio that buys firms with high takeover vulnerability and high public pension fund (blockholder) ownership and shorts firms with low takeover vulnerability and high public pension fund (blockholder) ownership generates an annualized abnormal return (alpha) of 10-15%. (Cremers & Nair, 2005, p.2862)

However, such a strategy when public pension funds have a low ownership does not yield a significant abnormal return, regardless of the takeover vulnerability level (Cremers & Nair, 2005). In addition, this complementary relation is also verified whether accounting measures are used such as net profit margin, ROA and ROE (Cremers & Nair, 2005).

4.3 - Real pooled investment vehicles

This section is divided into three main parts because the academic literature on SRI open-end funds undergone three important schisms. Section 4.3.1 reviews studies published between 1992 and 2005, while section 4.3.2 starts with the research article published by Bauer et al. (2005) and it ends with the paper written by Renneboog et al. (2008.b). Then, section 4.3.3 presents advanced studies from 2011 to 2015, while a general conclusion is drawn in section 4.3.4; some of the most recent evidence on green investment funds is also reviewed in this last section.

¹ UK or European Monetary Union (EMU) zone.

Most studies within the first section 4.3.1 rely on comparing the performance of ethical investment funds to the performance of a characteristics-matched sample of conventional portfolios, as initiated by Mallin et al. (1995). Comparing SRI funds against a market benchmark alone has strong limitations. Indeed, Hamilton et al. (1993) state,

We know from many studies that, on average, mutual funds trail broad stock indexes. It is therefore possible that, while socially responsible mutual funds have low excess returns to the NYSE, their returns are higher than the average excess returns of conventional mutual funds. (Hamilton et al., 1993, p.64)

Thus, employing a reference group of traditional funds, along with the usual technique of computing the performance indicator against a market benchmark, appears as a smarter choice. Furthermore, Mallin et al. (1995) insist on the set of traditional portfolios being matched to the set of SRI funds; based on fund characteristics such as age and size. If Mallin et al. (1995) initially believed in controlling for the small cap bias among the ethical trust population, which was early suspected by Luther et al. (1992), Gregory et al. (1997) claim that this approach cannot perform such a task: matching trusts based on their size and age would implicitly mean, “similar sized and aged funds will have similar spreads of investments” (Gregory et al., 1997, p.706). Although, the characteristics-matching methodology has become a major element of the empirical SRI fund literature. In fact, almost every study published after Mallin et al. (1995) relies on such an experiment design because it supposedly isolates any hypothetical abnormal performance from being caused by a difference in cost management. For example, Malhotra & McLeod (1997) support the idea that investors should search for funds with low expenses, which are function of observable information such as fund age, fund size, turnover ratio and cash ratio. Yet, matching ethical and conventional funds based on age and size seems to be a consensus within the academic literature, whereas no consensus has been reached on other characteristics (Climent & Soriano, 2011).

The second section 4.3.2 reports studies that rely on the Carhart 4-factor model of section 3.2; whereas research papers in the first section 4.3.1 mostly focus on the 1-factor CAPM or an extended version of the CAPM controlling for a small cap bias (for examples on the small firm size bias being controlled by a 2-factor model, see Schröder, 2004 or Kreander et al., 2005). Bauer et al. (2005) emphasize on Carhart (1997) as being the current standard methodology in mutual fund research. Given the evidence brought by Fama & French (1992), Fama & French (1993) and

Carhart (1997), anyone could argue that the findings presented in the first section 4.3.1 are supported by deficient methodologies. Yet, ignoring the results yielded by those researches would be an academic mistake because the empirical field of SRI fund performance is still very young: to the best of my knowledge, Luther et al. (1992) and Hamilton et al. (1993) are the first eminent studies, which address the problematic in case of the UK and the US respectively. Next, there is a great difference in methodology between research articles of section 4.3.1 and those of section 4.3.2. Indeed, the earliest articles prefer to analyze fund performance at the individual fund level, while those of section 4.3.2 aim at forming equally-weighted portfolios of funds. Hence, comparing ethical and conventional funds is straightforward for the latter ones because there is no need to compute the average of the performance indicators among the population; and to adjust the corresponding statistical tests. Furthermore, Bauer et al. (2005) conduct a singular method when determining if SRI and traditional portfolios perform any differently: a difference portfolio¹ is constructed by taking the difference in return between the equally-weighted portfolio of ethical funds and the equally-weighted portfolio of non-ethical funds. Again, it has the advantage of producing straightforward statistical tests (assuming that standard errors are corrected for heteroscedasticity and autocorrelation). This method has spread across the SRI literature.

Finally, section 4.3.3 reviews the most recent researches. They are largely inspired by the methodologies of the previous section, characteristics-matching approach; equally-weighted portfolio of funds; and conditional time-varying betas as in Ferson & Schadt (1996). However, Cortez et al. (2012) and Leite & Cortez (2014) also consider time-varying alpha in the spirit of Christopherson et al. (1998)². Moreover, studies in section 4.3.3 are characterized by their authors' wish to mostly investigate international funds, whereas those of section 4.3.2 consider both domestic and international funds separately; except for Renneboog et al. (2008.b). Naturally, they fully embrace the potential of discriminating fund performance in market crises and non-crisis periods (see Muñoz et al., 2014, Nofsinger & Varma, 2014, Lean et al., 2015 and Leite & Cortez, 2015). Most importantly, they capitalize on the trend initiated by Renneboog et al. (2008.b), which consists in differentiating SRI funds based on their screening strategy. As it shall be seen later, findings from the SRI open-end fund literature converge into ethical portfolios yielding an average

¹ It may also be viewed as a zero-investment portfolio with a long buying position on SRI funds and a short selling position on conventional funds.

² See section 3.1.3 and 3.2 for further details.

excess return that is not statistically different than the average excess return of conventional funds; however, this failure in identifying a difference could be caused by previous experiment designs that do not consider SRI funds as a heterogeneous population (Galema et al., 2008).

4.3.1 - Premise studies

Main findings

This review covers 10 different research papers published between 1992 and 2005, which all share two common points. Obviously, the main empirical part of those articles is dedicated to evaluate the financial market performance of individual ethical investment funds through time-series regressions against market benchmarks, before comparing it to the same benchmark performance but derived from conventional investment portfolios. Only 3 papers do not consider evaluating performance of SRI funds against a matched sample of unrestricted ones, but only against a single market benchmark such as the S&P 500, the FTSE All-Share or the Domini Social Index: those are Luther et al. (1992), Cummings (2000) and Schröder (2004). Based on the small number of ethical funds exhibiting a significant Jensen's alpha estimate, either being positive or negative, Cummings (2000) and Schröder (2004) conclude that investing into firms complying to CSR standards does not come with any cost or any reward. On the other hand, Luther et al. (1992) find weak evidence of outperformance for UK funds but the authors believe that it would rather be caused by a small size premium than the ethical feature. Furthermore, Luther et al. (1992) also notice, "it is apparent that any extraordinary performance that ethicals may exhibit is unlikely to be directly attributable to a common strand of uniformly defined ethicality" (Luther et al., 1992, p.61).

Of course, any abnormal performance against a passive-style benchmark could either be driven by the fund's holdings themselves or the managerial abilities of the investment institution, as explained in section 4.2.1. Yet, findings from remaining studies converge with those from Cummings (2000) and Schröder (2004). Indeed, the US study supported by Hamilton et al. (1993) also finds very few significant alphas, as does Gregory et al. (1997) for the UK. Gregory et al. (1997) also show some contrast regarding the statistical significance of the Jensen's alpha estimate, when derived from a cross-sectional regression in the spirit of Fama & McBeth (1973): 20 regressions out of 36 exhibit negative and significant estimates on a dummy variable proxying for the ethical nature of the funds. Kreander et al. (2005) is the only other research presented within

this section that relies on cross-sectional regression. The estimates on an ethics dummy variable are positive, including the one obtained from the UK domestic ethical sample, but not significantly different from zero.

The second common point shared by the research articles that are analyzed in this section relates to the deficiency in the methodology used by their authors to evaluate fund performance¹. Yet, I will now cover the findings when the performance of SRI funds is compared against the performance of characteristics-matched conventional funds. Despite the assumptions issued from the modern portfolio theory and the stakeholder theory², there is very little evidence indicating that ethical portfolios would perform any differently than unrestricted portfolios.

Weak evidence of SRI funds underperforming their conventional peers comes from UK studies only. First, Mallin et al. (1995) hold such a conclusion because of the economic outperformance of their ethical sample vis-à-vis the non-ethical sample. However, no statistical test on the difference of any of the average performance indicator is ever presented in the article. Next, results from a cross-sectional regression in the spirit of Fama & McBeth (1973) lead to the conclusion that UK SRI funds negatively and significantly underperform conventional funds by 0.25% a month at the 5% level (Gregory et al., 1997). On the other hand, results from the same study, but based on estimates from a 1 and 2-factor CAPM, designate the neutral performance hypothesis as the winning hypothesis. Finally, Kreander et al. (2005) conclude their research study by stating that ethical investment funds neither outperform nor underperform traditional investment vehicles. Those findings are robust given that the same conclusion holds in respect to 3 different performance indicators and 4 different countries. Furthermore, Kreander et al. (2005) is by far one of the most advance study presented in this section given that the results are small cap bias and market timing consistent.

Evidence from the US is more straightforward than those from the UK. Hamilton et al. (1993) formulate the problematic as follows: does an investor may do well while doing good? Investigation from US studies (data from 1981 to 2001)³ would indicate that doing well does not

¹ As explained in the prelude of section 4.3.

² See section 2.3 for further details.

³ See table 10 in appendix 6.

imply doing good, but it does not imply doing bad either (see Hamilton et al., 1993, Goldreyer et al., 1999, Statman, 2000, Schröder, 2004 and Bello, 2005). Statman (2000) is among the first study to employ a social market index, the Domini Social Index or DSI¹, when evaluating fund performance. If computing the Jensen's alpha from a 1-factor CAPM with the market portfolio being proxied by the DSI, Statman (2000) obtains slightly better results regarding SRI funds: those results are economically better but remain mostly statistically insignificant. Bello (2005) focuses on the benchmark performance of funds against the S&P 500 and the DSI, separately. The numbers of funds exhibiting significant alphas remain unchanged whether the DSI proxies for the market portfolio. Finally, Schröder (2004) employs no less than 10 SRI indexes. Unfortunately, they are only used to compare index performances and not directly fund performance.

Side findings

Findings indirectly related to the performance problematic have also emerged from the mentioned studies. First, UK researches show the importance of the small size premium when evaluating SRI fund performance. Indeed, Gregory et al. (1997) insist on small UK stocks underperforming big ones from 1989 to 1993. At the same time, domestic ethical UK trusts seem to favor small caps, as already suspected earlier by Luther et al. (1992), meaning that an underperformance of ethical trusts is expected during this period if measures are taken against a general market benchmark. Of course, such a small cap bias is not suspected among a sample of conventional trusts, so that conventional investment vehicles should outperform their matched SRI counterparts. Kreander et al. (2005) fully integrate the outcomes from those findings into their experiment design.

On the other hand, this small cap bias does not appear to be sustained among domestic American ethical funds. Even though Rudd (1981) showed that SRI funds might be carrying an extra-market covariance due to their restricted investment universe, and that it could also result in those funds investing into firms with small market capitalization, Bello (2005) fails to prove so; based on a sample of 42 US domestic ethical funds with data from 1994 to 2001. It does not only appear that diversification might not be harmed by SRI constraints, but also that the mean market capitalization of firms in which funds invest do not differ between ethical and conventional portfolios (Bello, 2005). Furthermore, US ethical funds from 1990 until 2002 are more exposed to

¹ See section 4.2.2 for a formal definition.

a blue chips index than to a small cap index, while the opposite stands for German and Swiss funds (Schröder, 2004). In conclusion, one might state that US SRI funds are not tilted towards small size companies, while European SRI funds, as represented by the UK; Germany; and Switzerland, might be. Second, both Schröder (2004) and Kreander et al. (2005) investigate timing abilities of SRI fund managers: the first research relies on the approach developed by Treynor & Mazuy (1966), whereas the other focuses on the methodology built by Henriksson & Merton (1981)¹. Most of the UK, Swedish, German and Dutch funds show a significant and negative market timing coefficient, in line with results from previous studies on actively managed investment funds (Kreander et al., 2005). However, no difference in the ability to time the market is noticed between the SRI population and the traditional one (Kreander et al., 2005). Findings from Schröder (2004) indicate some contrast between US and European funds, as it is the case for the small cap bias. In fact, the author shows that American SRI fund managers have a neutral timing ability, while German and Swiss counterparts badly time the market.

Conclusion

Studies published between 1992 and 2005 should be analyzed with caution since they are supported by deficient methodologies. If it is not clear whether SRI funds outperform or underperform the usual 1-factor CAPM benchmark and its 2-factor extension accounting for small size premium, it is mostly undoubtful that the market does not price CSR when comparing SRI fund performance to the performance of characteristics-matched conventional funds. Luther et al. (1992) already suspected that any abnormal performance is unlikely to be caused by the ethical dimension itself as this criterion and the screening implementation varies deeply among funds. A more recent article (Galema et al., 2008) directly points at the inability of past studies to discriminate funds based on their screening strategies, which led to a failure to identify any difference in performance between ethical and non-ethical portfolios. Namely, aggregating different dimensions, such as good corporate governance or good environmental inclination, that have confounding effects could be the cause of the failure in identifying differences in performance (Galema et al., 2008). Although such a consideration is widely overlooked by the articles within this section, Goldreyer et al. (1999) somehow appear as precursors. Indeed, the performance of SRI funds using positive screens is compared to the performance of funds using negative screens.

¹ See section 3.1.2 for further details.

Results are striking as the former group outperforms the latter one, regardless of the indicator, and that the t-test on the difference in Jensen's alpha is significant at the 5% level (Goldreyer et al., 1999).

4.3.2 - Performance and investment style

4 articles are covered in this section, published between 2005 and 2008. I recommend the reader to refer to the prelude of section 4.3 to have a better understanding of such a division within the SRI mutual fund performance literature. Naturally, by summarizing the findings of Bauer et al. (2005), Bauer et al. (2006), Bauer et al. (2007) and Renneboog et al. (2008.b), I extend the previous conclusion of section 4.3.1. In addition, new conclusions can be drawn regarding investment style strategies because all those studies rely on the Carhart 4-factor model to some extent. Finally, the reader is welcome to refer to table 11 in appendix 6 to better apprehend the general framework of each study.

Main findings

Although Bauer et al. (2005) find that international German SRI funds significantly perform worse than their 1-factor CAPM and their 4-factor Carhart (1997) benchmarks, by 4.20% and 3.81% a year respectively, no such underperformance is found for the UK and the US. More importantly, Bauer et al. (2005) find that SRI funds do not exhibit alphas that are significantly different from those of conventional funds in neither one of the country under investigation, not even Germany. In addition, estimates are checked for robustness: the 4-factor model is estimated a second time where the returns are gross of management fees. It is needed because descriptive statistics indicate that SRI funds are more expensive than conventional ones (see Bauer et al., 2005). Findings in case of the before fees alphas yield the same conclusion as those with after fees alphas. Namely, Bauer et al. (2005) state, "No evidence of statistically significant difference in return between ethical and conventional mutual fund returns is found after controlling for common factors like size, book-to-market and momentum" (Bauer et al., 2005, p.1766). It is also important to notice the general increase in the adjusted R^2 's when controlling for those factors, compared to the adjusted R^2 's obtained by the single factor CAPM: it proves that the 4-factor model has better explanation power than the usual single factor CAPM.

Assuming that those results could be sample specific, Bauer et al. (2006) capitalize on the work of Bauer et al. (2005) by addressing similar methodologies to a sample of Australian funds,

while Bauer et al. (2007) elaborate on a sample of Canadian funds. Overall, Australian SRI funds, investing either globally or mainly into domestic stocks, do not exhibit different average excess returns than their conventional peers (Bauer et al., 2006). In addition, the same truth holds for domestic Canadian funds (Bauer et al., 2007).

Next, the research article of Renneboog et al. (2008.b) is a highly extensive empirical study, which contains three main experiment parts¹. Results derived from the first part (estimation of several specifications of the Carhart 4-factor model) yield the same main conclusion as in Bauer et al. (2005), Bauer et al. (2006) and Bauer et al. (2007). Namely, ethical funds neither outperform nor underperform conventional counterparts. Moreover, evidence from all sides about the UK and the US converges into this direction. Only a few countries are found to significantly underperform non-ethical funds, which depends on the chosen model. Indeed, the difference in the Jensen's alpha estimate from Carhart (1997), between the ethical and conventional samples, is negative and significantly different from zero for France, Ireland, Sweden and Japan.

In contradiction with the results obtained by Bauer et al. (2007), Renneboog et al. (2008.b) find that SRI Canadian funds failed in performing at least as well as their traditional peers, when estimating a 5-factor version of Carhart (1997). This version of the model controls for size, book-to-market, momentum and a fifth factor which is constructed by taking the difference between an ethical index the risk-free rate. It might be a problem to consider the return of two market indexes over a risk-free rate within the same model because it could be a source of multicollinearity (see Cummings, 2000 for example). Thus, results about Canadian funds could be doubtful. Moreover, the study of Renneboog et al. (2008.b) is subject to two other critics. First, the matching approach, as initiated by Mallin et al. (1995), is not considered for results derived from the Carhart 4-factor model but only for the third part of the experiment. Second, no distinction is made between funds investing globally and funds focusing on domestic stocks as in Bauer et al. (2005), Bauer et al. (2006) or Kreander et al. (2005); the latter specifically states, "International ethical funds are able to overcome constraints on performance by international diversification, while excluding sectors pose a more difficult challenge for domestic ethical fund performance" (Kreander et al., 2005, p.1486). In conclusion, the rare countries from Renneboog et al. (2008.b) in which SRI funds underperform traditional ones could be caused by some methodological bias rather than the ethical

¹ See table 11 in appendix 6.

constraint alone. For example, the equally-weighted portfolios of conventional French funds could contain more funds investing globally than its ethical counterpart, which means that any underperformance of the French SRI portfolio vis-à-vis its traditional peer could be caused by poor diversification rather than the ethical screen itself.

Nonetheless, the second and third part of the experiment designed by Renneboog et al. (2008.b) do not suffer from a matching bias and indicate that SRI funds perform significantly worse than non-SRI funds. As the authors study “the smart money effect”¹ within the SRI industry, the Carhart 4-factor model is estimated a second time using value-weighted portfolios instead of equally-weighted ones. SRI portfolios in continental Europe and Asia-Pacific underperform the factor-mimicking strategies by 5.6% and 6.2% by annum respectively. Thus, Renneboog et al. (2008.b) state,

Investing in socially responsible funds might be not a socially optimal way of committing to ethical considerations. For instance, alternative ways of committing to ethical considerations, such as donating 6% of one’s wealth directly to charities or paying 6% of environmental taxation, may be more cost efficient. (Renneboog et al., 2008.b, p.317)

Those results give explicit support to Friedman’s critic². Then, the cross-sectional estimates of the third experiment part leave the ethical funds significantly underperforming conventional peers by 7% per annum at a confidence level of 1%.

Part of the experiment design in Bauer et al. (2005), Bauer et al. (2006) and Renneboog et al. (2008.b) relates to estimating the Jensen’s alpha on three mutually exclusive subperiods rather than on the all sample period. Bauer et al. (2005) show that German and US ethical funds went into a catching-up period before delivering equal or slightly better returns than those of non-SRI funds. The same learning effect is found for Germany and the US in the article of Renneboog et al. (2008.b). However, such a learning effect does not emerge for the 15 other countries that Renneboog et al. (2008.b) investigate. Finally, Bauer et al. (2006) also find the same effect for domestic Australian funds over the 1992-2003 period.

¹ As the “hot hands” effect refers to the ability of investors to persistently select undervalued stocks, the concept of “smart money effect” means being able to continuously select funds that will outperform in the future.

² See section 2.3 for further details.

Side findings

Findings indirectly related to the performance of open-end funds are covered in this part, such as evidence about investment style strategies. In section 4.3.1, I gather proves carrying the fact that European ethical funds could be tilted towards small size firms but not American funds. Comparing the difference in investment style factors between ethical and conventional investment funds, German and UK SRI portfolios are found to be significantly more exposed to small caps than their traditional peers; although, American SRI funds are significantly less exposed to such a bias in respect to their non-ethical counterparts (Bauer et al., 2005 and Renneboog et al., 2008.b). Moreover, ethical funds in Bauer et al. (2005) are either more growth-oriented or less value-oriented than their conventional peers, regardless of the country in which the funds are domiciled. Such a bias might be caused by “The exclusion of traditional value sectors like chemical, energy and basic industries” (Bauer et al., 2005, p.1762). Surprisingly, domestic Australian ethical funds in Bauer et al. (2006) are found to be significantly more exposed to value stocks than to growth stocks at the 5% level. On the other hand, Renneboog et al. (2008.b), who cover 17 countries worldwide, find very little evidence of both significant exposure to the HML factor and significant difference in this exposure between ethical and traditional investment vehicles. Only Japanese and Canadian SRI funds do exhibit a significantly higher exposure to value stocks than non-SRI funds; at the 1% and 5% levels, respectively. Yet, Bauer et al. (2007) do not gather proves about such a significant bias in case of domestic Canadian funds. Finally, evidence of a difference in the momentum factor exposure is scarce (see Bauer et al., 2005, Bauer et al., 2006, Bauer et al., 2007 and Renneboog et al., 2008.b).

Bauer et al. (2006) and Bauer et al. (2007) show some singular experiment design. In fact, the investment style strategies of the funds are analyzed based on rolling regressions of the Carhart 4-factor model. It allows to obtain so-called recursive coefficient estimates on the factor loadings. A time-series rolling regression simply consists in estimating the same model several times but with a fixed window of time that is updated each time, so that the sample becomes more and more recent. From this experiment, Bauer et al. (2006) obtain the following graphs for international Australian funds:

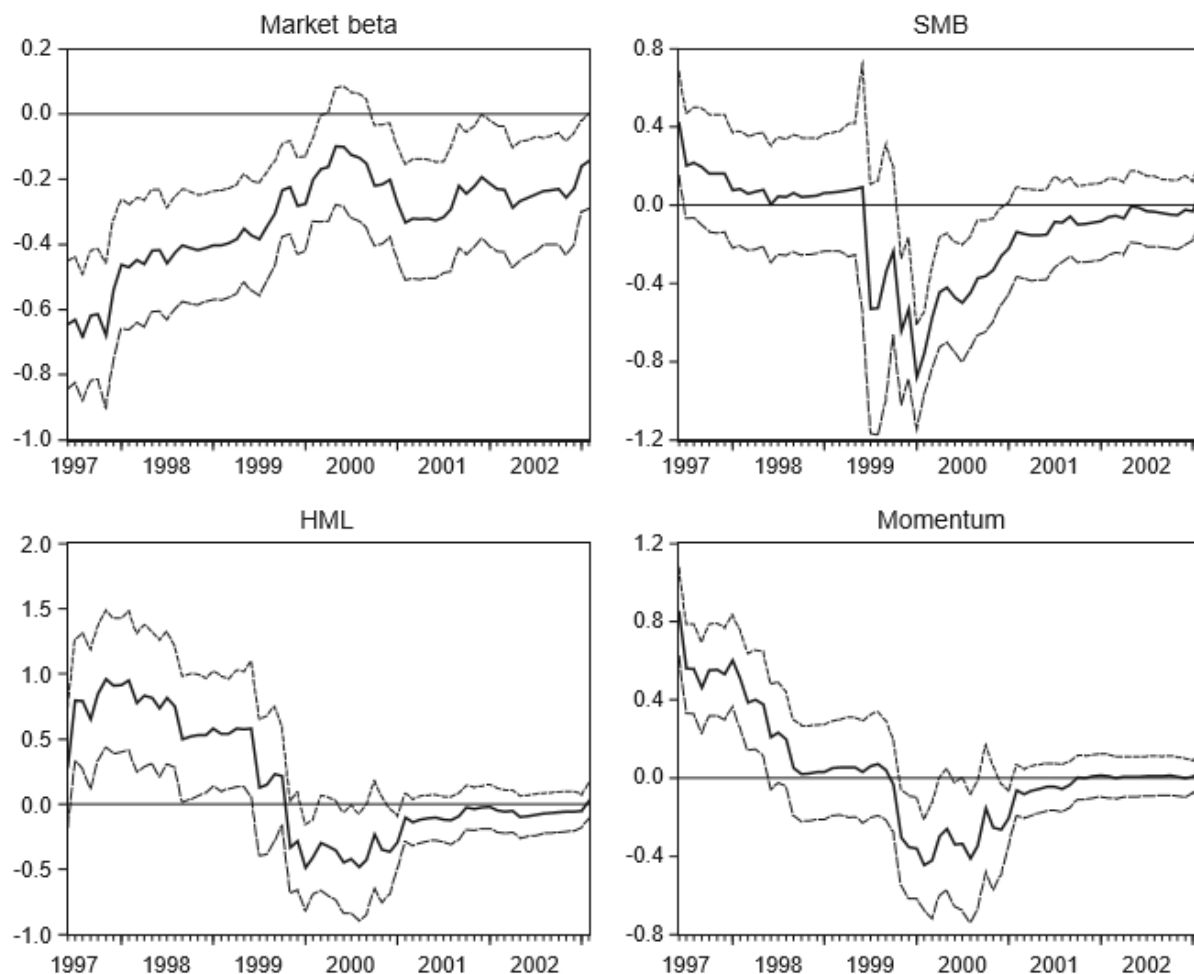


Figure 5 - Source : Bauer et al. (2006, p 45.)

Rolling market beta, SMB, HML and momentum for the difference between Australian international ethical and Australian conventional funds. This figure presents the differences in market beta, SMB, HML and momentum between international ethical and conventional funds over time. These results are obtained by performing 36-month rolling window regressions [using Carhart (1997)]. The solid line gives the estimates, while 95% confidence bounds are presented as dashed lines. (Bauer et al., 2006, p 45)

I would like to strengthen the fact that the estimates come from the difference portfolio. Thus, the graphs show the departures of ethical funds from the investment style strategies, followed by traditional investment vehicles. The results are striking as the 4 recursive coefficient estimates become unprecedently close to the zero-horizontal line over time. Of course, it means that by the beginning of the 21st century, SRI and non-SRI funds cannot be distinguished anymore in terms of investment style strategies anymore. The same picture holds for domestic Australian funds in Bauer et al. (2006), as well as for domestic Canadian funds (see Bauer et al., 2007). Undoubtedly, those

findings raise some questions about the true nature of SRI funds and if they really depart from their conventional peers. Bauer et al. (2007) even conclude, “these observations should be of interest to regulators who oversee the transparency and information dissemination of mutual fund products to investors” (Bauer et al., 2007, p.122). Furthermore, Renneboog et al. (2008.b) find that the adjusted R^2 of ethical funds increased over time; based on the 4-factor model where the sample is split into 3 subperiods. Hence, the authors conclude that SRI fund managers converge to holding the same pool of assets as conventional fund managers - or the other way around. Yet, Bauer et al. (2007) do not investigate the cause of the phenomena but still give a plausible explanation for it. In fact, the authors argue that the shift from negative screening strategies to positives ones, often coupled to a best-in-class approach, would result in SRI funds choosing the “least controversial” companies instead of “good” ones.

Asides from findings related to investment style strategies, Bauer et al. (2005) and Bauer et al. (2007) conduct estimations of the 1-factor CAPM where the market portfolio is proxied by an ethical index. Comparing the adjusted R^2 between the models with an ethical and a broad market index, Bauer et al. (2005) conclude that such a model is not better at explaining fund returns than would the usual CAPM. Furthermore, the market sensitivity to the Jantzi Social Index¹ is slightly higher for conventional funds than for ethical ones (Bauer et al., 2007). Thus, it gives an additional weight to the convergence in investment style theory detailed above. However, the difference in sensitivity to this social index is not statistically different at the usual cutoffs. Then, Renneboog et al. (2008.b) follow the same approach as their colleagues but by enhancing the Carhart (1997) model from an additional ethical factor instead. This factor is not a premium in the strict sense of the term because the excess return of the social index is taken over the risk-free rate and not over a broad general index. Renneboog et al. (2008.b) were expecting their model to explain the large proportion of negative alphas found in their sample. Yet, they conclude, “Adding the ethics factor to the four-factor model has only limited influence on the risk-adjusted returns of ethical funds. Consequently, the underperformance of ethical funds seems not to be driven by a missing ethics style factor” (Renneboog et al., 2008.b, p.309).

¹ Local SRI Canadian stock index

Finally, Renneboog et al. (2008.b) process a conditional version of Carhart (1997)¹. Given that their conditional and unconditional results are very similar they state, “allowing for time-varying risk loadings has little impact on our results on SRI fund performance” (Renneboog et al., 2008.b, p.313). However, Bauer et al. (2006) and Bauer et al. (2007), on Australia and Canada respectively, perform heteroscedastic consistent Wald tests on the joint significance of additional variables resulting from time-varying betas and they reject the null hypothesis at the 5% level each time, regardless of the nature of the fund. Given such evidence, the conditional performance is at the center of my empirical investigation, as it shall be detailed in section 5.

Conclusion

Evidence from Bauer et al. (2005), Bauer et al. (2006) and Bauer et al. (2007) leads to the conclusion that CSR is not priced by financial markets. Jensen’s alpha estimates from time-series regressions - controlling for size, book-to-market and momentum - and their difference between SRI and traditional funds yield the same conclusion for almost all countries under investigation by Renneboog et al. (2008.b). The few negative and significant alphas might be due to other fund characteristics than their ethical nature itself, since the two samples are not matched on any criterion except the country of domicile. Nonetheless, the second and third part of the empirical research undertaken by Renneboog et al. (2008.b) reveal undeniable poor performance of ethical funds when compared against conventional peers. As no distinction is ever done between funds investing locally or globally, the source of this performance remains unsure. In conclusion, I find that there is very little evidence that ethical funds perform any differently than conventional portfolios in terms of average excess return. This conclusion is also drawn from the study review of section 4.3.1.

One might address a similar critic as in section 4.3.1 regarding this neutral performance: research articles reviewed in this section fail to discriminate funds based on the screening strategies, which are pursued by the fund managers. Galema et al. (2008) suspect this gap as being the source of the failure in identifying any difference in average excess return between SRI and non-SRI funds. Though, the third part of the experiment conducted by Renneboog et al. (2008.b) is an exception and it stands therefore as one of the first research to comprehensively tackle such an issue. The cross-sectional regression with time and country fixed effects yields very interesting

¹ See section 3.2 for further details.

results. Indeed, the estimates on dummy variables proxying for “community involvement” and the use of an “in-house SRI research team”¹ are both positive and significantly different from zero. Those results support the hypothesis explained in section 2.3 that the screening process could generate value-relevant information not available to conventional investors. Last, the number of screens negatively influences the risk-adjusted returns and the corresponding estimate is significant at the 10% level (Renneboog et al., 2008.b). Thus, it contrasts with the findings of Barnett and Salomon (2006), presented in section 2.3.

4.3.3 - Market crisis and heterogeneity of SRI screens

This section presents most recent evidence from 7 articles published between 2011 and 2015, which were built upon best practices of section 4.3.1 and 4.3.2. Yet, they also show specific common experiment designs and themes, which are not shared with the research papers of the two previous sections:

- Regression analysis is controlled for market crisis (see Muñoz et al., 2014, Nofsinger & Varma, 2014, Lean et al., 2015 and Leite & Cortez, 2015)
- SRI funds are discriminated upon their screening strategy, which means that ethical funds are rather seen as a heterogeneous population than a homogenous one² (see Climent & Soriano, 2011, Leite & Cortez, 2014, Muñoz et al., 2014, Nofsinger & Varma, 2014 and Leite & Cortez, 2015); thus, it sharply contrasts with previous experiment designs of section 4.3.1 and 4.3.2.
- Conditional performance allowing for both time-varying alpha and betas, in the spirit of Christopherson et al. (1998)³, is estimated (see Cortez et al., 2012 and Leite & Cortez, 2014).
- Market timing and style-timing⁴ analysis is conducted (see Muñoz et al., 2014 and Leite & Cortez, 2015)

¹ I recommend the reader to refer to table 11 in appendix 6 to better apprehend the experiment design in Renneboog et al. (2008).

² In this section, the concept of SRI (sustainable and responsible investment) fund still refers to the broad set of ethical funds, while the term of socially responsible fund refers now to a subset of the ethical population.

³ See section 3.1.3 and 3.2 for further details.

⁴ Style-timing analysis relies on estimating and interpreting the model of Carhart (1997) but with additional quadratic factors in the spirit of Treynor & Mazuy (1966); see appendix 5 for details about the model.

Main findings

Leite & Cortez (2015) algorithmically identify 3 distinguished market crises, the internet bubble (January 2001 to March 2003), the global financial crisis (June 2007 to February 2009) and the euro sovereign debt crisis (May 2011 to May 2012). If the sample is composed of investment funds domiciled in Europe, then the regression analysis is usually controlled for all three market downturns (see Muñoz et al., 2014 and Leite & Cortez, 2015); however, US fund samples are not adjusted in respect to the last crisis (see Muñoz et al, 2014 and Nofsinger & Varma, 2014). Singularly, Lean et al. (2015) control for the global financial crisis only.

Performance as measured by two Jensen's alpha estimates, one proxying for market crisis performance and the other one for non-market crisis performance, yields unprecedented findings. The most optimistic results support the hypothesis that sustainable and responsible investors, in respect to traditional investors, are willing to be granted suboptimal return performance during non-market crisis periods, against a significant and better performance than their conventional peers during market crisis periods (Nofsinger & Varma, 2014). Less optimistic results indicate that ethical funds underperform characteristics-matched conventional ones during non-market crisis times but match their performance during crisis times (Muñoz et al., 2014, and Leite & Cortez, 2015). On the other hand, Lean et al. (2015) show that European SRI portfolios stand as a hedging alternative during market downturns but not Northern American funds; however, no comparison is conducted with conventional funds, which means that the source of the benchmark outperformance could be driven by something else than the SRI screen. In conclusion, empirical results show that ethical fund performance is state-dependent. Some evidence show that people pay greater attention to corporate behavior during poor economic states (Hirshleifer, 2008 and Shefrin & Statman, 1993). Furthermore, there is a stronger demand in actively managed investment funds during market crisis (Glode, 2011) and the Prospect Theory indicates that investors are more negatively impacted by losses than they are positively affected by gains of same amplitude (Kahneman & Tversky, 1979). Therefore, the asymmetric performance of ethical funds seems to have some socio-economic background on which to rely (Nofsinger & Varma, 2014).

By analyzing their sample of US domestic funds upon their screening strategy separately, Nofsinger & Varma (2014) isolate the origin of the state-dependent performance. The authors retain 8 ethical fund categories among which ESG and shareholder advocacy funds. Then, 3

additional groups are created by splitting the ESG category into its three dimensions¹. The matched pair analysis reveals that the asymmetric performance remains significant across both market states for ESG and environmental screening strategies only. On the other hand, social, governance and shareholder advocacy screens enable ethical funds to significantly outperform their matched conventional peers during market crisis periods, whereas the performance is neutral otherwise. The highest outperformance is yielded by the portfolio of governance-focus funds, which exhibits a difference in average excess return of 2.99% a year during poor economic states (significant at the 1% level). Second, the experiment design in Nofsinger & Varma (2014) further separates the [ESG], [ENV], [SOC] and [GOV] investment vehicles based upon their preference towards negative screens or positive/best-in-class approach. Findings sharply indicate that the significant asymmetric performance across both market states, regarding ESG and environmental screens, is caused by positive screens only. The same parallelism holds for social and governance-focus portfolios but during market crisis only. In case of negative screens, neither the alpha estimates computed against the Carhart 4-factor benchmark, nor the difference in those estimates between SRI and traditional portfolios are significant at the usual cutoffs; not even during market downturns. Then, results in Nofsinger & Varma (2014) are checked for robustness by conducting a holding-based analysis: they confirm the previous findings except that the ESG dimension itself and all its individual components (ethical, social and environmental) appear to be significant across both market states; and not the ESG and environmental fund groups only. Finally, Leite & Cortez (2015) aim at separating fund using best-in-class strategy from those relying on negative screens, as in Nofsinger & Varma (2014). Although, Leite & Cortez (2015) find that ethical funds economically outperform matched conventional counterparts during poor economic states, they do not gather evidence that this outperformance is statistically significant in contrast to Nofsinger & Varma (2014). Yet, French SRI funds are found to significantly underperform traditional funds by 0.1107% a month during non-market crisis periods (Leite & Cortez, 2015); however, it is driven by funds relying on exclusionary strategies, whereas fund managers preferring inclusionary strategies perform neutrally across both market states.

Next, Muñoz et al. (2014) incorporate similar experiment designs as in Nofsinger & Varma (2014) and Leite & Cortez (2015): namely, regression analyses are controlled for market downturns

¹ I recommend the reader to refer to table 12 in appendix 6 to fully apprehend the experiment design of Nofsinger & Varma (2014).

and the SRI population is discriminated upon its diverse components. Indeed, Muñoz et al. (2014) investigate whether green investment vehicles perform differently than conventional and ESG investment funds. Overall, they find weaker evidence of state-dependent performance than other studies. In fact, the funds are classified according to their investment universe (domestic US, global US domestic Europe and global Europe) and only global green US funds are found to significantly perform worse than both matched conventional peers and the ESG portfolio during non-market crisis periods; and neutrally otherwise. This statistically significant poor performance against the conventional portfolio even remains when the regression is not controlled for market crisis: the difference is negative by 0.004% a month and significant at the 5% level. Regarding domestic US green funds, Muñoz et al. (2014) find similar results to those of Climent & Soriano (2011): no significant premium is witnessed for domestic US green funds in respect to conventional domestic peers (Climent & Soriano, 2014 and Muñoz et al., 2014) and to socially responsible funds (Climent & Soriano, 2011) or ESG portfolios (Muñoz et al., 2014). Finally, there is stronger evidence of alpha state-dependent performance in case of US ethical portfolios than European ethical ones (Muñoz et al., 2014). However, the US economy might have been more deeply impacted by the 2008 global financial crisis than European economies. Hence, it could explain such different findings (Muñoz et al., 2014).

Then, Cortez et al. (2012) and Leite & Cortez (2014) do not directly control for market crisis downturns as in other studies because their models rely on conditional performance instead of unconditional performance¹. Both research articles are singular because they focus on funds investing globally. In addition, Leite & Cortez (2014) separately consider equity portfolios, which invest mostly into European stocks. Even though Cortez et al. (2012) do not employ a reference group against which to compare SRI fund performance, they find interesting results. Indeed, Austrian and US ethical funds are found to persistently and significantly underperform their benchmark models, conditionally and unconditionally. On the other hand, all other global SRI funds, domiciled either in the UK; Belgium; France; Germany; Italy; or the Netherlands, do not exhibit robust evidence of such underperformance. France is found to significantly underperform its benchmark in one situation only: the equally-weighted portfolio of French ethical investment funds performs significantly worse than its unconditional Carhart (1997) benchmark by 0.345% a

¹ I recommend the reader to refer to section 3.1.3 and 3.2 for details about the conditional CAPM model and the conditional Carhart 4-factor model, respectively.

month, if the market portfolio is proxied by the MSCI All World index. Those findings contrast with Renneboog et al. (2008.b), who find a strong majority of negative and significant SRI alphas against either a conditional or unconditional Carhart (1997) benchmark. Since Renneboog et al. (2008.b) do not differentiate international and domestic funds within their sample, one would legitimately assume that global diversification enables ethical funds to overcome their investment constraint, so that they match the performance of a market benchmark, adjusted for investment style strategies. Early suspicions of this phenomenon were carried by the findings of Kreander et al. (2005). Furthermore, the fund level analysis conducted by Leite & Cortez (2014) reveals that only 35% and 22% of the global and European ethical funds, respectively, exhibit a negative and statistically significant conditional Jensen's alpha estimate.

Last, Leite & Cortez (2014) conclude that no significant difference in conditional performance is found between global SRI funds and characteristics-matched conventional peers: the cross-sectional average difference is never significant in neither one of the category (global EMU¹, global UK and European funds). Moreover, if the regression analysis is not controlled for any market crisis, there is little evidence that CSR is priced at the portfolio level even when discriminating funds upon their screening strategies (see Climent & Soriano, 2011, Muñoz et al., 2014, Nofsinger & Varma, 2014 and Leite & Cortez, 2015). Hence, it is in line with the main conclusion drawn from section 4.3.1 and 4.3.2.

Side findings

I cover in this subsection findings related to investment style, market timing, style-timing and I further elaborate on the parameter estimates from conditional performance models. In Muñoz et al (2014) and Leite & Cortez (2015), investment style; market timing; and style-timing are separately analyzed during poor and good economic market states.

First, US, UK and European global ethical investment funds appear to be significantly biased towards small cap stocks: this effect is robust to several multi-factor specifications² (Cortez et al., 2012). Regarding the book-to-market factor loading, those same investment portfolios appear to favor growth stocks over values tocks (Cortez et al., 2012). Surprisingly, those results reveal

¹ European Monetary Union; see table 12 in appendix 6 for details about the fund categorization based on investment universe in Leite & Cortez (2014).

² See table 12 in appendix 6 for further details on the models used by Cortez et al. (2012).

some misclassification issues among the global SRI population of Cortez et al. (2012) because most of their funds are either labeled as large caps or blend fund. On the other hand, comparing investment styles between international ethical and international traditional investment funds show some contrast. Indeed, international SRI portfolios in Leite & Cortez (2014) are not found to significantly depart from their matched conventional counterparts regarding their book-to-market and momentum factor loadings. In addition, the difference in the local factor, which proxies for an investment bias into domestic stocks, is not found to be different between global ethical and global traditional equity investment vehicles: both conventional and SRI funds are strongly exposed to local investment biases, which results in a difference not being statistically significant. Yet some differences remain. In fact, UK global portfolios appear to exhibit a significant higher exposure to small size firms than their matched non-ethical trusts, while portfolios investing mainly into European stocks depict a tendency to significantly neglect small size caps in respect to their conventional peers (Leite & Cortez, 2014). International French ethical funds are also statistically and significantly less exposed to small caps than their matched non-SRI counterparts (Leite & Cortez, 2015). Last, findings on French funds show that risk exposures are state-dependent (Leite & Cortez, 2015).

Next, splitting portfolios into best-in-class funds and funds using negatives screens lead to the conclusion that the local bias is driven by best-in-class funds: investing internationally means departing away from the information source (Engström, 2003), which could explain why best-in-class funds exhibit a stronger local bias (Leite & Cortez, 2014). Moreover, best-in-class funds are also found to be less exposed to small caps than SRI portfolios relying on exclusionary screens (Leite & Cortez, 2014). The side findings in the review of section 4.3.2 lead to the conclusion that ethical and conventional investment vehicles could hardly be differentiated in terms of investment style strategy anymore. Bauer et al. (2006) suspect the shift of SRI funds from using negative screens to relying on best-in-class approach as being the cause. Therefore, the findings about best-in-class funds of Leite & Cortez (2014) yield some empirical proves on which this idea may stand.

Third, evidence from Muñoz et al. (2014) show that US green fund managers exhibit poor market timing abilities but not poorer than conventional and ESG counterparts, whereas European green fund managers do exhibit worse market timing abilities; in the Treynor & Mazuy (1966)

sense of the term¹. Hence, it further proves what is showed by Schröder (2004): US and European ethical portfolio managers do not have the same ability to time the market. However, French managers of Europe-focus funds possess a better ability to time the market during non-market crisis periods than fund managers of characteristics-matched portfolios: it appears to be driven by funds relying on negative screens, which is consistent with the idea that exclusionary strategies must be compensated by a greater effort in other managerial abilities than stock selection (Leite & Cortez, 2015). Regarding style-timing, US green fund managers are found to have better skills during market crisis times, while European green fund managers show a greater aptitude in style-timing during non-market crisis times (Muñoz et al., 2014). Overall, “it does not appear that SR funds take advantage of their narrower investment universe to implement active management strategies” (Muñoz et al., 2014, p.566). French ethical fund managers also exhibit very weak evidence of such a trend (Leite & Cortez, 2014).

Finally, evidence would suggest that SRI funds are more affected by time-varying betas than a time-varying alpha (Cortez et al., 2012 and Leite & Cortez, 2014). For example, Leite & Cortez (2014) conclude that 94% of the funds within their ethical sample exhibit significant time-varying betas, while only 22% yield a significant time-varying alpha. According to Cortez et al. (2012), SRI screens would help ethical fund managers to intrinsically possess more stable alpha performance because of the good reputation carried by CSR, which protects firms from declining in stock price during market downturns.

Conclusion

Overall, the review of section 4.3.3 converges with the main conclusion of section 4.3.1 and 4.3.2: CSR is not priced at the portfolio level. Yet, performance as measured by the Jensen’s alpha appears to be state-dependent and evidence from domestic US funds would suggest that ESG portfolios yield higher returns than matched peers during market-crisis periods; only if the fund managers favor best-in-class approach over exclusionary screens (Nofsinger & Varma, 2014). On the other hand, considering SRI funds as a homogenous population, rather than analyzing some specific SRI screens, suggests that this performance is neutral during market downturns and negative during non-market crisis times (Muñoz et al., 2014 and Leite and Cortez, 2015). Additionally, conditional performance from global funds indicate that there is no substantial

¹ See section 3.1.2 for details

difference in performance between SRI and traditional funds (Cortez et al., 2012 and Leite & Cortez, 2014).

Regarding investment style, distinguishing both kinds of fund might become harder over time as ethical fund managers are keeping implementing positive and best-in-class screening strategies rather than negative screens. European portfolios are even less exposed to small caps than their traditional counterparts (Leite & Cortez, 2014) consistently with the evidence carried by domestic and international US funds in section 4.3.2; but in contradiction with the evidence yielded by German funds (Bauer et al., 2005 and Renneboog et al., 2008.b) and UK funds (Renneboog et al., 2008.b and Leite & Cortez, 2014). Some evidence would indicate that investment style strategies, market timing and style-timing depend on the state of the economy (Muñoz et al., 2014 and Leite & Cortez, 2015).

4.3.4 - Trends and conclusions

In this section, the main trends and findings from the study reviews of section 4.3.1, 4.3.2 and 4.3.3 are summarized:

- Unconditional performance that is not controlled for market crisis and conditional performance of SRI funds indicate that CSR is not priced at the portfolio level. In addition, analyzing specific ethical screening strategies, such as green, socially responsible, or corporate governance screens for example, does not carry proofs that the resulting performance is different than the performance of the SRI fund population taken as a whole; in contrast with the suspicions carried by Galema et al. (2008).
- Yet, average excess return of ethical funds appears to be state-dependent. Evidence from domestic US funds shows that best-in-class ESG screens can even bring financial rewards during poor economic states, while evidence from international funds is more likely to favor neutral performance during market-crisis periods; in respect to traditional investment portfolios.
- SRI indexes in a 1 or 4-factor framework are not better at explaining SRI fund returns than traditional indexes.
- If the small size firm bias seems to persist across studies and countries, evidence from funds with global investment universe would suggest that this bias is significantly poorer for ethical funds than it is for their characteristics-matched traditional peers. In addition,

domestic and international US funds are persistently less exposed to small size firms than their matched traditional peers; while domestic and/or international UK and German funds are consistently more exposed to small caps than their conventional counterparts.

- There is little evidence that ethical funds exhibit statistically significant and different exposures in the book-to-market ratio and the momentum factors than non-ethical investment funds.
- As ethical funds keep shifting from negative screening strategy to best-in-class approach, it will be harder to distinguish SRI portfolios from unconstrained portfolios; however, it would probably force ethical fund managers to reduce their investment universe to a geographically restrained one because of the information advantage that is needed to implement such strategies.

Overall, there seems to subsist some conflict whether alpha performance is computed in a conditional framework, as in section 3.1.3, or through a regression that is controlled for market downturns¹. The study of Silva & Cortez (2016) offers some clarification because the performance is evaluated in respect to both approaches. On the one hand, conditional estimates on a difference portfolio between global green funds and global SRI funds does not produce statistically significant alphas; regardless of the area in which the portfolios are domiciled (US or Europe). On the other hand, following the “dummy variable” approach of Muñoz et al. (2014); Nofsinger & Varma (2014); and Leite & Cortez (2015), Silva & Cortez (2016) do obtain statistically significant alpha estimates: US global green funds are found to outperform matched SRI ones during crisis periods (neutrally otherwise), while European global green portfolios appear to underperform their matched SRI peers during non-market crisis periods (neutrally otherwise). In conclusion, both methodologies seem to be inclined to deliver different results even regarding the intra-CSR pricing problematic of green and SRI investment funds.

Since the evidence carried about eco-efficiency by the study of Derwall et al. (2005)² and the recent ratification of the Paris Climate agreements, green fund studies should keep flourishing. If the research article of Muñoz et al. (2014) does consider ESG portfolios instead of SRI ones against which to compare the performance of green investment funds, it still depicts some great insights

¹ By either splitting the sample period or incorporating dummy variables.

² See section 4.2.2 for further details.

because both Muñoz et al. (2014) and Silva & Cortez (2016) focus on funds investing internationally. Results carried by Muñoz et al. (2014) show that US green funds do underperform ESG ones during non-market crisis times (neutrally otherwise), while Silva & Cortez (2016) proves that those US green funds statistically outperform SRI ones at the 5% level during market crisis times (neutrally otherwise). At the same time, European green funds do underperform traditional portfolios during non-crisis times (neutrally otherwise) in Silva & Cortez (2016), while Muñoz et al. (2014) show that there is little evidence of the alpha performance being state-dependent in case of global European green investment funds. Hence, one would conclude that investing according to environmental beliefs is priced in case of investment funds domiciled in the US only. More importantly, evidence from domestic and international ESG and green funds (domiciled in the US) has shown that it is possible to do well while doing green (see Nofsinger & Varma, 2014 and Silva & Cortez, 2016). Yet, evidence from renewable energy funds would suggest that green investors face some additional costs instead of superior rewards: Reboredo et al. (2017) show that renewable energy funds (quoted in the US) significantly underperform characteristics-matched corporate and SRI funds, while those funds quoted in Europe also perform worse than corporate funds but not differently than SRI ones.

5 - Empirical evidence from European SRI/ethical funds

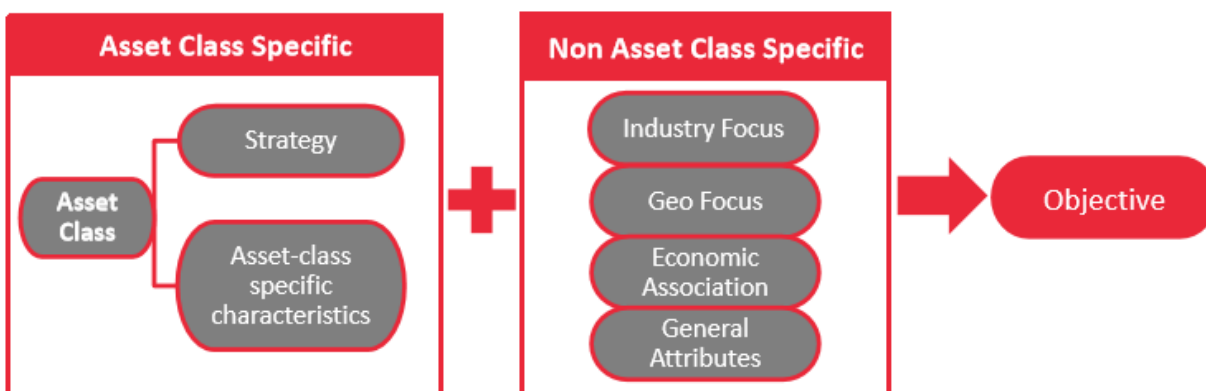
I estimate unconditional and conditional performance of SRI/ethical open-end equity funds domiciled in Belgium, the Netherlands, France and Germany from monthly time-series regressions and compare it to the performance of characteristics-matched conventional funds. All data were collected from a Bloomberg terminal at Université Catholique de Louvain-la-Neuve (ESPO library). Only the returns on the market, the SMB, the HML and the momentum factors were retrieved from Kenneth French's website¹. The SRI fund ticker list was primarily obtained from the Bloomberg fund research engine tool: the final list is provided in appendix 3 along with the ticker list of characteristics-matched conventional funds.

¹ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

5.1 - Data collection

5.1.1 - Bloomberg fund search engine

Before detailing the data collection, I first describe the SRI criteria that I have chosen to retrieve my ethical fund ticker list. Described in the Bloomberg Fund Classifications Guide (Bloomberg Fund Classifications, 2013), the objective of a fund as labeled by Bloomberg results in a consensus of several dimensions and criteria. Here is a graph, obtained from the guide (Bloomberg Fund Classifications, 2013), summarizing the overall process:



*Figure 6 - Source: Bloomberg Fund Classifications (2013)
Labeling process of a fund objective by a Bloomberg terminal*

At first, information related to the asset class of the fund are taken into consideration before more specific information such as the geographical focus are integrated. The features associated to the category named “General Attributes” are of fundamental interest in case of ethical funds. Those of interest in gathering a sample of SRI funds are presented next and the definitions come from the guide (Bloomberg Fund Classifications, 2013):

- Clean Energy: funds investing in securities of companies contributing to less carbon intensive energy production and consumption.
- Climate Change: funds investing in securities of companies facilitating adaptation to the impacts of climate change.
- Environmentally Friendly: funds investing in securities of companies contributing to improving the quality of the environment.

- ESG: environmental, social and corporate governance – fund invests in companies compliant with ESG criteria.
- Socially Responsible: funds investing in securities of companies meeting socially responsible standards.

Restricting the Bloomberg search engine to those criteria - on a sample of active open-end equity funds domiciled either in Belgium, the Netherlands, France or Germany - left me with a set of 130 alive SRI funds as of the 05/07/2017. The time series relative to fund total return and total net assets start in May 2010 and they end in April 2017. I require every fund to have at least 12 months of observation. Thus, 4 ethical funds must be dropped. Once the ticker list of SRI funds had been retrieved, I gathered a list of conventional open-end equity funds domiciled in Belgium, the Netherlands, France or Germany by being sure that the previously identified ethical portfolios were excluded from the investment universe. The same minimum number of observations is imposed to the sample of conventional funds. Hence, 94 funds must be dropped. The print screen of figure 7 was taken from the Bloomberg terminal and it should stand as a proof that the fund samples are mutually exclusive; the minus in front of the general attributes means being excluded.

%) Currency conversion not selected	
Selected Screening Criteria	Matches
Universe Criteria	765241
11) Market Status: Active	345565
12) Fund Primary Share Class = Yes	129975
13) Fund Objective: Equity	35677
14) Fund Type: Open-End Funds	31150
15) Country of Domicile: Belgium,France,Netherlands,Germany	1833
16) General Attribute: -Clean Energy,-Climate Change,-Environmentally Friendly,-ESG,-Socially Responsible	1703

*Figure 7 - Source: Bloomberg terminal 05/07/2017
Conventional open-end funds: initial investment universe*

5.1.2 - Description of the matching methodology: investment objective and size

The academic literature has largely relied on the matching approach to ensure that fund characteristics such as size, age and investment objective do not influence the performance of SRI funds when comparing them to conventional funds¹. The matching method on which I rely consists in assigning 3 conventional funds to each ethical one.

¹ See prelude of section 4.3, section 4.3 itself and tables 10, 11 and 12 in appendix 6 for further details.

First, I ensured that at least 4 conventional funds could be found for each ethical investment vehicle, restricting that they all had the same investment objective as defined by the process in figure 6. It resulted in excluding 9 SRI funds because 4 traditional funds at minimum could not be matched to them. Breaking down the final number of SRI funds by country, my ethical sample is composed of 9 funds domiciled in Belgium, 7 in the Netherlands, 85 in France and 16 in Germany. Those funds must be labeled of at least one of the five “General Attributes” described above. Although, the criteria are not mutually exclusive: for example, the LAZARD EQUITY SRI-C fund has been attributed three labels (environmentally friendly, ESG and socially responsible).

The sample is assumed to be exclusively composed of funds investing globally. Indeed, when restricting the original sample, which includes 130 individuals, to additional constraints accounting for global/international focus such as Eurozone; OECD countries; Multiple Region; etc., the search engine excluded 7 SRI funds only. Given that 6 of them are domiciled in France (out of 85) and 1 in Germany (out of 16), I kept those funds within my sample presuming that results from a global investor’s perspective should not be distorted by a significant local investment bias. The graph of figure 8 shows the different objectives pursued by the portfolio managers among the definitive ethical set of 117 funds. The label names are the original ones except for “Global” and “Other” which regroups the categories “OECD Countries”, “Blend Broad Market”, “Growth Broad Market”, “Foreign Value” and “Natural Resources”, “Energy Sector”, “Blend Large Cap”, respectively. In addition, the “Multiple Region” objective is an original label to which I integrated funds categorized as “North America Region” and “Asia Pacific Region”. Overall, the “Thematic Sector” objective is the predominant fund objective, which is not surprising given its definition in the Bloomberg Fund Classifications Guide (Bloomberg Fund Classifications, 2013),

Funds that invest by following a certain social, economic or corporate, demographic, or other themes that are popular in society. Currently, some popular themes are environmental and clean investing agriculture, infrastructure, religiously responsible, fighting disease, and socially-responsible investing, as well as companies affected by globalization. (Bloomberg Fund Classifications, 2013, p.28)

On the other hand, summing up the percentages of funds classified as either “Eurozone”, “European Region” or “European Union” results in a higher proportion than the percentage of the “Thematic

Sector” slice (39% and 38% respectively). Hence, my sample of ethical funds is strongly biased towards European stocks.

Objectives of SRI/Ethical Open-End Funds

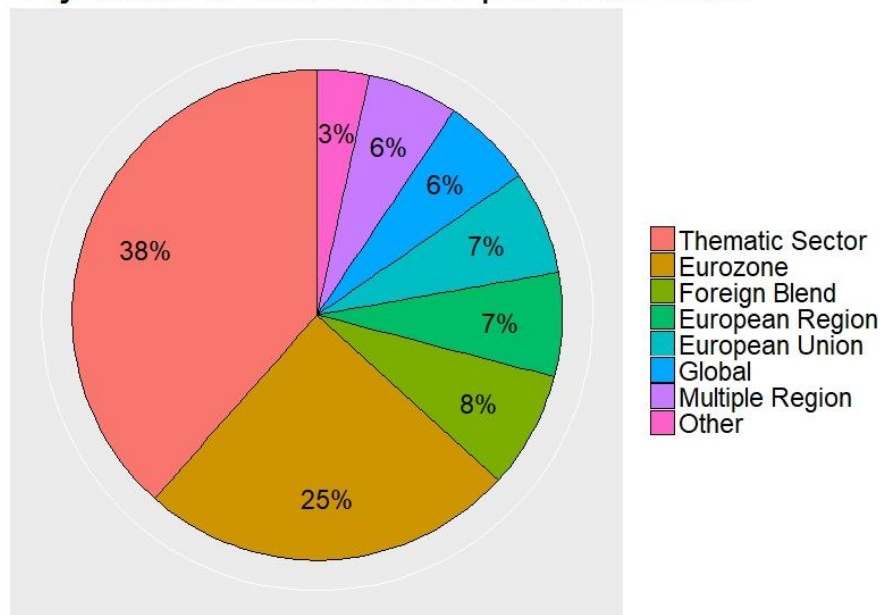


Figure 8

Objectives of SRI/ethical funds as labeled by the Bloomberg process of figure 6.

Second, it is important to notice that the list of investment objectives as defined by Bloomberg is quite far more extensive than the traditional nine-category investment matrix¹. Thus requiring at least 4 conventional funds having the same investment objective as each ethical portfolio might be a stringent constraint for some funds. Consequently, I decided to use only one additional characteristic to match the portfolios: the median over the sample period of the total net asset value. The total net assets of a fund are defined within the Bloomberg system as “the total amount of money invested in the fund and includes cash and securities”. By using the median value, I reduce the probability of obsolete matching outcomes. This characteristic is used so that among all eligible conventional candidates, only the 3 closest ones in terms of median total net asset value - measured as the absolute value of the difference - are finally retrieved. The figure 9 is an attempt to measure the quality of the match based on fund size. No graph exists to depict such an effect, which is why I choose to rely on boxplots: close box heights and close second quantile line (in bold

¹ See <http://www.investopedia.com/articles/basics/06/stylebox.asp> for details.

on the graphs) between conventional and ethical sets should be interpreted as a good matching outcome. Outliers have been removed so that the graphs are clear and because it does not make much sense to discuss about outliers in this situation. From figure 9, one can see that the distribution of the median total net asset value for French and German funds are quite similar between SRI/ethical and traditional portfolios meaning that the matching procedure was successful. Belgian and Dutch boxplots could look somehow disappointing; however, the ethical sets are composed of 9 and 7 investment funds only so that a single value may strongly distort the overall shape of the box. In addition, the pool of conventional funds was also quite smaller in case of those countries than France and Germany. Consequently, the probability of finding 3 investment funds of close asset size to each ethical fund and of same investment objective was considerably reduced.

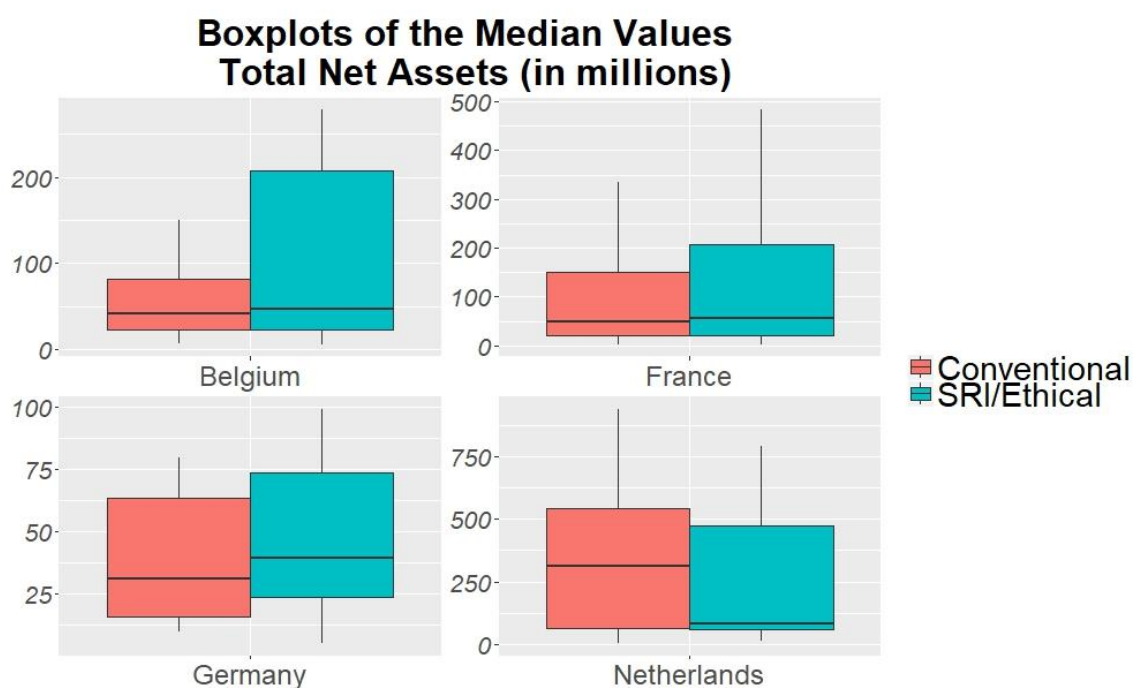


Figure 9

Comparison of interquartile range between conventional open-end funds and ethical open-end funds – segmented by country.

5.1.3 - Returns, factors and information variables

The returns were collected for each of the 117 SRI funds and their characteristics-matched conventional ones. If a traditional fund was matched more than once, I decided to retrieve the returns of such a fund only once. Thus, I gathered data for 231 conventional open-end equity

investment funds (22 Belgian, 15 Dutch, 167 French and 27 German) instead of 351 (3 X 117) portfolios. Next, the return metric I chose to obtain my data is called “Day to Day Total Return (Gross Dividends)” and it is defined within the Bloomberg system as:

One day total return as of today. The start date is one day prior to the end date (as of date). Historically, this is a series of day to day total return values for daily periodicity. Applicable periodicity values are daily, weekly, monthly, quarterly, semi annually and annually. Gross dividends are used.

Hence, by setting a monthly periodicity I collected monthly time-series of returns. They are gross of management fees but net of transaction costs because they are primarily computed from the net asset value of the funds (NAV). To ensure that the returns were inclusive of all capital gains and dividend distributions, I relied on the “Dividend & Corporate Action Settings (DPDF)” when retrieving the data. The DPDF tool may be used to adjust historical financial returns to normal cash distributions, abnormal cash distributions and capital changes (Help Page - Dividend & Corporate Action Settings, 2017). For example, the “Cash Adjustment Abnormal” option enables to control for capital gains, long-term capital gains and short-term capital gains (Help Page - Dividend & Corporate Action Settings, 2017, p.8). Finally, the total returns are expressed in \$USD currency and not continuously compounded. Choosing to express the returns in another currency than €EUR was unavoidable because every time-series factor return I retrieved from Kenneth French’s website is expressed in \$USD. In addition, those factor returns are also not continuously compounded¹.

In section 5.2, I estimate the parameters in the models of equation 14 and 15. Both require to collect proxies for the SMB, HML and Mom explanatory variables. Moreover, it is also needed to have a proxy for the risk-free rate and the market portfolio. Since, I chose to stand from a global investor’s perspective, I withdrew data for global factors instead of European factors; or even North American ones. Though, I also retrieved time-series return on the European market portfolio because my sample is strongly biased towards European Stocks. This additional variable was therefore used to construct a supplementary factor in the Carhart-4 factor model of equation 14 and 15 by taking the difference in return between the European market portfolio and the global one. Several studies do correct their model for a local bias at the country level (see for example Bauer et al., 2006, Cortez et al., 2012 or Leite & Cortez, 2015). Hence, my approach should not be seen

¹ See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_3developed.html

any differently than controlling my sample of international funds for a bias at the continent level. Last, the risk-free rate is the one-month US T-bill rate¹.

The model of equation 15 does not only need the usual factor variables of Carhart (1997) but also the so-called information variables². I used three information variables as in Leite & Cortez (2014): a dividend yield on a global market index, a term spread and a quality spread. I collected all time-series information from a Bloomberg terminal. The dividend yield is based on the FTSE All World Index. As I chose to stand from a global investor's point of view, finding adequate proxies for the term and quality spread might be somehow challenging. The usual approach consists in assuming that the American market proxies for the global one (Cortez et al., 2012). Yet, it might not be such a naïve choice opting for a US benchmark, as demonstrated by Leite & Cortez. (2014). Indeed, they show that proxying information variables by the US slope of the term structure and the US corporate bond spread, in a conditional model in the spirit of Christopherson et al. (1998), is better at explaining European stock returns than proxying information variables by European ones. Moreover, it holds for both ethical and non-ethical investment funds. Therefore, the term spread in equation 15 was approximated by the difference between the annualized "US Generic Govt 10 Year Yield (USGG10YR Index)" and the annualized "US Treasury Yield Curve Rate T Note Constant Maturity 3 Month (H15T3M Index)", as in Leite & Cortez (2014). Then, the corporate bond spread was proxied by the difference between the "USD US Corporate BBB+, BBB, BBB- BVAL Yield Curve" and the "USD US Corporate AA+, AA, AA- BVAL Yield Curve". All information variables were stochastically detrended by subtracting a 12-month trailing average of their own past values: it aims at avoiding spurious regression biases (Ferson et al., 2003).

5.2 - Results

Section 5.2.1 depicts the results from estimating the unconditional version of Carhart (1997), while section 5.2.2 shows the outcomes from estimating its conditional version as in equation 15. Yet, an additional factor was added to both equation 14 and 15 so that the sample is controlled for the European stock bias³: the extra EU variable was obtained by taking the difference in return between the European market index and the global market index. Next, all estimates are

¹ See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_3developed.html

² See section 3.1.3 for further details.

³ Described in section 5.1.2 by figure 8.

obtained by Ordinary Least Squares where the fund returns are constructed by forming equally-weighted portfolios, in excess of the risk-free rate, for each country. Naturally, the market portfolio returns are also computed as excess returns over the risk-free rate. The difference portfolio is obtained by taking the difference in return between the SRI/ethical portfolio and the traditional one. Moreover, the statistical inferences are consistent to heteroscedasticity and autocorrelation: I followed the procedure of Newey & West (1987) as most SRI studies of section 4.3.2 and 4.2.3 (see for example Bauer et al., 2007, Leite & Cortez, 2014 or Nofsinger & Varma, 2014).

The sample period starts in May 2010 and it ends in April 2017. Such a timeframe was chosen to avoid the effects of market crisis as identified by Leite & Cortez (2015)¹. Yet, my sample is not free of the most recent crisis, the euro sovereign debt crisis. However, estimating equation 15 by OLS stands as a robustness check since it allows for both alpha and betas to vary over time². Finally, results of section 5.2.1, 5.2.2 and 5.2.3 were all obtained by using the software R and its integrated development environment, Rstudio. The packages on which I relied are the `lmtest`³, `stats`⁴ and `sandwich`⁵ libraries. The code script aiming at calculating Belgian statistics is provided in appendix 4. Other scripts are available upon request.

Results from the conditional model, presented in section 5.2.2, are divided into two tables. The first one reports the OLS estimate of α_{j0} , the heteroscedastic-consistent Wald tests and the adjusted R^2 's. The p-values of the Wald tests indicate whether the estimates on the cross products between the original variables of equation 14 and the information variables are jointly significant in respect to the unconditional model: W (1) is related to the vector A_j and W (2) to the vectors B_j^a , B_j^b , B_j^c and B_j^d of equation 15. W (3) results from a test on the joint significance of all those parameters. Of course, the additional variable accounting for the European stock bias does not fit equation 15 any differently than the SMB, HML and Mom factors. Hence, the second table reports

¹ The internet bubble (January 2001 to March 2003), the global financial crisis (June 2007 to February 2009) and the euro sovereign debt crisis (May 2011 to May 2012).

² See section 3.1.3 for further details.

³ See <https://cran.r-project.org/web/packages/lmtest/lmtest.pdf> for details.

⁴ See <https://stat.ethz.ch/R-manual/R-devel/library/stats/html/00Index.html> for details.

⁵ See <https://cran.r-project.org/web/packages/sandwich/sandwich.pdf> for details.

the OLS estimates of β_{j0}^a , β_{j0}^b , β_{j0}^c and β_{j0}^d from equation 15, as well as the estimate on the additional factor.

Next, table 8 and 9 of section 5.2.3 report conditional performance as in section 5.2.2 but for green and socially responsible funds only; regardless of the country in which the investment vehicle is domiciled. The funds labeled as green have been attributed a single “General Attribute”, which is either “clean energy”, “climate change” or “environmentally friendly”¹. Then, the socially responsible funds respond to the “socially responsible” criteria as defined in section 5.1.1. It is important to insist on those funds being labelled of one “General Attribute” only so that no confounding effects, as expected by Galema et al. (2008), can parasite the results. To each green and socially responsible fund was matched 3 conventional peers by following the matching procedure described in section 5.1.2. Table 8 and 9 exhibit some specific results on their last line because the estimates are issued from the difference in return between green and socially responsible funds without matching them to one another as in the procedure of section 5.1.2. Finally, as in section 5.2.1 and 5.2.2, I formed equally-weighted portfolios of funds before estimating the corresponding parameters; and the statistical inferences are robust to heteroscedasticity and autocorrelation.

5.2.1 - Unconditional performance

Table 5 below reports the unconditional performance estimates of Carhart (1997). None of the Jensen’s alpha estimate from the difference portfolios is statistically and significantly different from zero, which is in line with the academic literature on SRI open-end funds presented in section 4.3. However, French ethical funds in Renneboog et al. (2008.b) appear to perform significantly worse than traditional funds by 4.08% a year. Yet, most recent evidence on international French SRI portfolios shows that this difference is not significant (Leite & Cortez, 2015). Thus, my findings are consistent with the most recent literature.

¹ See section 5.1.2 for further details.

	Alpha	Market Beta	SMB	HML	Mom	EU	Adj R ²
<u>Belgium</u>							
SRI/ethical	-0.201***	1.008***	0.011	-0.012	-0.037*	0.445***	0.9866
Conventionnal	-0.162**	1.035***	0.176***	-0.066	-0.056	0.388***	0.9800
Difference Portfolio	-0.039	-0.027	-0.165***	0.054	0.018	0.057*	0.0842
<u>The Netherlands</u>							
SRI/ethical	-0.044	0.995***	-0.138***	-0.024	-0.042	0.504***	0.9858
Conventionnal	0.074	0.937***	0.124*	-0.065	-0.099**	0.610***	0.9423
Difference Portfolio	-0.118	0.058	-0.262***	0.042	0.056	-0.106**	0.1094
<u>France</u>							
SRI/ethical	-0.169**	1.015***	-0.068**	0.004	-0.031*	1.055***	0.9809
Conventionnal	-0.102	0.952***	0.153***	-0.013	-0.070***	0.988***	0.9831
Difference Portfolio	-0.067	0.063***	-0.221***	0.017	0.039	0.067**	0.4469
<u>Germany</u>							
SRI/ethical	-0.222***	1.022***	0.120*	-0.127***	-0.047	0.534***	0.9623
Conventionnal	-0.137***	0.950***	0.008	-0.057	-0.045	0.477***	0.9683
Difference Portfolio	-0.085	0.073***	0.112**	-0.070*	-0.002	0.057	0.2829

Table 5 reports the OLS estimates (alpha and betas) of the unconditional performance model of equation 14, with an additional factor controlling for a bias towards European stocks. Returns are computed monthly from May 2010 until April 2017 and the difference portfolio is obtained by taking the difference in return between the equally-weighted portfolio of SRI/ethical funds and the equally-weighted portfolio of conventional funds. Following the procedure of Newey & West (1987), the statistical inferences are consistent to heteroscedasticity and autocorrelation. *, ** and *** denote significant p-value at the 10%, 5% and 1% levels. The adjusted R² comes from equation 14.

Then, except Dutch and conventional French funds, each equally-weighted portfolio underperforms the 5-factor benchmark. Over the 1997-2008 period, Cortez et al. (2012) find that global ethical funds domiciled in France underperform an unconditional 5-factor benchmark¹, while those domiciled in the Netherlands perform neutrally. Hence, my results about French and Dutch funds over the 2010-2017 period match those of Cortez et al. (2012), whereas those about

¹ The fifth factor being a local premium; see table 12 in appendix 6.

Belgian and German ethical funds differ. Since my sample of Dutch ethical funds is composed of 4 index funds out of 7 SRI funds, it is not surprising to witness a neutral benchmark performance¹. Yet, international German SRI funds in Bauer et al. (2005) and global French SRI funds in Leite & Cortez (2015) are also found to significantly underperform an unconditional Carhart (1997) benchmark.

Regarding the HML and Mom factor exposures, I find very little evidence of statistical difference in exposures between SRI and characteristics-matched peers: only German ethical funds appear to be more exposed to growth stocks than their conventional counterparts, at the 10% level only. Next, only German SRI funds are found to be significantly more exposed to small size firms, while other SRI funds somehow favor big size stocks. Those results are in line with the academic literature. On the one hand, German SRI funds in Bauer et al. (2005) and Renneboog et al. (2008.b) exhibit a stronger small size firm bias than traditional portfolios. On the other hand, the study of Renneboog et al. (2008.b) covers 17 countries worldwide and such a difference in the SMB exposure is found only for Germany, the US, Canada and Japan; not Belgium, the Netherlands or France. In addition, Leite & Cortez (2014) gather evidence that ethical portfolios with a European investment universe are less exposed to small caps than their characteristics-matched conventional peers. Consequently, my estimates are in line with the academic literature. Finally, ethical funds in Belgium, the Netherlands and France are more exposed to European stocks in respect to traditional investment funds. If Leite & Cortez (2014) find that global ethical funds are biased towards domestic stocks, they cannot argue that this difference is significant with traditional funds. Yet, my findings do support such a difference in exposure to a European factor. One might argue that not only best-in-class funds need an information advantage² to operate, but each SRI fund does.

5.2.2 - Conditional performance

Tables 8 and 9 below result from estimating the conditional Carhart (1997) model, in the spirit of Christopherson et al. (1998):

¹ There is only one remaining index fund in my sample, the French socially responsible fund AVILRSA FP Equity.

² As explained in Engström (2003).

	Alpha	W (1)	W (2)	W (3)	Adj R ²
<u>Belgium</u>					
SRI/ethical	-0.119	0.8328	0.0000	0.3933	0.9850
Conventionnal	-0.174***	0.0071	0.0000	0.0000	0.9827
Difference Portfolio	0.055	0.5026	0.0000	0.0000	0.2004
<u>The Netherlands</u>					
SRI/ethical	-0.093	0.3775	0.0000	0.0000	0.9858
Conventionnal	-0.112	0.8009	0.0000	0.0000	0.9432
Difference Portfolio	0.019	0.7950	0.0000	0.0000	0.1817
<u>France</u>					
SRI/ethical	-0.163	0.5681	0.0005	0.0000	0.9786
Conventionnal	-0.075	0.3788	0.0000	0.0000	0.9838
Difference Portfolio	-0.088	0.5672	0.0000	0.0000	0.3968
<u>Germany</u>					
SRI/ethical	-0.340***	0.9681	0.0000	0.0000	0.9596
Conventionnal	-0.194***	0.4304	0.0000	0.0000	0.9651
Difference Portfolio	-0.146	0.9900	0.0000	0.0000	0.3370

Table 6 reports the OLS Jensen's alpha estimate of the conditional performance model of equation 15, with an additional factor controlling for a bias towards European stocks. Returns are computed monthly from May 2010 until April 2017 and the difference portfolio is obtained by taking the difference in return between the equally-weighted portfolio of SRI/ethical funds and the equally-weighted portfolio of conventional funds. Following the procedure of Newey & West (1987), the statistical inferences are consistent to heteroscedasticity and autocorrelation. *, ** and *** denote significant p-value at the 10%, 5% and 1% levels. The heteroscedastic and autocorrelation consistent Wald tests are also reported. W (1) tests the hypothesis that additional factors resulting from the time-varying alpha are jointly equal to zero. W (2) tests the hypothesis that additional factors resulting from the time-varying betas are jointly equal to zero. W (3) tests the hypothesis that additional factors resulting from both the time-varying alpha and time-varying betas are jointly equal to zero. The adjusted R² comes from equation 15.

The conditional alpha estimates on the difference portfolios remain statistically insignificant as in section 5.2.1. My findings are in line with those of Leite & Cortez (2014) and thus indicate that CSR is not priced at the portfolio level. Both ethical and conventional German funds still significantly underperform their benchmark, whereas the significant benchmark underperformance from Belgian and French SRI funds is removed. Comparing results between

estimates from an unconditional 5-factor model and a conditional 4-factor one, Cortez et al. (2012) also found that the significant poor French performance disappears. Regarding the joint significance of the additional factors resulting from conditional performance, only Belgian conventional funds exhibit statistical significance of a time-varying alpha; while the null hypothesis of time-constant betas can always be rejected at the 1% level. Consequently, I do find more evidence of time-varying betas than a time-varying alpha, which is in line with the academic literature (See Bauer et al., 2006, Bauer et al., 2007, Cortez et al., 2012 and Leite & Cortez, 2014).

Next, Cortez et al. (2012) state that conclusions about investment style analysis barely differ whether they are yielded by unconditional performance models or conditional ones. It does appear to hold for my findings regarding the HML and Mom factors. Then, estimates of the conditional SMB factor are very close to those of the unconditional SMB factor, except for Germany: German SRI funds cease to be more greatly exposed to small caps than conventional funds, when being evaluated in a conditional framework. If Bauer et al. (2005) and Renneboog et al. (2008.b) show that this bias is true in an unconditional scheme, results from the conditional Carhart (1997) model, in the spirit of Christopherson et al. (1998), would suggest to be more cautious. Finally, every difference in the European factor exposure identified in the previous section is removed. My unconditional findings about the EU factor of section 5.2.1 do differ from those of Leite & Cortez (2014) about international funds being biased towards domestic stocks; however, the model used by Leite & Cortez (2014) is a 5-factor conditional one. Therefore, my results seem to suggest that no significant difference in exposure to European stocks exists between SRI and conventional funds; if yielded by a conditional model, which is consistent with Leite & Cortez (2014) about the insignificant difference in exposure to domestic stocks.

	Market Beta	SMB	HML	Mom	EU
<i>Belgium</i>					
SRI/ethical	1.000***	0.055	-0.008	-0.059	0.448***
Conventionnal	0.980***	0.160***	-0.086	-0.052*	0.427***
Difference Portfolio	0.019	-0.105*	0.078	-0.006	0.021
<i>The Netherlands</i>					
SRI/ethical	1.019***	-0.086**	0.006	-0.010	0.544***
Conventionnal	0.945***	0.106**	-0.014	-0.049	0.639***
Difference Portfolio	0.074***	-0.191***	0.020	0.040	-0.094
<i>France</i>					
SRI/ethical	0.983***	-0.116*	0.032	-0.004	1.072***
Conventionnal	0.893***	0.100***	0.039	-0.028	1.044***
Difference Portfolio	0.090***	-0.216***	-0.006	0.024	0.028
<i>Germany</i>					
SRI/ethical	1.005***	0.036	-0.092	0.010	0.411***
Conventionnal	0.960***	-0.007	-0.012	-0.020	0.478***
Difference Portfolio	0.045***	0.043	-0.081*	0.030	-0.067

Table 7 reports the OLS beta estimates of the conditional performance model of equation 15, with an additional factor controlling for a bias towards European stocks. Returns are computed monthly from May 2010 until April 2017 and the difference portfolio is obtained by taking the difference in return between the equally-weighted portfolio of SRI/ethical funds and the equally-weighted portfolio of conventional funds. Following the procedure of Newey & West (1987), the statistical inferences are consistent to heteroscedasticity and autocorrelation. *, ** and *** denote significant p-value at the 10%, 5% and 1% levels.

5.2.3 - Green and socially responsible investment funds

Table 8 and 9 below report the estimates from the conditional Carhart (1997) model for portfolios of green and socially responsible funds; the unconditional alpha of the Carhart 4-factor model is also reported in table 8.

	Alpha_{UC}	Alpha_C	W (1)	W (2)	W (3)	Adj R^2
Green (1)	-0.425***	-0.418**	0.3916	0.0000	0.0000	0.9582
Conventiional	-0.288***	-0.291***	0.0805	0.0000	0.0000	0.9558
Difference Portfolio	-0.137	-0.127	0.0021	0.0000	0.0000	0.2354
Socially Responsible (2)	-0.198***	-0.199***	0.3186	0.0000	0.0000	0.9824
Conventiional	-0.116*	-0.112	0.3343	0.0000	0.0000	0.9829
Difference Portfolio	-0.082*	-0.087	0.9561	0.0000	0.0176	0.3587
(1)-(2)	-0.227*	-0.219	0.0117	0.0000	0.0000	0.4589

Table 8 reports the unconditional (Alpha_{UC}) and conditional (Alpha_C) OLS Jensen's alpha estimates of equation 14 and equation 15, respectively; with an additional factor controlling for a bias towards European stocks. Returns are computed monthly from May 2010 until April 2017 and the difference portfolio is obtained by taking the difference in return between the equally-weighted portfolio of SRI/ethical funds and the equally-weighted portfolio of conventional funds. Following the procedure of Newey & West (1987), the statistical inferences are consistent to heteroscedasticity and autocorrelation. *, ** and *** denote significant p-value at the 10%, 5% and 1% levels. The heteroscedastic and autocorrelation consistent Wald tests are also reported. W (1) tests the hypothesis that additional factors resulting from the time-varying alpha are jointly equal to zero. W (2) tests the hypothesis that additional factors resulting from the time-varying betas are jointly equal to zero. W (3) tests the hypothesis that additional factors resulting from both the time-varying alpha and time-varying betas are jointly equal to zero. The last line of the table was obtained from the difference in return between the equally-weighted portfolio of green funds and the equally-weighted portfolio of socially responsible funds, without matching the funds to one another. The adjusted R^2 comes from equation 15.

Interpreting the unconditional alphas on the difference portfolios leads to the conclusion that socially responsible funds significantly underperform characteristics-matched conventional funds by 0.082% a month at the 10% level, while they significantly outperform the equally-weighted portfolio of green funds by 0.227% a month at the 10% level. On the other hand, green funds are not found to come with any reward or cost, in respect to their matched conventional peers: this result is in line with those from the unconditional Carhart (1997) model about global European green funds during the 1994-2013 period (see Muñoz et al., 2014); and even domestic US green funds during the 2001-2009 period (Climent & Soriano, 2011).

Yet, estimating conditional alphas based on three lagged information variables, a dividend yield; a term spread; and a quality spread, indicates that neither green nor socially responsible funds

perform differently than their matched traditional peers. Furthermore, the difference in performance between the green portfolio and the socially responsible portfolio is also removed when measuring the Jensen's alpha in a conditional framework: this result is in line with findings by Silva & Cortez (2016). If there is little evidence of time-varying alphas, as in section 5.2.2, the joint significance of the additional variables resulting from both the time-varying alpha and the time-varying betas cannot be rejected at the 5% in any case. Hence, it appears to be crucial to consider the conditional performance and not the unconditional one when estimating the average excess return of green and socially responsible investment funds.

	Market Beta	SMB	HML	Mom	EU
Green (1)	0.991***	0.191**	-0.054	0.041	0.305***
Conventional	0.971***	0.260***	0.014	-0.107	0.349***
Difference Portfolio	0.021	-0.069	-0.067	0.148**	-0.044
Socially Responsible (2)	1.008***	-0.116*	0.043	-0.000	0.917***
Conventional	0.908***	0.089**	0.010	-0.031	0.910***
Difference Portfolio	0.100***	-0.205***	0.032	0.031	0.008
(1)-(2)	-0.017	0.307***	-0.096	0.041	-0.612***

Table 9 reports the OLS beta estimates of the conditional performance model of equation 15, with an additional factor controlling for a bias towards European stocks. Returns are computed monthly from May 2010 until April 2017 and the difference portfolio is obtained by taking the difference in return between the equally-weighted portfolio of SRI/ethical funds and the equally-weighted portfolio of conventional funds. Following the procedure of Newey & West (1987), the statistical inferences are consistent to heteroscedasticity and autocorrelation. *, ** and *** denote significant p-value at the 10%, 5% and 1% levels. The last line of the table was obtained from the difference in return between the equally-weighted portfolio of green funds and the equally-weighted portfolio of socially responsible funds, without matching the funds to one another.

Regarding investment style, the green portfolio is more exposed to the momentum factor than the matched portfolio but none of them exhibits a significant exposure to the factor itself. Next, socially responsible funds are statistically and significantly more exposed to big size firms than both the matched and the green portfolio: Silva & Cortez (2016) also found that global European green funds are more exposed to small size firms than a portfolio of SRI funds.

Interestingly, each portfolio shows a significant bias to European stocks and green funds are significantly less exposed to such a bias on respect to socially responsible funds.

6 - Conclusion

Before drawing a general conclusion, I would like to disclose two shortcomings regarding my empirical investigation. On the one hand, neither my SRI nor my conventional sample of open-end investment funds is survivorship-bias free. Hence, the average excess return of the equally-weighted portfolio of funds could be overestimated. In fact, it is known that analyzing a sample that does not contain any dead fund may overestimate the Jensen's alpha performance: Grinblatt & Titman (1989) show that this bias can result in a performance that is higher by 0.5% a year. Yet, as neither one of the sample is free of this bias, it is rational to assume that the average excess return on the difference portfolio is less likely to suffer from such an overestimation. Furthermore, only 7 research papers (out of 21) that are covered in section 4.3 do exhibit survivorship-bias free results. Second, I matched SRI and conventional funds based on investment objective and size, whereas some studies also consider fund age. In addition, from Gregory et al. (1997); Kreander et al. (2005); and Renneboog et al. (2008.b), anyone would legitimately assume that age has proven to be a more effective matching criterion than size. However, matching my samples based on both size and age would not only have implied some tradeoffs between those two criteria, but it would also have required to manipulate data about the inception dates of the funds: unfortunately, this task could not be performed as easily as it had been for the size variable. In fact, the total net assets data could easily be retrieved from a Bloomberg terminal in a time-series format, whereas inception dates should have had to be processed one by one.

Despite the arguments carried by the modern portfolio and the stakeholder theories, my results indicate the Corporate Social Responsibility is not priced at the portfolio level, which is in line with the findings produced by the academic literature since Luther et al. (1992) and Hamilton et al. (1993). Comparing results between the unconditional and the conditional model - both controlling for size, book-to-market ratio, momentum and a European local factor - yields some interesting findings. First, even if the equally-weighted portfolio of socially responsible funds appears to unconditionally underperform characteristics-matched conventional peers, while unconditionally outperforming the equally-weighted portfolio of green funds, those pieces of evidence about CSR pricing vanish once the average excess return is computed in a conditional

framework. Even if the academic literature has shown that the alpha performance of ethical funds could be state-dependent, conditional performance (alpha and/or betas time-varying parameters) has failed to prove that SRI funds could either outperform nor underperform conventional portfolios; at least to the best of my knowledge. Therefore, the results of section 5.2.2 and 5.2.3 correspond to those yielded by the academic literature. Second, several studies have shown that German ethical funds favor small caps over big size firms (Schröder, 2004, Bauer et al., 2005 and Renneboog et al., 2008.b). Yet, my unconditional results do support such a hypothesis but the conditional SMB estimate on the German difference portfolio shows otherwise. In conclusion, time-series regression analysis of average excess return and investment style strategies should be conducted through a conditional scheme as developed by Ferson & Schadt (1996) or Christopherson et al. (1998); especially when analyzing the SRI population as a heterogenous population rather than a compact one.

7 - Bibliography

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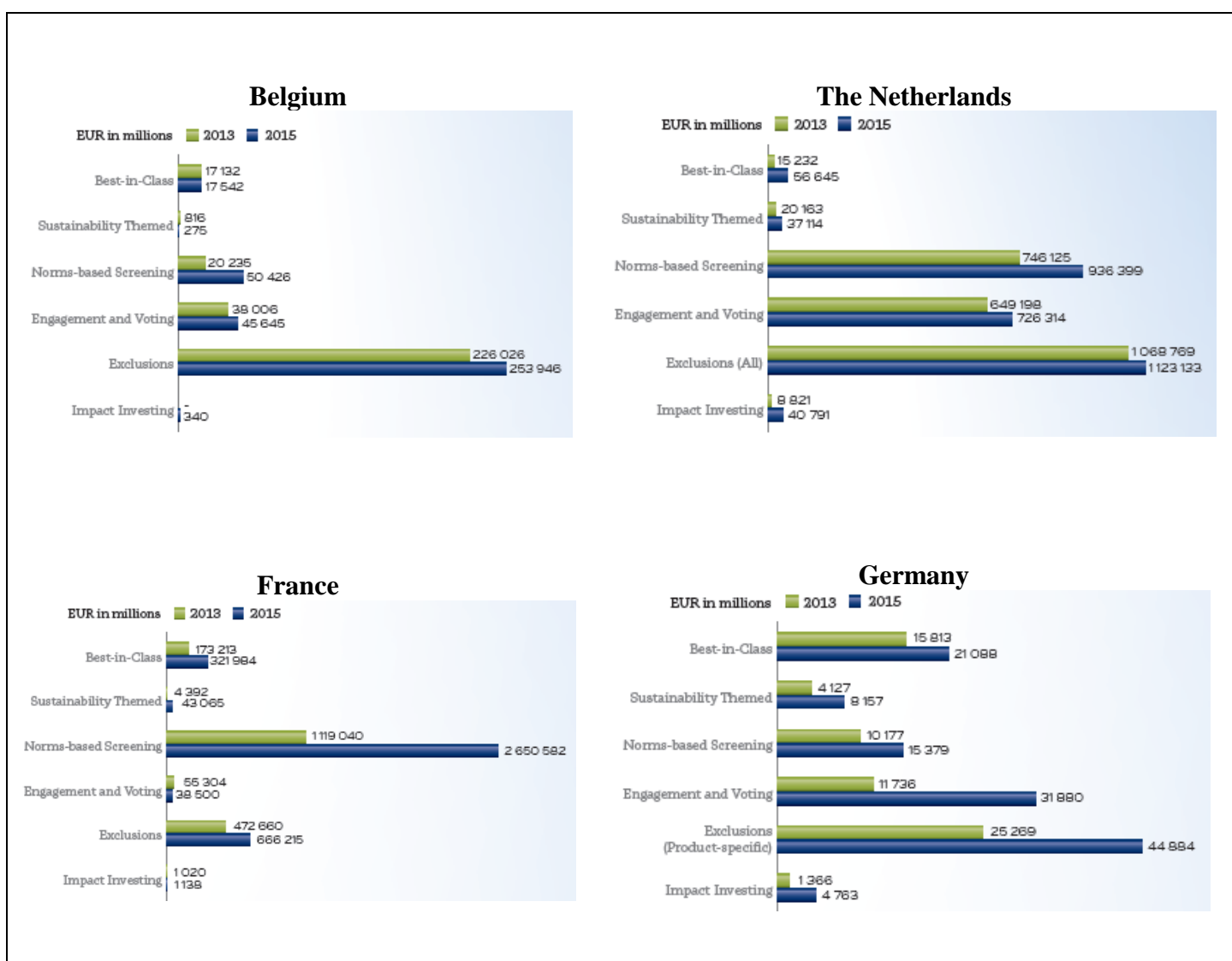
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8 - Appendices

✚ Appendix 1: SRI strategies in Europe (Eurosif, 2016, pp. 63; 71; 75; 83)



✚ Appendix 2

Reviewing the work of Fama (1970), Van Der Wijst (2013) compactly describes the Efficient Market Hypothesis:

- *Weak form market efficiency occurs when all past price histories are fully reflected in current prices.*
- *Under the semi-strong form of the market efficiency current prices fully reflect all publicly available information: in addition to price histories this includes financial statements, articles in the (financial) press, product-, industry- and macroeconomic data, etc.*
- *A market is strong form efficient if all information is reflected in current prices, including private and inside information. (Van Der Wijst, 2013, p.99)*

✚ Appendix 3

SRI fund ticker list

KBEEEUC BB Equity;KBC6733 BB Equity;BAC6167 BB Equity;FNI4520 BB Equity;PAMEETH BB Equity;BAC6413 BB Equity;BAC6220 BB Equity;KECLICG BB Equity;KBE2028 BB Equity;PERAVEN FP Equity;FEDETHI FP Equity;FGFEDEN FP Equity;ODDGENC FP Equity;HPERENV FP Equity;STHOPME FP Equity;LOBETHQ FP Equity;AGFFIDA FP Equity;SYSEREI FP Equity;SELVINGT FP Equity;LBPENVD FP Equity;AGFEUAC FP Equity;NSMCRET FP Equity;MACMGAC FP Equity;MEESAET FP Equity;EURETHI FP Equity;CMPLNTF FP Equity;AAZEIRA FP Equity;B2VAISR FP Equity;AGFOPID FP Equity;COVEAFI FP Equity;ECURLLE FP Equity;POETHIC FP Equity;MACRDRC FP Equity;OFISMBE FP Equity;ISCERAC FP Equity;CATOUDU FP Equity;CAIFRPC FP Equity;ATTFUTC FP Equity;LFPLEDD FP Equity;METHPAR FP Equity;HUMFAEI FP Equity;MEESAEN FP Equity;IMESAEU FP Equity;ECDEDUI FP Equity;MACMGEC FP Equity;FEDFREU FP Equity;AXAEUNC FP Equity;UNIFRAN FP Equity;ETENVIR FP Equity;OFIMLEA FP Equity;ACTFRAN FP Equity;MADUSOL FP Equity;COCEPET FP Equity;MAIT100 FP Equity;SICEURS FP Equity;FIEUCAP FP Equity;CCRAMVR FP Equity;LBPRAEI FP Equity;RGACTFR FP Equity;FRACTFP FP Equity;PROBTPR FP Equity;MACRODC FP Equity;LFRATSI FP Equity;IIEDYIC FP Equity;BNPAPSA FP Equity;CACDURA FP Equity;CDCINSE FP Equity;AGDASIR FP Equity;FEDPAIE FP Equity;AVILRSA FP Equity;FIMEUOP FP Equity;EXPEXDU FP Equity;INDEURO FP Equity;BNPRFIX FP Equity;BNPAQUI FP Equity;CMVALTH FP Equity;TAITAAZ FP Equity;METVSRI FP Equity;AXALEAA FP Equity;SGEUETH FP Equity;CPRPDEP FP Equity;CPRIISR FP Equity;BNPMIRE FP Equity;LBPACTA FP Equity;BNPETHE FP Equity;RETRIAT FP Equity;MASDVDU FP Equity;FQETWRC FP

Equity;PALENRN FP Equity;OSSESG1 FP Equity;AGMODUD FP Equity;BPPEE18C FP Equity;ECDEP90 FP Equity;DYNAUSC FP Equity;LBBWNAC GR Equity;EBSUEUI GR Equity;DEKUICF GR Equity;AMPGPAE GR Equity;BNYPNDN GR Equity;GLWSBWI GR Equity;UIGLSAA GR Equity;STFUNAR GR Equity;KCDAKTI GR Equity;WARZUKS GR Equity;BKCANKI GR Equity;GERLG21 GR Equity;NDGLBID GR Equity;DWSZURE GR Equity;DWSKLIM GR Equity;MEAGNAE GR Equity;NTEMESA NA Equity;SUSEUID NA Equity;SNSREUE NA Equity;SUSWLIN NA Equity;NNDZA NA Equity;DDEFARA NA Equity;NTWCEAE NA Equity.

Matched conventional fund ticker list

KIEESMC BB Equity;KBC7075 BB Equity;KBN2029 BB Equity;AMO7903 BB Equity;SIV2741 BB Equity;TRUNFC BB Equity;SIV2720 BB Equity;KBCHIDV BB Equity;AXAEQEC BB Equity;AMO7908 BB Equity;AMO7906 BB Equity;LCFL100 BB Equity;KBI8985 BB Equity;PIIFPAC BB Equity;KEA2091 BB Equity;KBHDIVD BB Equity;KBHDNAB BB Equity;DEXECGD BB Equity;DEG2487 BB Equity;KBCEFCCK BB Equity;KBCEECK BB Equity;PAMAGRA BB Equity;PORTNOU FP Equity;FCPRFVT FP Equity;EGPPMER FP Equity;ETGEPME FP Equity;KERESSC FP Equity;JPMEACT FP Equity;ECHENTR FP Equity;TGSEPME FP Equity;FGDSS2C FP Equity;ALAPPEA FP Equity;KIRSCIC FP Equity;SYNSMAC FP Equity;ODSEVAM FP Equity;NATEUVC FP Equity;LAZOSCE FP Equity;CHGECAM FP Equity;TOCPMEP FP Equity;ODDPIFR FP Equity;SGFACPC FP Equity;INDEURN FP Equity;OBJREUA FP Equity;ATHEPAV FP Equity;OBJALPH FP Equity;PRIMEURP FP Equity;PATOFRFA FP Equity;CHRROIS FP Equity;MONMLCP FP Equity;BROAVEN FP Equity;COGPROS FP Equity;SOGSCEU FP Equity;MSLVAUT FP Equity;SYSYCTE FP Equity;AFGVIVA FP Equity;UCRMAIT FP Equity;IDEDYNE FP Equity;SYCLGCP FP Equity;BRTGAFR FP Equity;LCEMULF FP Equity;ESSEUOP FP Equity;GESUDES FP Equity;AXAMESC FP Equity;ATHAOCL FP Equity;OBJACEU FP Equity;GGEUVAL FP Equity;EUROPME FP Equity;DNCACEC FP Equity;TALEMCA FP Equity;BNPAMEU FP Equity;FBGGLTV FP Equity;CARSTSP FP Equity;SLFEUZM FP Equity;AGFCTEV FP Equity;ABELICD FP Equity;ETOMGFC FP Equity;ROTEMEC FP Equity;CAPIEUR FP Equity;BPSDSAF FP Equity;GIEUMCV FP Equity;AXAVEUC FP Equity;AXIOAEA FP Equity;BNPAPEU FP Equity;CPRGINP FP Equity;TRICREC FP Equity;CPRSAGP FP Equity;OFIEURI FP Equity;AXAOPPO FP Equity;SILECOC FP Equity;CARACTE FP Equity;PALBLEU FP Equity;FAMLEUR FP Equity;GPEUROS FP Equity;MMAEUAC FP Equity;NEUFRAC FP Equity;PIMEURA FP Equity;CCRCAEU FP Equity;FGALLBI FP Equity;CPRFDCA FP Equity;VENSEEU FP Equity;PALOCAP FP Equity;FLORVFI FP Equity;UNOFFRA FP Equity;ALP50AC FP Equity;SGINEUR FP Equity;CIAVEUP FP Equity;AVENEUR FP Equity;HIXDIVC FP Equity;BNPINEP FP Equity;AVICAPP FP Equity;INDVARE FP Equity;BRNGRND FP Equity;ACTVRP2 FP Equity;ESSRASI FP Equity;CAMRENO FP Equity;CDCEUAC FP Equity;CARDVLS FP Equity;VIVMRDM FP Equity;MEURMPK FP Equity;LFPCONV FP Equity;FEDEURA FP Equity;CHAFRNE FP Equity;VIACTEC FP Equity;OBJACTF FP Equity;AVIUFCP FP Equity;ALSEACT FP Equity;AVICAPA FP Equity;CASELIC FP Equity;INVEURA FP Equity;AVIUFFC FP Equity;LFPSECE FP Equity;HSBCAEC FP Equity;RCMENTR FP Equity;BFTEDIV FP Equity;CGPVAFE FP Equity;DNCCEUC FP

Equity;ODINVEU FP Equity;AMPPRMU FP Equity;INOSVAC FP Equity;CPRGSAI FP Equity;CPRELPF FP Equity;GPGAITD FP Equity;SGACTES FP Equity;CICGLIA FP Equity;CPRRFLX FP Equity;ZURACTP FP Equity;CIUNIEU FP Equity;AVIAS2I FP Equity;CHINTLA FP Equity;METVILO FP Equity;CICEUAC FP Equity;UNIGEST FP Equity;MAITP75 FP Equity;ARCAFLO FP Equity;CMPEMOC FP Equity;CROSPLS FP Equity;MAAFINV FP Equity;PRORACT FP Equity;MONDYMQ FP Equity;HAMEULD FP Equity;DNCATAL FP Equity;MCEIEMU FP Equity;AVGMARI FP Equity;FDCTRAF FP Equity;ODDPSEC FP Equity;EAE9022 FP Equity;INEVMPC FP Equity;BNPSELE FP Equity;BNPAMON FP Equity;PLAENJX FP Equity;FEDINUS FP Equity;ZENISEC FP Equity;SGMOPCD FP Equity;MOPOAME FP Equity;SGETPES FP Equity;OBJAMVA FP Equity;SOGMIDO FP Equity;AGAWFIA FP Equity;ETENERE FP Equity;CMACTOR FP Equity;UNDBREC FP Equity;FDCRNAT FP Equity;MALACRE FP Equity;FEDORMT FP Equity;AMARNPC FP Equity;INVMINE FP Equity;NATRGEF FP Equity;CMCGRSM FP Equity;EDRGEOP FP Equity;KISDYPL GR Equity;BHWMGFT GR Equity;S4APEQG GR Equity;DEUNORD GR Equity;CHOMCAR GR Equity;OPEURWI GR Equity;VOBAPAI GR Equity;WFPICAM GR Equity;DPEUAKT GR Equity;TRCINKA GR Equity;DHAKTUN GR Equity;AMPTRLB GR Equity;BBEURIN GR Equity;DWSZKFT GR Equity;NBDIVDE GR Equity;VKBCHAN GR Equity;DEKGCCF GR Equity;UNINOAM GR Equity;DEKKAGD GR Equity;IACGLBA GR Equity;DEKTELM GR Equity;LBBKGVA GR Equity;BBMILIN GR Equity;DWSTELM GR Equity;MVBUNGL GR Equity;GERBAL8 GR Equity;HIEURDS GR Equity;FSUHIAF NA Equity;DLEDFND NA Equity;DLSDF NA Equity;ASN NA Equity;OREUHDI NA Equity;SNSREUA NA Equity;NTEFIAE NA Equity;HLEFU NA Equity;FDJBEFE NA Equity;HHVF NA Equity;ROMF NA Equity;OPWAF NA Equity;RINCEFD NA Equity;FSAMBAA NA Equity;NNHDA NA Equity

🚩 Appendix 4: code script for calculation of Belgian statistics

```
#####
SCRIPT USED TO OBTAIN THE BELGIAN ESTIMATES AND OTHER STATISTICS OF SECTION 5
#####
library(readr)
library(stats)
library(sandwich)
library(lmtest)

file <- "C:/Users/Max/Documents/Mémoire/Data/alpha/EW/Matrix_alpha.csv"
returns <- read.csv(file, sep=";", dec=".")

EU_bias <- (returns$Mrt_RF_EU - returns$Mrt_RF_Global)
delta_bel <- returns$SRI_Bel_RF - returns$Con_Bel_RF
delta_ne <- returns$SRI_Neth_RF - returns$Con_Neth_RF
delta_fr <- returns$SRI_FR_RF - returns$Con_FR_RF
delta_de <- returns$SRI_DE_RF - returns$Con_DE_RF

#### div yield inter
```

```

mkt.div <- returns$Mrt_RF_Global*returns$Div_yield
smb.div <- returns$SMB_Global*returns$Div_yield
hml.div <- returns$HML_Global*returns$Div_yield
mom.div <- returns$MOM_Global*returns$Div_yield
EU_bias.div <- EU_bias*returns$Div_yield

#### bond inter

mkt.bond <- returns$Mrt_RF_Global*returns$Bond_spread
smb.bond <- returns$SMB_Global*returns$Bond_spread
hml.bond <- returns$HML_Global*returns$Bond_spread
mom.bond <- returns$MOM_Global*returns$Bond_spread
EU_bias.bond <- EU_bias*returns$Bond_spread

#### term structure inter

mkt.term <- returns$Mrt_RF_Global*returns$Term_structure
smb.term <- returns$SMB_Global*returns$Term_structure
hml.term <- returns$HML_Global*returns$Term_structure
mom.term <- returns$MOM_Global*returns$Term_structure
EU_bias.term <- EU_bias*returns$Term_structure

##### Unconditional
#####
#### Belgium ####
#####

#### SRI ####
SRI_bel_UC <- lm(returns$SRI_Bel_RF ~ returns$Mrt_RF_Global +
                returns$SMB_Global + returns$HML_Global +
                returns$MOM_Global + EU_bias)
summary(SRI_bel_UC)
NW_SRIbelUC <- NeweyWest(SRI_bel_UC, prewhite = FALSE)

coefest(SRI_bel_UC,vcov. = NW_SRIbelUC)

#### Con ####
Con_bel_UC <- lm(returns$Con_Bel_RF ~ returns$Mrt_RF_Global +
                returns$SMB_Global + returns$HML_Global +
                returns$MOM_Global + EU_bias)
summary(Con_bel_UC)
NW_ConbelUC <- NeweyWest(Con_bel_UC, prewhite = FALSE)

coefest(Con_bel_UC,vcov. = NW_ConbelUC)

#### diff ####
Dif_bel_UC <- lm(delta_bel ~ returns$Mrt_RF_Global +
                returns$SMB_Global + returns$HML_Global +
                returns$MOM_Global + EU_bias)
summary(Dif_bel_UC)
NW_DifbelUC <- NeweyWest(Dif_bel_UC, prewhite = FALSE)

coefest(Dif_bel_UC,vcov. = NW_DifbelUC)

##### Alpha - Beta Conditional
#####

```

```

#### Belgium ####
#####

#### SRI ####
SRI_bel_alphaBeta <- lm(returns$SRI_Bel_RF ~ returns$Mrt_RF_Global +
  returns$SMB_Global + returns$HML_Global +
  returns$MOM_Global + EU_bias +

  returns$Div_yield + returns$Bond_spread + returns$Term_structure +

  mkt.div + smb.div + hml.div + mom.div + EU_bias.div +

  mkt.bond + smb.bond + hml.bond + mom.bond + EU_bias.bond +

  mkt.term + smb.term + hml.term + mom.term + EU_bias.term)

summary(SRI_bel_alphaBeta)
NW_SRIbelalphaBeta <- NeweyWest(SRI_bel_alphaBeta, prewhite = FALSE)

coefest(SRI_bel_alphaBeta,vcov. = NW_SRIbelalphaBeta)

#### Con ####
Con_bel_alphaBeta <- lm(returns$Con_Bel_RF ~ returns$Mrt_RF_Global +
  returns$SMB_Global + returns$HML_Global +
  returns$MOM_Global + EU_bias +

  returns$Div_yield + returns$Bond_spread + returns$Term_structure +

  mkt.div + smb.div + hml.div + mom.div + EU_bias.div +

  mkt.bond + smb.bond + hml.bond + mom.bond + EU_bias.bond +

  mkt.term + smb.term + hml.term + mom.term + EU_bias.term)

summary(Con_bel_alphaBeta)
NW_ConbelalphaBeta <- NeweyWest(Con_bel_alphaBeta, prewhite = FALSE)

coefest(Con_bel_alphaBeta,vcov. = NW_ConbelalphaBeta)

#### diff ####
Dif_bel_alphaBeta <- lm(delta_bel ~ returns$Mrt_RF_Global +
  returns$SMB_Global + returns$HML_Global +
  returns$MOM_Global + EU_bias +

  returns$Div_yield + returns$Bond_spread + returns$Term_structure +

  mkt.div + smb.div + hml.div + mom.div + EU_bias.div +

  mkt.bond + smb.bond + hml.bond + mom.bond + EU_bias.bond +

  mkt.term + smb.term + hml.term + mom.term + EU_bias.term)

summary(Dif_bel_alphaBeta)
NW_DifbelalphaBeta <- NeweyWest(Dif_bel_alphaBeta, prewhite = FALSE)

coefest(Dif_bel_alphaBeta,vcov. = NW_DifbelalphaBeta)

```

```
#####
### Belgium ##### Wald tests
#####

### SRI ###
W1.bel.SRI <- waldtest(SRI_bel_alpha,SRI_bel_UC, vcov = NW_SRIbelalphaBeta, test = "Chisq")
W2.bel.SRI <- waldtest(SRI_bel_beta,SRI_bel_UC, vcov = NW_SRIbelalphaBeta, test = "Chisq")
W3.bel.SRI <- waldtest(SRI_bel_alphaBeta,SRI_bel_UC, vcov = NW_SRIbelalphaBeta, test = "Chisq")

### Con ###
W1.bel.Con <- waldtest(Con_bel_alpha,Con_bel_UC, vcov = NW_ConbelalphaBeta, test = "Chisq")
W2.bel.Con <- waldtest(Con_bel_beta,Con_bel_UC, vcov = NW_ConbelalphaBeta, test = "Chisq")
W3.bel.Con <- waldtest(Con_bel_alphaBeta,Con_bel_UC, vcov = NW_ConbelalphaBeta, test = "Chisq")

### Dif ###
W1.bel.Dif <- waldtest(Dif_bel_alpha,Dif_bel_UC, vcov = NW_DifbelalphaBeta, test = "Chisq")
W2.bel.Dif <- waldtest(Dif_bel_beta,Dif_bel_UC, vcov = NW_DifbelalphaBeta, test = "Chisq")
W3.bel.Dif <- waldtest(Dif_bel_alphaBeta,Dif_bel_UC, vcov = NW_DifbelalphaBeta, test = "Chisq")
```

✚ **Appendix 5:** Carhart (1997) model in the spirit of Treynor & Mazuy (1966)

$$R_{jt} = \alpha_j + \beta_j^a * R_{mt} + \beta_j^b * SMB_t + \beta_j^c * HML_t + \beta_j^d * Mom_t + \gamma_j^a * (R_{mt})^2 + \gamma_j^b * (SMB_t)^2 + \gamma_j^c * (HML_t)^2 + \gamma_j^d * (Mom_t)^2 + u_{jt}$$

✚ **Appendix 6:** experiment designs and details of studies in section 4.3

Study, country and sample period	Risk-adjusted performance indicator	Experiment design
Luther et al. (1992) UK: 1972-1990	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Jensen's alpha based on CAPM 	The performance of a large sample of 15 ethical unit trusts is analyzed as well as a smaller one requiring 2 years of data at least (10 trusts). The performance is measured against a domestic and an international benchmark for each individual fund; no reference group is used.
Hamilton et al. (1993) US: 1981-1990	<ul style="list-style-type: none"> ▪ Jensen's alpha based on CAPM 	Two samples of ethical funds are formed: the first one incorporates ethical funds established in 1985 or earlier (17 funds), and the second one includes funds established in 1986 or later (15 funds). The performance of the SRI funds is measured against the NYSE Index. Then the mean of the funds' alphas is computed before being statistically compared to the mean excess return of a sample of 170 and 150 conventional funds.
Mallin et al. (1995) UK: 1986-1993	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Treynor ratio ▪ Jensen's alpha based on CAPM 	The performance of each trust, both ethical and conventional, is measured against the Financial Times All Share Actuaries Index. Then, the economic differential is compared between each of the 29 ethical investment vehicles and their single matched conventional peer; the match is based on fund age and size.
Gregory et al. (1997) UK: 1986-1993	<ul style="list-style-type: none"> ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM enhanced by a small size premium in the spirit of Fama et al. (1993.b) ➤ Fama-MacBeth (1973) cross-sectional regression 	The starting sample is the same one as in Mallin et al. (1995). Then, 18 trusts are matched to the 18 ethical ones based on size, formation year, investment balance and type of fund. The experiment is divided into two main parts. First, time-series regressions are conducted for each trust through a 2-factor CAPM model; the second factor is constructed by taking the difference in return between a small cap index and a general domestic one. Second, a cross-sectional regression is performed using the pre-estimated 2-factor CAPM coefficients (but on a rolling basis) as explanatory variables, as well as a variable accounting for fund size and another one for the ethical nature of the funds (dummy variable).

<p>Goldreyer et al. (1999)</p> <p>US: 1981-1997</p>	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Treynor ratio ▪ Jensen's alpha based on CAPM 	<p>Ethical and conventional funds are discriminated based on their investment objective. This results in an ethical sample of 29 equity, 9 bond and 11 balanced funds. Performance indicators are then computed for each group of ethical fund and their matched conventional peers; only cross-sectional average estimates and statistical tests are presented. A second experiment discriminates the funds based on both asset size and market sensitivity, while a third one investigates the difference in performance between SRI vehicles relying on exclusionary screening strategies and inclusionary ones.</p>
<p>Cummings (2000)</p> <p>Australia: 1986-1994</p>	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Treynor ratio ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ Multiple regression with 3 market indexes 	<p>The performance of SRI funds is evaluated individually against three different benchmarks separately (a market, an industry average and a small cap index) before computing the excess return (Jensen's alpha) from a full 3-index regression; no reference group is used and the SRI sample is made of 7 unlisted ethical funds.</p>
<p>Statman (2000)</p> <p>US: 1990-1998</p>	<ul style="list-style-type: none"> ▪ eSDAR ▪ Jensen's alpha based on CAPM 	<p>The SRI sample is made of 31 equity funds with less than 30% in bonds and cash and is survivorship-bias free. Then, 2 conventional funds are matched to each ethical one based on asset size. The part of the section 4.3.1 dedicated to this study mostly presents results coming from the performance of funds: otherwise, I disregard in section 4.3.1 the other part of the research paper, which is dedicated to the performance of the Dominic Social Index (DSI). However, details can be found in section 4.2.</p>
<p>Schröder (2004)</p> <p>US, Germany and Switzerland: 1990-2002</p>	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM enhanced by a small size market index ➤ CAPM 2-factor model accounting for market timing in the spirit of Treynor & Mazuy (1966) ➤ Conditional 2-factor (including quadratic variables) model in the spirit of Ferson and Schadt (1996) 	<p>The research paper contains two main result panels: one is dedicated to the performance of 46 SRI equity funds (30 domiciled in the US and 16 in either Germany or Switzerland) and the other one to the performance of 10 SRI indexes. Again, I disregard in section 4.3.1 the results obtained from the index-style analysis but further details can be found in section 4.2. No reference group is used to evaluate the performance of the SRI fund sample and no strong assumption on the survivorship-bias is made. The CAPM constitutes the basic model from which the excess return of each fund is calculated. Then, the experiment builds on this model to incorporate market timing abilities of fund managers, conditional performance and finally both dimensions. Finally, the author employs two information variables within the conditional model, the US long term interest rate and the US term spread. The performance is evaluated at the fund level.</p>

<p>Bello (2005)</p> <p>US: 1994-2001</p>	<ul style="list-style-type: none"> ▪ New Sharpe ratio ▪ eSDAR ▪ Jensen's alpha based on CAPM 	<p>Results are half dedicated to the diversification problematic in the spirit of Rudd (1981) and half to the performance of ethical funds against this of size-matched conventional funds. The ethical sample is made of 42 SRI domestic equity and the other one of 84 funds. The author expects his data to be survivorship-biased, even though some dead funds are incorporated into the ethical sample. Last, the performance is evaluated at the fund level against a conventional benchmark, the S&P 500, and an ethically restricted one, the Domini Social Index.</p>
<p>Kreander et al. (2005)</p> <p>UK, Sweden, Germany and the Netherlands: 1995-2001</p>	<ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Treynor ratio ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ CAPM enhanced by a small size premium in the spirit of Fama et al. (1993.b) ➤ 2-factor CAPM accounting for market timing in the spirit of Henriksson & Merton (1981) ➤ Cross-sectional regression accounting for funds' characteristics 	<p>The authors employ a matching-sample approach based on size, age, country of domicile and investment universe (investing domestically or globally). Both ethical and non-ethical samples are made of 30 funds (34 UK, 14 Swedish, 8 German and 4 Dutch funds). Returns are computed weekly.</p> <p>The experiment is quite extensive as the small size bias and the market timing abilities of fund managers are considered separately before being considered all together. Then a cross-sectional regression accounting for fund size, age, fee, load and the ethical dimension is conducted, but only for funds investing internationally and domestic funds domiciled either in the UK or Sweden.</p>

Study, country, sample period and performance indicator	Experiment design
<p>Bauer et al. (2005)</p> <p>Germany, UK and US: 1990-2001</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ Carhart 4-factor model 	<p>Data from a sample of 103 ethical funds is retrieved as well as data from a matched conventional sample (based on fund age and size). Then equally-weighted portfolios of funds are formed, including difference portfolios. The UK and US funds are separated between domestic and international funds. On the other hand, only international funds are considered in the case of Germany. Finally, the conventional sample is survivorship-bias free.</p> <p>The experiment is divided into 4 main sections. First, the excess return is estimated from the CAPM before being estimated a second time but controlling for additional factors as in Carhart (1997). The factors are constructed using the Worldscope universe, restricted to the appropriate country/region. Then, the model is estimated on three subperiods from the overall 1990-2001 sample (1990-1993, 1994-1997, 1998-2001). Last, the CAPM is estimated a second time but using ethical indexes such as the DSI or the Dow Jones Sustainability Global Index (DSJI) instead of a broad market index.</p>
<p>Bauer et al. (2006)</p> <p>Australia: 1992-2003</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ Carhart 4-factor model ➤ Carhart 4-factor model enhanced by a premium accounting for a local bias ➤ Conditional Carhart 4-factor model in the spirit of Ferson and Schadt (1996) 	<p>The ethical sample is composed of 25 open-end equity funds, distinguished into domestic and international funds. The conventional sample of funds is not characteristics-matched and contains 281 alive portfolios. However, this sample is adjusted in order to be survivorship-bias free.</p> <p>An unconditional Carhart 4-factor model is estimated on the domestic and international equally-weighted portfolios of ethical funds, as well as on the domestic and international equally-weighted portfolios of conventional funds. Then, the same model is also evaluated on the corresponding difference portfolios. The same procedure holds for a 5-factor model where the fifth factor accounts for a local premium (difference in return between an Australian market benchmark and a global one). Next, a conditional Carhart 4-factor model follows the same procedure. All factors are constructed from the appropriate Worldscope universe and the information variables for the conditional model are the 3-month T-bill rate, the dividend yield of the Worldscope Australia total market index, the slope of the term structure and a corporate bond quality spread. Finally, the sample is divided into three subperiods (1992-1996, 1996-1999, 1999-2003) before estimating the unconditional 4-factor model on each subsample. In addition, rolling regressions are conducted, so that a clear picture of the investment style factor loadings through time can be drawn.</p> <p>N.B.: results for the unconditional Carhart (1997) model are checked (although not presented) for robustness using a matching approach and it does not alter the findings.</p>

<p>Bauer et al. (2007)</p> <p>Canada: 1994-2002</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Sharpe ratio ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ Carhart 4-factor model ➤ Conditional Carhart 4-factor model in the spirit of Ferson and Schadt (1996) 	<p>The sample contains 67 ethical and 267 traditional equity funds with domestic equity orientation; samples are not matched based on funds' characteristics. Both samples are subject to the survivorship-bias. The first part of the empirical research is dedicated to estimating the 1-factor CAPM with a domestic equity index (S&P / TSX Composite Index) and then a domestic ethical index (the Jantzi Social Index). Then, an unconditional as well as a conditional Carhart 4-factor model replace the single factor CAPM. The factors are constructed from the Worldscope universe and the information variables for the conditional version of Carhart (1997) are the 3-month T-bill rate, the dividend yield on the S&P / TSX Composite Index, the term spread and the corporate bond quality spread. Finally, rolling regressions are computed using the unconditional model.</p>
<p>Renneboog et al. (2008.b)</p> <p>Worldwide 17 countries: 1991-2003</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen's alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ Carhart 4-factor model ➤ Carhart 4-factor model enhanced by an ethical index ➤ Conditional Carhart 4 and 5-factor model in the spirit of Ferson and Schadt (1996) ➤ Cross-sectional regression with fixed country and time effects, accounting for funds' 	<p>The sample contains funds domiciled in Europe, North America and Asia Pacific. It is composed of 440 ethical dead and alive funds, while the survivorship-bias free conventional sample incorporates no less than 16036 portfolios. Equally-weighted portfolios of funds are then formed by country. The experiment is designed into 3 main sub experiments. First, several specifications of the Carhart 4-factor model are estimated. The factors are constructed from the Worldscope universe restricted to the stocks of the corresponding country; meaning that only local benchmarks are considered. The lagged information variables for the conditional version of the model are also local (1-month inter-bank rate or T-Bill rate, dividend yield on the matching value-weighted market index, a term spread and a bond credit-risk premium). This part of the experiment does not rely on conventional and ethical funds being matched on any characteristic (except the country of domicile), whereas the third part does. Second, the authors study the smart money effect within the SRI mutual fund industry: it is conducted by forming portfolios of funds based on the money flow situations of the funds from one period to another. Finally, a cross-sectional regression on all funds is performed with fixed effects. Conventional and ethical funds are primarily matched through a score calculation. The equation comprises 3 main categories of variable <i>Screening Activity</i>, <i>Fund Characteristic</i> and <i>Investment Style</i>. The independent variables from the last category are not different than the usual Carhart (1997) factors. The <i>Fund Characteristic</i> category includes variables such as fund age, fund size, load fees, etc. Finally, the last category integrates 4 dummy variables and a continuous one:</p> <ul style="list-style-type: none"> ▪ <i>SRI</i> is equal to 1 if the fund is SRI, 0 otherwise;

characteristics and screen activities	<ul style="list-style-type: none">▪ <i>Activism Policy</i> is an indicator variable which equal 1 if the fund intends to influence corporate behavior through direct engagement or proxy voting, 0 otherwise;▪ <i>Community Involvement</i> is an indicator variable which equal 1 if the fund has adopted a policy of active involvement with local communities, 0 otherwise;▪ <i>In-House SRI Research</i> is an indicator variable which equal 1 if the screening activities of the fund are based on an in-house SRI research team, 0 otherwise;▪ <i>Islamic Fund</i> is an indicator variable which equal 1 if the fund is designed for Islamic investors, 0 otherwise;▪ <i>Screening Intensity</i> is proxied by the number of screens on which the ethical fund relies.
---------------------------------------	--

Study, country, sample period and risk-adjusted performance indicator	Experiment design
<p>Climent & Soriano (2011)</p> <p>US: 1987-2009</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen’s alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ Carhart 4-factor model 	<p>The performance of 7 domestic green US funds is compared to the performance of matched conventional funds (28) and matched socially responsible funds (14). The ethical funds are retrieved from Bloomberg and identified by the system as “environmentally friendly” and “socially responsible”. The CAPM is evaluated twice: the first version relies on the S&P 500, while the second one proxies the market index by a green index, the FTSE KLD Global Climate 100 index. Then, the Carhart 4-factor model is estimated over the entire sample period before being estimated over two subperiods (1987-2001 and 2001-2009). The factors are obtained from the CRSP Survivor-Bias Free US mutual Fund Database and equally-weighted portfolios of funds are built before estimating the models.</p>
<p>Cortez et al. (2012)</p> <p>US, UK, Austria, Belgium, France, Germany, Italy, the Netherlands: 1996-2008</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen’s alpha based on: <ul style="list-style-type: none"> ➤ CAPM ➤ 2-factor model in the spirit of Fama & French (1998) ➤ 3-factor model (market, size and value factors) ➤ Carhart 4-factor model (with and without a local investment factor) 	<p>A sample of 46 open-end funds, investing globally, is analyzed against several multi-factor benchmarks, including some models where the market portfolio is proxied by an ethical index, the FTSE4Good Global index; no reference group is used. Yet, the Morgan Stanley Capital International (MSCI) All Country World Index proxies for the global index. Next, the factors in the 2 and 4-factor model are those available on Kenneth French’s webpage while in the 3-factor model, the factors are constructed by taking the difference between appropriate market indexes. The factor returns provided by the Kenneth French library are converted into local currency returns for the European countries. Finally, the information variables used in the conditional models are the short-term rate and the dividend yield: the first one being proxied by a constant-maturity 3-month US Treasury Bill and the other one by the dividend yield based on the FTSE All-World Index.</p> <p>N.B.: except the CAPM, each model is also estimated within a conditional framework, in the spirit of Christopherson et al. (1998).</p>
<p>Leite & Cortez (2014)</p> <p>UK, Austria, Belgium, France, Germany, Italy, the Netherlands and Spain: 2000-2008</p> <p><u>Risk-adjusted performance</u></p>	<p>The analysis is conducted at the individual fund level as most studies of section 4.2.1, which means that the statistical tests are computed based on the average of the population. The sample is composed of 54 equity ethical funds investing either globally or into European stocks and 145 conventional peers matched by age, country of domicile, investment universe and objective. Rather than being grouped by country of domicile the investment vehicles are grouped into three categories, Global EMU (European Monetary Union) countries, Global UK and European investment funds.</p>

<ul style="list-style-type: none"> ▪ Jensen’s alpha based on: <ul style="list-style-type: none"> ➤ Conditional Carhart 4-factor model in the spirit of Christopherson et al. (1998), enhanced by a premium accounting for a local bias 	<p>The experiment is divided into two main parts. First, the conditional Carhart 4-factor model is estimated for each SRI fund and the corresponding equally-weighted portfolio of 2 or 3 matched conventional funds; the factors either come from Kenneth French’s website or are constructed by taking the difference in return between appropriate market indexes. The model relies on 3 information variables only, a dividend yield, a term spread and a quality spread. Finally, the sample is split according to the screening strategy of the funds: those using negative screens are separated from those using positive/best-in-class approach.</p>
<p>Muñoz et al. (2014)</p> <p>US and Europe: 1994-2013</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen’s alphas based on: <ul style="list-style-type: none"> ➤ Carhart 4-factor model ➤ Carhart 4-factor model accounting for market and style timing in the spirit of Treynor & Mazuy (1966) 	<p>Managerial abilities of 18 US and 89 European green fund managers are analyzed from decomposing performance into stock selection, market timing and style timing skills; the experiment design controls for crisis and non-market crisis periods (technology bubble, global financial crisis and euro sovereign debt crisis).The analysis on risk-adjusted return is based on estimates from a 4-factor model, while market and style timing analysis rely on estimate from the original Carhart 4-factor model but with additional factors in the spirit of Treynor & Mazuy (1966). Those managerial abilities are compared to those of conventional and ESG funds; the latter ones not being characteristics-matched to the green funds, as opposed to the former ones. Green and ESG funds are labeled by Morningstar.</p> <p>Equally-weighted portfolio of funds are then formed in respect to the following categories, domestic green US, global green US, domestic conventional green US, global conventional green US, domestic ESG US, global ESG US and domestic religion US. The same groups stand in case of funds domiciled in Europe except for religious funds, which are only considered in case of the US. All factors com form Kenneth French’s website.</p>
<p>Nofsinger & Varma (2014)</p> <p>US: 2000-2011</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen’s alphas based on: <ul style="list-style-type: none"> ➤ Carhart 4-factor model ➤ Panel data regression controlling for characteristics of fund holdings and screening strategies 	<p>A sample of 240 US domestic SRI funds, including non-retail funds and a few ETF’s, is compared to a sample of characteristics-matched conventional funds. The study controls for two market crises, the technology bubble and the global financial downturn of 2008. The first part of the experiment relies on estimating non-market crisis Jensen’s alphas and crisis market Jensen’s alphas; as well as alphas on the entire sample period. A similar analysis is then conducted but considering the SRI fund population as a heterogeneous group of different categories. A further division is finally performed by separating funds using positive screens from those using negative screens. The second part of the experiment consists in conducting a panel data regression controlling for fund holdings and characteristics: it serves as a robustness check for the findings from the first experiment part.</p> <p>The screening strategies are grouped under for main denominations (product screen, ESG screen [ESG], shareholder advocacy [SHR_ADV] and faith/religion based). The product screen category comprises funds relying on product screen</p>

	<p>only [PROD_ONLY] and a distinction is made with faith/religion-based funds [REL]; even though they employ product screens most of the time. In addition, a more restricted product screen category incorporates funds that only exclude firms with business related to alcohol, tobacco or gambling [ATG_ONLY]. Then, the ESG-based funds are subdivided into three groups (social screen [SOC], governance screen [GOV] and environmental screen [ENV]). The ESG funds and the corresponding subdivisions are not mutually exclusive of any of the previously described screens. Once correctly categorized, funds are formed into average return portfolio among the SRI sample and the matched conventional one.</p>
<p>Lean et al (2015)</p> <p>North America and Europe: 2001-2011</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen's alphas based on: <ul style="list-style-type: none"> ➤ Fama-French 3-factor model (1993) ➤ Carhart 4-factor model 	<p>A survivorship-bias free sample of 500 SRI funds domiciled in Europe and 248 in North America is analyzed but not compared against a reference group of conventional funds; equally-weighted portfolios of funds are formed. The Carhart 4-factor model is adjusted to control for the global financial crisis of 2008. Then, the main part of the experiment relies on studying the performance persistence of ethical funds by forming top, middle and bottom performing portfolios of funds.</p>
<p>Leite & Cortez (2015)</p> <p>France: 2001-2012</p> <p><u>Risk-adjusted performance</u></p> <ul style="list-style-type: none"> ▪ Jensen's alphas based on: <ul style="list-style-type: none"> ➤ Carhart 4-factor model enhanced by a local premium ➤ Carhart 4-factor model (including a local premium) accounting for market and style timing in the spirit of Treynor & Mazuy (1966) 	<p>The experiment is designed so that stock selection, market timing and style-timing abilities of French fund managers are controlled for market crises (technology bubble, global financial crisis and euro debt sovereignty crisis): the intercept is removed from the time-series regressions and the original variables are multiplied by two dummies separately, one proxying for market crisis and the other one for non-market crisis. 40 Ethical funds with a European equity focus are compared to 120 matched conventional funds based on age and investment category; SRI and conventional equally-weighted portfolios of investment funds are then formed. In addition, all factors are constructed by taking the difference between market indexes except the momentum factor, which is self-built. Finally, all managerial abilities are scrutinized but for funds using positive/best-in-class approach and funds using negative screens separately.</p>

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