

## Socially Responsible Investments: Methodology, Risk and Performance

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# Discussion Paper

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**SOCIALLY RESPONSIBLE INVESTMENTS:  
METHODOLOGY, RISK AND PERFORMANCE**

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# **Socially Responsible Investments: Methodology, Risk Exposure and Performance**

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## **Abstract**

This paper surveys the literature on socially responsible investments (SRI). Over the past decade, SRI has experienced an explosive growth around the world. Particular to the SRI funds is that both financial goals and social objectives are pursued. While corporate social responsibility (CSR) - defined as good corporate governance, sound environmental standards, and good management towards stakeholder relations - may create value for shareholders, participating in other social and ethical issues is likely to destroy shareholder value. Furthermore, the risk-adjusted returns of SRI funds in the US and UK are not significantly different from those of conventional funds, whereas SRI funds in Continental Europe and Asia-Pacific strongly underperform benchmark portfolios. Finally, the volatility of money-flows is lower in SRI funds than of conventional funds, and SRI investors' decisions to invest in an SRI fund are less affected by management fees than the decisions by conventional fund investors.

**Keywords:** socially responsible investments, ethical investing, corporate social responsibility, mutual funds, performance evaluation, money-flows, investment screens, mutual funds.

**JEL codes:** A13, G11 and G12

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## 1. Introduction

Over the past decade, socially responsible investments (SRI), often also called ethical investments or sustainable investments, have grown rapidly around the world and become a multi-trillion dollar market. SRI can be defined broadly as “an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis” (Social Investment Forum (SIF), 2001:4). Unlike conventional types of investments, SRI funds apply a set of investment screens to select stocks from an investment universe based on social, environmental or ethical (SEE) criteria.

This paper surveys the literature on socially responsible investments. In the first part of the paper, we review the institutional background of ethical investing. In particular, we study the historical roots, the market development, the regulatory background, and the investment screens employed in SRI. While ethical investing has ancient origins and is rooted in religious traditions, modern SRI is based on growing social awareness. Issues like environment protection, human rights and corporate governance have become common in the investment screens used by SRI. Currently, socially screened assets represent about 10% of the total assets under management in the US. Furthermore, in recent years, governments in western countries have taken many regulatory initiatives regarding SRI. For instance, the UK was the first country that regulated the disclosure of social, environmental or ethical investment policies by pension funds and charities.

Second, we introduce the literature on corporate social responsibility (CSR). At the heart of SRI is a fundamental question: is a firm’s aim to maximize shareholder value or stakeholder value? While in competitive and complete markets there is no conflict between these two objectives, in practice the maximization of shareholder value often conflicts with the stakeholder value criterion due to the existence of economic externalities. In the paper, we define corporate social responsibility as a combination of good corporate governance, sound environmental standards, and care of stakeholder relations. We will present the empirical findings on the impact of each of these three components on shareholder value. In general, the literature shows that CSR enhances shareholder value.

Third, we review the literature on performance evaluation of mutual funds. We evaluate mutual fund performance from the perspective of a mean-variance investor, and discuss the performance evaluation techniques based on the CAPM and multifactor models (e.g. Carhart (1997)). We also discuss methodologies using conditional strategies (e.g. Ferson and Schadt (1996)) and seemingly unrelated assets (e.g. Pastor and Stambaugh (2002)) to evaluate fund performance. Furthermore, tests of market-timing ability and return-based style analysis are discussed.

Fourth, we present the empirical findings on the performance and money-flows of socially responsible mutual funds around the world. For SRI funds in the US and UK, there is little evidence that the risk-adjusted returns of SRI funds are different from those of conventional funds (see, e.g., Bauer,

Koedijk and Otten (2005)). However, SRI funds in Continental Europe and Asia-Pacific show strong underperformance relative to benchmark portfolios. Furthermore, while SRI investors chase past performance, their decision to invest in an SRI fund is less affected by management fees and funds' risk than the decision of conventional fund investors (Renneboog, Ter Horst, and Zhang (2006)). Also, the volatility of money-flows is lower in SRI funds than in conventional funds (Bollen (2006)).

The remainder of the paper is organized as follows. Section 2 presents the institutional background of SRI. Section 3 reviews the theoretical literature on and the empirical firm-level analyses of corporate social responsibility. Section 4 reviews the econometric techniques employed in portfolio performance evaluation, and Section 5 introduces the empirical findings of the literature on the performance and money-flows of SRI mutual funds. Section 6 concludes.

## **2. Institutional Background of SRI**

### **2.1 History of SRI**

Ethical investing has ancient origins and is rooted in Jewish, Christian, and Islamic traditions. Judaism has a wealth of teachings on how to use money ethically<sup>1</sup>, and in medieval Christian times, there were ethical restrictions on loans and investments which were based on the Old Testament<sup>2</sup>. The Catholic Church imposed a universal prohibition on usury in 1139, which had not been relaxed until the 19<sup>th</sup> century. In England, a law called The Act Against Usury which prohibited excessive interests on loans was in effect from 1571 to 1624 (Glaeser and Scheinkman (1998), and Lewison (1999))<sup>3</sup>. In the 17<sup>th</sup> century, the Quakers ('Society of Friends') refused to profit from the weapons and slaves trade when they settled in North America. The founder of Methodism, John Wesley (1703-1791), stated in his sermon 'The Use of Money' that people should not engage in sinful trade or profit from exploiting others. The Methodist Church in the UK avoided investing in 'sinful' companies, such as companies involved in alcohol, tobacco, weapons and gambling, when they began investing in the stock market in 1920s. Based on the teachings of the Koran and its interpretations, Islamic investors avoid investing in companies involved in pork production, pornography, gambling, and in interest-based financial institutions.

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<sup>1</sup> See, e.g., Maimonides, Mishneh Torah, Laws of Gifts to the Poor 10:7: "There are eight degrees of tzedakah (righteous giving), one above the other. The highest degree is to strengthen the hand of a poor person by making a gift or a loan, or entering into a partnership, or finding work for him/her, so that they become self-sufficient". In Torah, Leviticus 19:9-10 "When you reap the harvest of your land, you shall not reap all the way to the edges of the field, or gather the gleanings of your harvest... You shall leave them for the poor and the stranger." and Deuteronomy 15:7-8 "If there be among you a needy person...you shall not shut your hand from him/her; but you shall surely open your hand and shall surely lend sufficient for his/her need, as to that which is lacking".

<sup>2</sup> See, e.g., Exodus 22:25 "If you lend money to my people, to the poor among you, you are not to act as a creditor to him; you shall not charge him interest" and Deuteronomy 23:19 "You shall not charge interest to your countrymen: interest on money, food, or anything that may be loaned at interest; but you may charge interest from loans to foreigners".

<sup>3</sup> During the reign of Henry VIII (1491-1547), usury was defined as a loan with interest rate higher than 10%.

Modern SRI is based on growing social awareness of investors. Since the 1960s, a series of social campaigns, e.g. the anti-war and the anti-racist movements, have made investors concerned about the social consequences of their investments. The first modern SRI mutual fund<sup>4</sup>, the Pax World Fund, was founded in 1971 in the US. Created for investors opposed to the Vietnam War (and militarism in general), the fund avoided investments in weapons contractors. In the 1980s, the racist system of apartheid in South Africa became a focal point of protests by social investors. SRI investors in the US pressurized companies doing business in South Africa to divert those operations to other countries, and urged mutual funds not to include South-African nor western firms with South-African subsidiaries into their portfolios. These campaigns were relatively successful, for instance, the state legislature of California passed a law amendment in 1986 requiring the state's pension funds to divest over \$6 billion from companies with activities in South Africa (Sparkes, 2002: 54).

On April 25<sup>th</sup>, 1986 the Chernobyl nuclear power plant in the former Soviet Union (now Ukraine) exploded during a test, spreading radioactive material across Europe and increasing the number of cancer deaths by over 2500. On March 23<sup>th</sup>, 1989 the worst environmental disaster in the US occurred when the oil supertanker Exxon Valdez ran aground near Alaska and spilled 11 million gallons of crude oil. The above and other environmental disasters in the late 1980s made investors aware of the negative environmental consequences of industrial development.

Since the early 1990s, the SRI industry has experienced strong growth in the US, Europe, and the rest of the world. An important factor behind this growth was ethical consumerism, where consumers pay a premium for products that are consistent with their personal values. Issues like environment protection, human rights, and labor relations have become common in the SRI investment screens. In recent years, a series of corporate scandals has turned corporate governance and responsibility into another focal point of SRI investors. Hence, criteria like transparency, governance and sustainability have emerged as essential SRI screens.

## **2.2 The Market of SRI**

Over the past decade, socially responsible investments have experienced a phenomenal growth around the world. Table 1 presents the total assets under management (AUM) of SRI screened portfolios and mutual funds in the US, Europe, Canada and Australia.

In the US, the professionally managed assets of socially screened portfolios reached \$2.3 trillion in 2003, growing by 1200% from \$162 billion in 1995. Currently, SRI assets represent about 10% of total assets under management in the US (SIF, 2005). Although the European SRI market is still in an early stage of development, it is also growing rapidly. In 2003, the assets of SRI screened portfolios in Europe totaled around €230 billion, and they account for about 1% of total assets under professional management

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<sup>4</sup> The first socially screened mutual fund, the Pioneer Fund, was founded in 1928. This fund excluded investments in the alcohol and tobacco industries.

in Europe. The UK, the Netherlands and Belgium are the countries with the highest percentage of socially screened assets in Europe. In the US, the assets under management of SRI funds<sup>5</sup> reached \$138 billion in 2003. From 1995 to 2003, the number of SRI mutual funds grew from 55 to 178 in the US (SIF, 2003), from 54 to 313 in Europe (SiRi, 2003), and from 10 to 63 in Australia (EIA, 2003).

[Insert Table 1 about here]

It is sometimes argued that investors in ethical funds are willing to sacrifice financial returns in order to comply with their social or environmental objectives. The fact that SRI investors may have a different investment objective function is suggested by the SIF (2001) report: during the stock market downturn over the first 9 months of 2001, there was a 94% drop in the money inflows into all US mutual funds. In contrast, the fall in net investments in socially screened mutual funds amounted to merely 54%. The SIF (2003, p.8) states, “Typically, social investors’ assets are “stickier” than those of investors concerned only with financial performance. That is, social investors have been less likely to move investments from one fund to another and have been more inclined to stay with their funds than conventional investors.”

In the foreseeable future, the growth of SRI assets is expected to continue worldwide. Some of the largest pension funds in the world have shown increasing interest in participating in SRI. The California Public Employees’ Retirement System (CALPERS), the largest pension fund in the world, actively engages companies to promote socially responsible behavior and was one of the leaders of the tobacco divestment of the late 1990s. The Dutch Pension Fund for Public Employees (ABP), the largest pension fund in Europe, revised its Code for Prudent Investment Policy in 2000, which states that ABP will promote the integration of SEE criteria in its investment process. Mr. Jean Frijns, the Chief Investment Officer of ABP Investments, regards sustainable investment as “one of the most critical factors driving the future of fiduciary investment” (Financial Times, Jan. 26, 2003). In addition, the Dutch pension fund PGGM, which manages about €45 billion assets, applies two negative screens (weapons production and human rights violation) to its investment portfolios (Eurosif, 2003).

## **2.3 Regulatory Background**

The growth of the SRI industry can be partly attributed to the changes in regulation regarding the disclosure of social, environmental and ethical (SEE) information by pension funds and listed companies. In this section, we review the regulatory initiatives taken by national governments regarding SRI and summarize these in Table 2. Most of the SRI regulation is passed in Europe.

[Insert Table 2 about here]

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<sup>5</sup> SRI funds or socially responsible investment mutual funds, a subset of socially screened portfolios, refer to the mutual funds applying SRI screens in their investment process.

### ***a. UK***

The UK was the first country that regulated the disclosure of SEE investment policies of pension funds and charities. This has contributed considerably to the growth of SRI industry. In July 2000, the Amendment to the 1995 Pensions Act was approved, requiring trustees of occupational pension funds to disclose in the Statement of Investment Principles “the extent (if at all) to which social, environmental and ethical considerations are taken into account in the selection, retention and realization of investments”.

The Trustee Act 2000, which came into effect in February 2001, requires charity trustees to ensure that investments are suitable to a charity’s stated aims. According to the Charity Commission guidance, charities should include ‘any relevant ethical considerations as to the kind of investments that are appropriate for the trust to make’. In 2002, The Cabinet Office in the UK published the Review of Charity Law in 2002, which proposed that all charities with an annual income of over £ 1 million report on the extent to which SEE issues are taken into account in their investment policies. The Home Office accepted these recommendations in 2003.

In addition, large organizations of institutional investors also have taken SRI initiatives. For instance, the Association of British Insurers (ABI), whose members invest in about \$1 trillion assets, published a disclosure guideline in 2001 suggesting that listed companies report on material SEE risks relevant to their business activities.

### ***b. Continental Europe***

Over the past decade, some national governments in continental Europe passed a series of regulations regarding social and environmental investments and savings. Since 1991, the Renewable Energy Act in Germany gives a tax advantage for closed-end funds to invest in wind energy (Eurosif, 2003). In 1995, the Dutch Tax Office introduced “Green Savings and Investment Plan”, which grants a tax deduction to investments in specific ‘green’ projects, such as wind and solar energy, and organic farming.

Following the British Amendment to the 1995 Pensions Act of 2000, four countries in Continental Europe (namely Belgium, Germany, Italy and Sweden) have passed similar regulations requiring pension funds to disclose SEE related information. 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. In January 2002, Germany adopted a regulation requiring that 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” (Eurosif, 2003). Sweden passed a regulation (effective since January 2002), requiring Swedish national pension funds to incorporate environmental and ethical aspects in their investment policies. In Italy, a legislation was adopted in September 2004 requiring pension funds to disclose the effect of non-financial factors (including social, environmental and ethical factors) that influence their

investment decisions. All these initiatives, have clearly had a positive impact on the growth of the SRI fund industry in Europe.

France is the first and so far the only European country making SEE reporting mandatory for all listed companies. In May 2001, the legislation “New Economic Regulations” came into force: listed companies are to publish social and environmental information on the companies in their annual reports<sup>6</sup>. Meanwhile, since February 2001, the managers of Employee Savings Plans are required to consider social, environmental or ethical issues when buying and selling shares<sup>7</sup>.

### ***c. Outside Europe***

In the US, section 406 of the Sarbanes-Oxley Act (July 2002), requires companies to disclose a written code of ethics signed by their chief executive, chief financial officer and chief accountant.

Australia is the only country outside Europe that has adopted a regulation regarding SRI. In 2001, the Australian government passed a bill requiring that all investment firms’ product disclosure statements include descriptions of “the extent to which labor standards or environmental, social or ethical considerations are taken into account.” Since 2001, all listed companies on the Australian Stock Exchange are obliged to make an annual social responsibility report.

## **2.4 Investment Screens**

The investment screens used in SRI have evolved over time. Table 3 presents a summary of the SRI screens used by ethical funds around the world. Usually, SRI mutual funds apply a combination of the social screens. SIF (2003) reports that 64% of all socially screened mutual funds in the US use more than five screens, while 18% of SRI funds use only one screen. These screens can be broadly classified into two groups: negative screens and positive ones.

First, the oldest and most basic SRI strategies are based on negative screens. These filters refer to the practice that certain stocks or industries are excluded from SRI portfolios based on SEE criteria. The funds based on such screens account for \$2.0 trillion out of the \$2.15 trillion SRI assets in the US (SIF, 2003). A typical negative screen can be applied on an initial asset pool such as the S&P 500 stocks from which the alcohol, tobacco, gambling and defense industries, or companies with poor performance in labor relations and environment protection are excluded. After negative SRI screening, the portfolios are created through financial and quantitative selection. The most common negative screens exclude tobacco,

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<sup>6</sup> Law No. 2001-420, Art. 225-102-1: “[The annual report] also contains information, the detail of which is being determined by a decree of the Council of State, on how the company takes into account the social and environmental consequences of its activities. The present paragraph applies only to ( listed ) companies [...]” (www.eurosif.org)

<sup>7</sup> Law No. 2001-152, Art. 214-39: “The [fund's] internal rules specify, if need be, the social, environmental or ethical considerations the fund management company must take into account when buying or selling securities, as well as when exercising the voting rights attached to the ownership of these securities. The fund's annual report reports on how these considerations have been taken into account, in terms defined by the Commission des Opérations de Bourse. ”

alcohol, gambling, weapons and nuclear power. Other negative screens may include irresponsible foreign operations, pornography, abortion, workplace conditions, violation of human rights, and animal testing. Some SRI funds only exclude companies from the investment universe when their revenue derived from ‘a-social or un-ethical’ sectors exceed a specific threshold, while other SRI funds apply the negative screens to the company’s branches or suppliers. A small number of SRI funds use screens based on traditional ideological or religious convictions: for instance they exclude investments in firms producing pork products, in financial institutions paying interest on savings, and even in insurance companies insuring non-married people<sup>8</sup>.

[Insert Table 3 about here]

Second, SRI portfolios are nowadays mostly based on positive screens, which in practice boils down to selecting shares that meet superior SEE standards. The most common positive screens focus on corporate governance, labor relations, the environment, sustainability of investments, and the stimulation of cultural diversity. Positive screens are also frequently used to select companies with a good track records concerning renewable energy usage or community involvement. The use of positive screens is often combined with a ‘best in class’ approach. Firms are ranked within *each industry* or market sector based on SEE criteria. Subsequently, for each industry only those firms are selected which pass a minimum threshold.

Negative and positive screens are often referred to as the *first* and *second* generation of SRI screens respectively. The *third* generation of screens refers to an integrated approach of selecting companies based on the 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’). The *fourth* generation of ethical funds combines the sustainable investing approach (third generation) with shareholder activism and commitment. In this case, portfolio managers or the companies specialized in granting ethical labels attempt to influence the company’s actions through direct dialogue with the management or by the use of voting rights at Annual General Meetings. SIF (2003) reports that in 2002 socially responsible investors in the US filed 292 shareholder resolutions on SEE issues. The largest number of resolutions is on environmental issues, followed by issues on global labor standards and equal employment conditions.

### **3 Firm-level Analysis on SRI**

In this section, we introduce the findings of firm-level studies related to socially responsible investments. While Section 3.1 surveys the theoretical arguments, Section 3.2 focuses on the empirical evidence.

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<sup>8</sup> These SRI funds are usually small which in total manage less than \$100 million of assets in the US.

### 3.1 Theoretical Background: Should Companies Be Socially Responsible?

Finance textbooks state that companies should maximize the value of their shareholders' equity<sup>9</sup>. In other words, companies' only responsibility is a financial one. In recent years, corporate social responsibility (CSR) has become a focal point of policy makers (and investors), who demand that corporations assume some responsibility towards society, the environment, or the stakeholders in general. SRI investors thus aim at promoting socially and environmentally sound corporate behavior. They avoid companies producing goods that may cause health hazards or exploiting employees both in developed and developing countries (negative screening) and select companies with sound social and environmental records and with good corporate governance (positive screening). In general, SRI investors expect companies to focus on social welfare in addition to value maximization.

#### *a. Shareholder value vs. Stakeholder value*

At the heart of the SRI movement is a fundamental question: is a firm's aim to maximize shareholder value or social value (defined as the sum of the value generated for all stakeholders)? Classical economics (e.g. Adam Smith's 'invisible hand' and the social welfare theorems) states that there is no conflict between the two goals: in competitive and complete markets, when all firms maximize their own profits (value), the resource allocation is Pareto-optimal and the social welfare is maximized.

However, modern economic theory also tells us that in some circumstances, namely when some of the assumptions of the welfare theorems do not hold, profit-maximizing behavior does not necessarily imply social-welfare maximizing outcomes. One of such circumstances is the existence of externalities, arising when the costs and benefits of an agent's action are affected by the actions of other (external) agents. Jensen (2001) gives a simple example of externalities: a fishery's catch is impaired by the pollution of an upstream chemical plant. When the chemical plant maximizes its profit by increasing pollution (as the cost of pollution are not borne by the chemical plant), the fishery in the downstream suffers from catching less fish and the social welfare (in this simplified case, equal to the sum of the profits of the two stakeholders) is not maximized. Economic solutions to the externality problem include the imposition of regulation (e.g. quotas or taxes on pollution) and the creation of a market for externalities (e.g. the trading of pollution permits). In practice, the maximization of shareholder value often conflicts with the social welfare criterion represented by the interests of all stakeholders of a firm, including employees, customers, local communities, environment and so forth. In Continental European

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<sup>9</sup> Value is the present value of future profits over the long run, and it is not necessarily the current market value of the firm, as markets can be irrational. Jensen (2004) argues that overvalued equity creates additional agency costs, which will inevitably lead to the destruction of firm value over the long run. Therefore, managers should regularly communicate with capital markets to prevent not only undervaluation but also overvaluation.

corporate governance regimes, a stakeholder approach is more common than in the Anglo-Saxon countries.<sup>10</sup>

***b. The problems of the stakeholder theory and implications for SRI***

According to the shareholder value theory, managers are expected to invest until the marginal project's return exceeds the cost of capital. In the stakeholder value concept, managers are asked to balance the interests of all stakeholders such that the aggregate welfare is maximized. But the stakeholder concept does not define how to aggregate welfare and how to make the tradeoff between stakeholders. If the social value of firms can be maximized, the society will by definition benefit. However, the question is whether or not this goal is achievable and how economic efficiency and managerial incentives are affected by the maximization of stakeholder value (including social and environmental value). Jensen (2001: 14) writes, "it is the failure to provide a criterion for making such tradeoffs (among stakeholders), or even to acknowledge the need for them, that makes stakeholder theory a prescription for destroying firm value and reducing social welfare".

Given that the objective function of a manager is not well defined in stakeholder theory, the performance of managers becomes unaccountable. Jensen (2001) argues that the stakeholder theory increases the agency costs and weakens the internal control systems of firms, because performance measures are only vaguely described. Similarly, Tirole (2001: 26) writes, "In a nutshell, management can almost always rationalize any action by invoking its impact on the welfare of *some* stakeholder. An empire builder can justify a costly acquisition by a claim that the purchase will save a couple of jobs in the acquired firm; a manager can choose his brother-in-law as supplier on the grounds that the latter's production process is environmentally friendly". In addition, Tirole (2001) shows that the absence of a reliable performance measure leads to flat – rather than performance-based - managerial compensation contracts, which further weakens managerial incentives.

Another problem of the stakeholder approach is that in a competitive market, a firm lowering its profits in order to pursue social and environmental goals may not survive competition or disciplinary actions by the market for corporate control. The reason is that another company can acquire this firm and replace the incumbent management with a value-maximizing one (Tirole (2001: 24)).

To conclude, in order for corporate social responsibility to become a workable concept, the following guidelines of performance yardsticks should be adopted:

(1) Corporate performance must be measurable. Lack of precisely formulated corporate goals and measures destroy firm value and social welfare in the long run. Firm value remains the single most important performance measure for management.

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<sup>10</sup> In Germany, for instance, the importance of stakeholders is even legally defined. German law mandates that the supervisory board is made up of representatives of the employees and unions, while the other half of the board consists of representatives of the major shareholders.

(2) Maximizing long-run firm value is in line with maximizing social welfare. Tirole (2001) concludes that focusing on shareholder value is a second-best optimum once managerial incentive problems like agency costs have been incorporated in a stakeholder framework.

(3) Even if one adopts the shareholder value criterion, it is important to consider the welfare of all stakeholders (including employees, the community and the environment) as firm behavior induces important externalities. Jensen (2001) notes, “we cannot maximize the long-term market value of an organization if we ignore or mistreat any important constituency (stakeholder)”.

(4) Economic theory predicts that companies will be more willing to sacrifice profits in order to be socially responsible, when their management is entrenched or shielded from anti-takeover mechanisms. The reason is that these managers are less likely to be replaced by profit-maximizing ones.

### *c. The impact of SRI on firm behavior*

Given that negative screening is the most common practice in SRI (see Section 2.4), it is interesting to study whether or not this approach achieves the goal of promoting social responsibility. In other words, we ask the question whether SRI affects corporate behavior, or whether the SRI's benefit is only a feel-good sentiment created by not being involved in unethical corporate behavior. To answer this question, Heinkel, Krause and Zechner (2001) developed a theoretical model that captures the effects of negative SRI screening on a polluting firm's economic behavior. The assumptions of this model are: (i) investors are risk averse and consist of two types: green investors and neutral investors, and (ii) each firm has one of two technologies: a clean technology and a polluting one. The basic question is whether the presence of green investors can cause firms to alter their corporate behavior, i.e. to change from using a polluting technology to a clean one. The model shows that the question is answered affirmatively: if fund managers adopt negative screens, polluting firms are present in fewer investment portfolios, which reduces risk-sharing opportunities among investors. Hence, the stock price of polluting firms falls, thus raising their cost of capital (expected return). When the increased cost of capital exceeds the cost of capital of socially responsible firms (in this case, the ones which transferred to a less polluting technology), polluting firms tend to turn more environmentally friendly. In a follow-up paper, Barnea, Heinkel and Krause (2005) investigate the effects of negative pollution screening on the investment decisions of polluting firms. The issue is examined in an equilibrium setting with endogenous investment decisions, i.e. firms are allowed to choose the level of investment. The study concludes that negative screening reduces the incentives of polluting firms to invest, which lowers the total level of investment in the economy.

## **3.2 Empirical Evidence: Which SRI Screens Can Enhance Value?**

Given that economic theory tells us that firms should be “socially responsible” to the extent that it helps maximizing firm value, the crucial question is which SRI screens enhance firm value and which do not. In other words, we ask the question which investment screens are likely to improve SRI fund

performance. We define corporate social responsibility as the sum of good corporate governance (protecting shareholders' interests), environmental efficiency (protecting environmental stakeholders' interest), and good stakeholder relations (protecting the interests of other stakeholders, including those of employees and the local community). In this subsection, we review the literature on the value-relevance of corporate social responsibility, and try to identify which of these three components are likely to be value drivers.

#### *a. Corporate Governance Screening*

Corporate governance addresses the conflicts of interests between an agent (manager) and a principal (investor). This conflict of interest is induced by the separation of ownership and control in the modern corporation, and can bring about important agency costs. Managers may exert insufficient effort in enhancing shareholders' value (moral hazard), enjoy building corporate empires and extract private benefits of control, or entrench themselves by anti-takeover provisions such that (dispersed) shareholders are not able to exercise control. These agency costs are at odds with the definition of corporate governance formulated by Shleifer and Vishny (1997): corporate governance consists of "the ways in which the suppliers of finance to corporations assure themselves of getting a fair return on their investment." Tirole (2001) takes a broader view and defines corporate governance as "the design of institutions that induce or force management to internalize the welfare of stakeholders."

The empirical literature shows that there is a positive relation between corporate governance and a firm's value. Gompers, Ishii and Metrick (2003) (hereafter GIM) study the relation between a set of 24 corporate-governance (anti-takeover) provisions and a firm's long-run performance in the 1990s. Since the governance structures of a firm are not exogenous, the paper makes no claim about the direction of causality between governance and performance, but rather analyzes whether or not corporate governance is associated with firm value. A striking relation between corporate governance and stock returns is uncovered: a strategy (i.e. an investment screen) that involves buying firms with the strongest shareholder rights and selling firms with the weakest shareholder rights generates an annual abnormal return of 8.5% over the 1990s. The return is measured by the Fama-French-Carhart four-factor model (see Section 4.2). In addition, the governance index is highly correlated with firm value (measured by Tobin's Q).

These findings can be interpreted as follows: (i) the stock market underestimates the agency costs induced by the corporate provisions that reduce shareholder rights, (ii) managers have private information (not shared with investors) that future firm performance will be poor, so they may use corporate provisions to entrench themselves and reduce shareholder rights, (iii) the significant abnormal returns generated by corporate governance screening may be not due to market-inefficiency, but rather capture the premium of some risk factors that is missing in the current asset pricing models.

The GIM's approach of defining corporate governance as a set of anti-takeover provisions has limitations. Cremers and Nair (2005) extend GIM's work by classifying corporate governance mechanisms into external governance (takeover vulnerability) and internal governance (the presence of

institutional blockholders), and investigate how the interaction of these two governance mechanisms is associated with equity returns. In particular, the authors use two proxies for internal governance: the percentage of shares owned by institutional blockholders, and the percentage of shares owned by public pension funds. The paper finds that internal and external governance are complements in relation to stock returns: an investment strategy (screen) based on shareholder rights (external governance) generates an annualized abnormal return of 10-15% when blockholder ownership is high (internal governance). Similarly, an investment strategy based on firm's internal governance mechanism yields annualized abnormal returns of 8% when external governance mechanism is strong (i.e. in firms with few anti-takeover provisions).

It is interesting to study if the same pattern appears in other corporate governance regimes. Bauer, Gunster and Otten (2004) apply the GIM methodology to European data. Corporate governance data are obtained from the Deminor Corporate Governance Ratings, which covers 269 firms included in the FTSE Eurotop 300 for the years of 2000 and 2001. For the period 1997-2000, the governance ratings are assumed to be constant over time. The authors use the overall governance ratings from Deminor, which are the aggregates of 300 criteria covering shareholder rights, takeover defense, information disclosure and board structure. The paper shows that good corporate governance leads to higher stock returns and higher firm value in Europe. In addition, contrary to the findings of GIM, the paper reports a negative relation between corporate governance standards and earnings measures (like ROE).<sup>11</sup>

### ***b. Environmental Screening***

Although simple economic logic suggests that a stringent environmental standard can increase the production costs and thus hurt corporate profitability, a growing body of empirical literature reports a positive relation between corporate environmental performance and firm value. Researchers use various methods to study the effect of environmental performance on value. First, an event study was performed to examine the information content of corporate news on environmental issues. For example, Klassen and McLaughlin (1996) find significant positive abnormal returns after a firm receives environmental performance awards, and significant negative returns after an environmental crisis.

Second, using Tobin's Q as a measure of firm value, some studies investigate if higher environmental standards are associated with a higher market value. Dowell, Hart and Yeung (2000) find that US-based multinational enterprises adopting a stringent global environmental standard have much higher market values than firms with less stringent standards. Konar and Cohen (2001) decompose

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<sup>11</sup> While the above corporate governance studies focus on well-developed market economies such as the US and Europe, Claessens (1997) investigates the relation between corporate governance and equity prices in the context of the transition of centrally planned economies to market economies. He reports that the prices of privatization vouchers depend upon ownership structures: the more concentrated ownership, the higher the prices. However, when an investment bank holds a relatively large share stake (which suggests conflicts of interests), the equity (i.e. voucher) prices are relatively low.

Tobin's Q into tangible asset value and intangible asset value and find that poor environmental performance is negatively correlated with the intangible asset value.

Third, the empirical literature has recently begun to measure the relation between stock returns and environmental performance. Derwall, Gunster, Bauer and Koedijk (2005) construct equity portfolios based on environmental performance criteria, namely the "eco-efficiency" scores from Innovest Strategic Value Advisors, and measure the performance of these portfolios by the Fama-French-Carhart four-factor model (see Section 4.2). A portfolio of firms with high environmental scores (based on positive screening) outperforms a portfolio of firms with low scores by 6% per annum over the period 1997-2003. The authors give two potential explanations: (i) the stock market undervalues the environmental information, and (ii) the eco-efficiency premium captures the premium of some missing risk factors in asset pricing models.

### *c. Stakeholder Relation Screening*

The empirical studies on corporate social responsibility (CSR) have focused on the valuation effect of CSR. For instance, Hillman and Keim (2001) investigate the valuation effect of CSR on market value added (MVA) which is the difference between the market value of equity and the book value of assets (Stewart, 1996). The authors argue that CSR consists of two components: the first (called 'stakeholder management') refers to improving the relationships with primary stakeholders like employees, customers, suppliers and communities, while the second refers to 'social issue participation' like a ban on nuclear energy, avoidance of 'sin' industries (such as gambling, pornography), and not doing business in countries with bad human rights records. Hillmann and Keim show that management focusing on stakeholder value also create shareholder value. In contrast, social issue participation often destroys shareholder value.

Furthermore, the existence of a major shareholder may have an impact on the level of stakeholder management and social issue participation of a company. For instance, major shareholders are visible to outsiders and may therefore become the target of social activism. Using detailed ownership data and data on corporate social responsibility of the S&P 500 firms, Goergen and Renneboog (2002) investigate the impact of ownership on CSR but fail to find a relation between control concentration and CSR.

To conclude this subsection, we summarize the empirical findings of corporate finance and strategy literature on corporate social responsibility. The following components of CSR can enhance shareholder value and thus social welfare: good corporate governance, sound environmental standards, and care of stakeholder relations. Participating in other social and ethical issues is likely to destroy firm value.

## **4 Performance Evaluation of Mutual Funds**

In Section 3 we have discussed firm-level evidence on corporate social responsibility. Before introducing empirical findings of portfolio-level studies on socially responsible investments in Section 5, we review the econometric methodologies used to evaluate mutual fund performance.

#### 4.1 Mean-Variance Analysis

Performance measurement refers to the practice of detecting whether or not a fund manager has special skills to beat a passive benchmark portfolio. We evaluate mutual fund performance from a portfolio perspective: an investor desires to maximize the risk-adjusted returns of his portfolio.

##### *a. Mean-Variance Optimization*

Consider a mean-variance optimizing investor who currently invests in  $K$  risky assets. Let the expected return and the covariance matrix of the  $K$ -dimensional asset return vector  $R_t$  be given by  $\mu_R$  and  $\Sigma_{RR}$  respectively, and the vector of initial portfolio weights is denoted as  $w_R$ . For a risk-averse investor, the mean-variance objective function in terms of certainty equivalence (i.e. the expected return that would make the investor indifferent from a riskless return), is:

$$CE = w_R' \mu_R - \frac{1}{2} \gamma w_R' \Sigma_{RR} w_R \quad (1)$$

where  $\gamma$  is the investor's constant relative risk aversion (CRRA) coefficient (it is assumed that  $\gamma > 0$ ). A mean-variance efficient portfolio is obtained by maximizing Eq. (1) with respect to  $w_R$  subject to the portfolio constraint  $w_R' \mathbf{1}_K = 1$ , where  $\mathbf{1}_K$  is a  $K$ -dimensional vector of ones. It follows that the optimal weighting vector  $w_R^*$  of the mean-variance portfolio is

$$w_R^* = \gamma^{-1} \Sigma_{RR}^{-1} (\mu_R - \eta \mathbf{1}_K) \quad (2)$$

where  $\eta$  is the expected return on the zero beta portfolio of  $w_R^*$ , which can be obtained as the intercept of the line tangent to the mean-variance frontier at  $w_R^*$  (in the mean-standard deviation space). Because of the constraint  $w_R' \mathbf{1}_K = 1$ , it is straightforward to show from Eq. (2) that the zero beta rate  $\eta$  depends on the risk aversion coefficient  $\gamma$ . This implies that each mean-variance efficient portfolio  $w_R^*$  is uniquely determined when either  $\eta$  or  $\gamma$  is known. The zero beta rate  $\eta$  also equals the inverse of the expectation of a stochastic discount factor (Cochrane (2001:108)). Note that when there exists a risk free asset in the economy, the zero beta rate  $\eta$  for every investor can be replaced by the risk-free rate as the mean-variance frontier becomes a straight line.

We now consider the case when an investor extends her initial set of  $K$  assets by adding a set of  $N$  mutual funds. The expected return and the covariance matrix of the  $N$ -dimensional fund return vector  $r_t$  is

denoted by  $\mu_r$  and  $\Sigma_{rr}$  respectively, and the covariance matrix with the set of initial assets is given by  $\Sigma_{rR}$ . Below, the variables referring to the returns of initial assets ( $R_i$ ) and mutual funds ( $r_i$ ) are labeled with subscript R and r, respectively. Variables that refer to the larger return set ( $R_t, r_t$ ) do not have a subscript. Thus, the K+N dimensional weight vector of the extended set is referred to as  $w$ . If the investor cannot extend the mean-variance frontier by investing in the set of N mutual funds, the optimal weight on each of the N mutual funds would be zero. In this case, the extended optimal weight vector  $w^*$  of the K+N assets is

$$w^* = \begin{pmatrix} w_R^* \\ 0_N \end{pmatrix} = \mathcal{Y}^{-1} \begin{pmatrix} \Sigma_{RR} & \Sigma_{Rr} \\ \Sigma_{rR} & \Sigma_{rr} \end{pmatrix}^{-1} \begin{pmatrix} \mu_R - \eta l_K \\ \mu_r - \eta l_N \end{pmatrix} \quad (3)$$

where  $0_N$  is a N dimensional vector of zeros. Substituting (2) into (3) gives

$$(\mu_r - \eta l_N) - B(\mu_R - \eta l_K) = 0_N \quad (4)$$

where  $B \equiv \Sigma_{rR} \Sigma_{RR}^{-1}$  is an  $N \times K$  matrix (see Ter Horst (1998: 40)). If Eq. (4) is valid, the optimal portfolio weight in the K+N assets coincides with the initial optional weight in K assets. In this case, it suggests that the two mean-variance frontiers will intersect at the investor's initial portfolio location.

### ***b. Generalized Jensen's alpha***

Eq. (4) has important implications for the performance measurement of mutual funds. The left hand side of Eq. (4),  $\alpha_j(\eta) \equiv (\mu_r - \eta l_N) - B(\mu_R - \eta l_K)$  (5), generalizes the original Jensen's alpha proposed by Jensen (1968). The original alpha-measure requires that an investor's benchmark assets are a risk free deposit and the market portfolio (see Section 4.2 for details). In that case the zero beta rate is equal to the risk free rate. In contrast, the generalized alpha-measure  $\alpha_j(\eta)$  does not assume that investors initially hold a risk free deposit and the market portfolio.  $\alpha_j(\eta)$  depends on the zero beta rate  $\eta$  and thus the risk aversion coefficient  $\gamma$ . A positive  $\alpha_j(\eta)$  indicates that the corresponding mutual fund outperforms the benchmark assets, while a negative one detects underperformance of the mutual fund. It is straightforward to show that an investor who holds the K benchmark assets can extend the mean-variance frontier by taking a long position in a fund with a positive  $\alpha_j(\eta)$  and a short position in a fund with a negative  $\alpha_j(\eta)$ .

When the generalized Jensen's alpha equals zero (i.e. Eq. (4) holds), it is important to distinguish between two cases. First, Eq. (4) only holds for one value of zero beta rate  $\eta$ . This implies that the mean-variance frontiers of the K assets and the K+N assets have only one point in common (i.e. the intersection). The initial mean-variance efficient portfolio  $w_R^*$  of the investor with zero beta rate  $\eta$  is also efficient for the extended set of K+N assets. Second, if Eq. (4) holds for any value of zero beta rate  $\eta$ ,

implying that the two mean-variance frontiers coincide at every point (i.e. mean-variance spanning). In this case the following testable condition holds,

$$\mu_r - B\mu_R = 0 \text{ and } B\iota_K - \iota_N = 0 \quad (6)$$

and the initial mean-variance efficient portfolio  $w_R^*$  is also efficient on the extended set of K+N assets, independent of the risk aversion coefficient.

The hypothesis that the generalized Jensen's alpha equals zero can be tested with an OLS regression:

$$r_t = \alpha + BR_t + \varepsilon_t \quad (7)$$

where  $\alpha = \mu_r - B\mu_R$  and  $\varepsilon_t$  is the idiosyncratic error term that is genetically uncorrelated with  $R_t$  and has a covariance matrix  $\Sigma_{\varepsilon\varepsilon}$ . In this case,  $\alpha_j(\eta) = \alpha - (\iota_N - B\iota_K)\eta$ . Note that Eq. (7) is essentially a multifactor model. The null hypothesis that the initial efficient frontier intersects with the extended frontier at the point of zero beta rate being  $\eta$  can be formulated by:

$$H_0 : \alpha - (\iota_N - B\iota_K)\eta = 0 \quad (8)$$

while the null hypothesis that the initial frontier spans the extended frontier is:

$$H_0 : \alpha = 0 \text{ and } B\iota_K - \iota_N = 0 \quad (9)$$

Both hypotheses can be tested using a standard Wald test. A rejection of the hypotheses implies that the mutual fund outperforms or underperforms (in terms of mean-variance efficiency) the K benchmark assets. The intuition of the restriction in Eq. (9) is that the benchmark assets can form a portfolio that has the same expected return but lower variance than the mutual funds under consideration. Thus if Eq. (9) holds, any mean-variance investor initially holding the K risky assets cannot extend the investment opportunity set by investing in the N mutual funds.

Note that when both  $r_t$  and  $R_t$  in the regression (7) are excess returns or returns of zero-investment spreads, the condition that benchmark assets form an investment portfolio, i.e.  $B\iota_K - \iota_N = 0$ , is satisfied automatically. In this case, a test of whether or not the initial frontier of benchmark assets spans or intersects the extended frontier by investing in mutual funds is equivalent to a test of whether  $\alpha = 0$ .

### ***c. Generalized Sharpe Ratio***

Another frequently used measure of mutual fund performance is the Sharpe ratio which is defined as the excess return of a portfolio (i.e. expected return minus the risk free rate) per unit of standard deviation risk<sup>12</sup> (Sharpe (1966)). We can easily generalize the Sharpe ratio for a portfolio with K benchmark assets:

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<sup>12</sup> A related performance measure is the Treynor Ratio, defined as a portfolio's excess return per unit of its market risk, where the market risk exposure is measured as the  $\beta_i$  of Eq. (12).

$$\theta_K(\eta) \equiv \frac{w_R' \mu_R - \eta}{\sqrt{w_R' \Sigma_{RR} w_R}} \quad (10)$$

As discussed above, when a risk free asset exists, the zero beta rate  $\eta$  for every investor can be replaced by the risk free rate. Note that in a mean - standard deviation space, the Sharpe ratio of a mean-variance efficient portfolio  $w^*$  is the slope of the tangent line at  $w^*$ . Hence, the mean-variance optimization of a portfolio is equivalent to maximization of the Sharpe ratio.

The Sharpe ratio is obtained by using the expected return and variance of a portfolio, while the generalized Jensen's alpha takes into account the covariance of a portfolio with an initial set of assets (Eq. (5)). The Sharpe ratios answer the question whether a portfolio should be preferred over another portfolio, whereas Jensen's alpha answers the question whether an investor who currently holds K assets should invest in N new assets. However, there is a close relation between the two measures:

$$\theta_{N+K}^2(\eta) = \theta_K^2(\eta) + \alpha_J(\eta)' \Sigma_{\epsilon\epsilon}^{-1} \alpha_J(\eta) \quad (11)$$

where  $\theta_{N+K}^2(\eta)$  and  $\theta_K^2(\eta)$  are the squared Sharpe ratios of the mean-variance efficient portfolios of N+K assets and K assets respectively, and where  $\alpha_J(\eta)$  and  $\Sigma_{\epsilon\epsilon}$  can both be obtained from the regression (7).

It follows from Eq. (11) that Jensen's alpha determines the potential improvement in the maximum attainable Sharpe ratio, i.e. the Sharpe ratio of the mean-variance efficient portfolio including the N new assets. Thus a positive Jensen's alpha also implies benefits from portfolio diversification: by combining the mutual funds under consideration and the benchmark assets, an investor can obtain a portfolio with a higher Sharpe ratio than the one that can be obtained by investing only in benchmark assets.

## 4.2 Performance Evaluation Methodologies

As discussed in Section 4.1, mutual fund performance evaluation requires an appropriate set of benchmark assets. Asset pricing models, from equilibrium models such as the Capital Asset Pricing Model (CAPM) to models such as the Arbitrage Pricing Theory (APT), use different benchmarks of assets. The benchmark assets can be interpreted as factor-mimicking portfolios of risk factors in the economy, such that a performance measure like the generalized Jensen's alpha can be interpreted as a risk-adjusted return. The alpha represents a fund manager's skill in selecting securities based on public and private information, to beat a passive factor-mimicking portfolio.

### a. CAPM

The Capital Asset Pricing Model is an equilibrium model stating that the market risk is the only non-diversifiable risk factor in capital markets. If the CAPM holds, two benchmark assets, namely a market portfolio and a risk free asset, span the mean-variance frontier of all assets in the capital market. Although the validity of the CAPM has been questioned, the Jensen's alpha computed using a single

market index is still a popular measure for mutual fund performance (e.g. Morningstar reports alphas based on a single market index). In this traditional way of performance evaluation, the following regression is estimated by an OLS regression:

$$r_{i,t} - r_{f,t} = \alpha_{M,i} + \beta_i(r_t^m - r_{f,t}) + \varepsilon_{i,t} \quad (12)$$

where  $r_{i,t}$  is the return on mutual fund  $i$  over time  $t$ ,  $r_t^m$  is the return of a broad market index and  $r_{f,t}$  is return on a risk free deposit.  $\alpha_{M,i}$  is the original Jensen's alpha introduced by Jensen (1968) and is equivalent to the generalized Jensen's alpha (Eq. (5)) with the zero beta rate being the risk free rate. As mentioned in Section 4.1, testing whether  $\alpha_{M,i} = 0$  is equivalent to testing whether a risk free deposit and the market portfolio span the extended efficient frontier including the possibility to invest in the mutual fund (in this case, the restriction that portfolio weights ought to sum to one disappears as the risk free asset acts as a benchmark asset). A positive alpha implies that an investor who invests in a risk free deposit and a market portfolio can extend the investment opportunity set by taking a long position in the mutual fund, whereas a negative alpha suggests that a short position in the fund yields a higher risk-adjusted return. If the CAPM holds,  $\alpha_{M,i}$  represents the skill of a fund manager in selecting mispriced securities. Alternatively,  $\alpha_{M,i}$  can be interpreted as the excess fund return adjusted for the market risk, while the mutual fund's exposure to the market risk is measured by  $\beta_i$  (in Eq. (12)).

### ***b. Multifactor Models***

As a single factor of the market risk may not adequately characterize the behavior of expected equity returns, Fama and French (1993) propose a three-factor model to capture the cross-sectional variation in stock returns, which can also be used to evaluate mutual fund performance:

$$r_{i,t} - r_{f,t} = \alpha_{FF,i} + \beta_{mi}(r_t^m - r_{f,t}) + \beta_{si}r_t^{smb} + \beta_{hi}r_t^{hml} + \varepsilon_{i,t} \quad (13)$$

where  $r_t^{smb}$  is the difference in returns between a portfolio of small stocks and a portfolio of big stocks, and  $r_t^{hml}$  is the difference in returns between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks. Testing whether or not  $\alpha_{FF,i} = 0$  is equivalent to testing whether or not the mean-variance frontier of the extended set of assets coincides with the frontier of a risk free deposit, the market portfolio, the spread between small and big stocks, and the spread between high and low book-to-market stocks. Note that as both  $r_t^{smb}$  and  $r_t^{hml}$  are zero-investment portfolios and a risk free asset exists, the portfolio constraint of the spanning test is satisfied. Alternatively,  $(r_t^m - r_{f,t})$ ,  $r_t^{smb}$  and  $r_t^{hml}$  can be interpreted as three zero-investment factor mimicking portfolios, such that  $\alpha_{FF,i}$  is the fund return adjusted for the three risk factors.

Fama and French (1996) report that their three-factor model cannot explain the anomaly of the continuation of short-term returns. Carhart (1997) extends the Fama-French model by adding a momentum factor:

$$r_{i,t} - r_{f,t} = \alpha_{C,i} + \beta_{mi}(r_t^m - r_{f,t}) + \beta_{si}r_t^{smb} + \beta_{hi}r_t^{hml} + \beta_{pi}r_t^{pr1yr} + \varepsilon_{i,t} \quad (14)$$

where  $r_t^{pr1yr}$  is the current month's difference in returns between the previous year's best-performing and worst-performing stocks. From the mean-variance framework described in Section 4.1, it follows that an investor initially holds a risk free deposit, a market portfolio,  $r_t^{smb}$  and  $r_t^{hml}$ , and follows a momentum strategy. Testing whether or not  $\alpha_{C,i} = 0$  is equivalent to testing whether the mean-variance frontier coincides with the initial frontier after adding the mutual fund. Alternatively, Eq. (14) can be interpreted as a pricing model with four risk factors, namely the market, size, book-to-market and momentum.

### c. Conditional Strategies

Up to now, we have assumed that the expected returns and co-variances of mutual funds and benchmark assets are constant over time. However, the expected returns of stocks and bonds may be time-variant (Keim and Stambaugh (1986)). Public information on the economic condition, such as interest rates and stock dividend yields, can predict the changes in expected returns over time. In the mean-variance analysis framework introduced in Section 4.1, mean-variance optimizing behavior crucially depends on the first and second moments of returns. When expected returns change over time, so do the optimal portfolio weights and consequently the efficient frontier as well. This implies that an investor's decision to invest in mutual funds depends on changing economic conditions.

Ferson and Schadt (1996) propose a simple method to incorporate conditional information in measuring mutual fund performance. Consider the case of one mutual fund and two benchmark assets, namely a risk free deposit and a market portfolio. Assume that the exposure to market risk ( $\beta_{i,t}$ ) is a linear combination of a time-constant beta ( $\beta_{i0}$ ) and a time-varying beta ( $\beta_{i1}z'_{t-1}$ ):  $\beta_{i,t} = \beta_{i0} + \beta_{i1}z'_{t-1}$ , where  $z_{t-1}$  is an information set including L variables that reflect the current state of the economy. Both  $\beta_{i1}$  and  $z_{t-1}$  are L dimensional row vectors, and consequently  $\beta_{i1}z'_{t-1}$  and  $\beta_{i,t}$  are time-varying scalars. Frequently used information variables are short-term T-bill rates, dividend yields of a market index, term spread (the difference in the yield between long and short term bonds), and the corporate bond yield spread (the difference in yield between low and high grade bonds). The conditional one factor model is estimated via an OLS regression:

$$r_{i,t} - r_{f,t} = \alpha_{FS,i} + \beta_{i0}(r_t^m - r_{f,t}) + \beta_{i1}(z_{t-1}'(r_t^m - r_{f,t})) + \varepsilon_{i,t} \quad (15)$$

where  $z_{t-1}'(r_t^m - r_{f,t})$  can be interpreted as the excess return of investing  $z_{t-1}$  units in the market portfolio at period t. Compared to the unconditional one-factor model of Eq. (12), the conditional one-factor model

has  $L+1$  factors. It is straightforward to extend the above conditional model to a conditional  $K$  factor model. The model has  $(L+1)*K$  factors to estimate, which is a disadvantage of this model induced by a degrees-of-freedom problem. Similar to other multifactor models with a risk free asset, a test on the abnormal performance of a mutual fund is equivalent to testing whether  $\alpha_{FS,i} = 0$ . A positive alpha indicates that an investor who follows a dynamic strategy to invest in the market portfolio and a risk free deposit, can extend the investment opportunity set by taking a long position in this fund, whereas a negative alpha implies a short position.

#### *d. Seemingly Unrelated Assets*

As discussed above, Equations (12), (13) and (14) can be interpreted as (multi-)factor pricing models, in which the benchmark assets are factor-mimicking portfolios. In this framework, a common interpretation of alpha, conditional on the validity of the pricing model, is that it represents the skills of a fund manager in selecting securities. However, Pastor and Stambaugh (2002b) argue that a non-zero alpha need not necessarily reflect the fund managers' selection skills if *some* passive assets can also generate non-zero alphas. In that scenario, a fund manager could achieve a positive alpha without any selection skills by investing in non-benchmark passive assets with historically positive alphas. To evaluate the fund managers' selection skills, Pastor and Stambaugh (2002a,b) propose to extend the Carhart (1997) model by adding returns of "seemingly unrelated assets" (SUAs) to the right hand side of Eq. (15):

$$r_{i,t} - r_{f,t} = \alpha_{PS,i} + \beta_{mi}(r_t^m - r_{f,t}) + \beta_{si}r_t^{smb} + \beta_{hi}r_t^{hml} + \beta_{pi}r_t^{pr1yr} + \beta_{ui}r_t^{sua} + \varepsilon_{i,t} \quad (16)$$

where  $r_t^{sua}$  is a 4-dimensional row vector of returns of the following four SUAs. The first seemingly unrelated asset is a characteristics-matched spread (denoted as CMS) with a long position in low  $\beta_{hi}$  stocks (as measured by Eq. (13)) and a short position in high  $\beta_{hi}$  stocks. The other three seemingly unrelated passive assets (denoted as IP1, IP2, and IP3) are constructed from a universe of 20 value-weighted industry portfolios. The latter three portfolios mimic the first three principal components of the disturbances in the multiple regressions of the 20 value-weighted industry returns on the other passive returns:  $r_t^m - r_{f,t}$ ,  $r_t^{smb}$ ,  $r_t^{hml}$ ,  $r_t^{pr1yr}$  and  $r_t^{cms}$ . The inclusion of the passive asset CMS is motivated by the empirical evidence that CMS may be mispriced by the Fama-French three factors (Daniel and Titman (1997)). The returns of the three industry portfolios are expected to explain the additional variance of funds' returns, e.g. when  $\beta_{ui} \neq 0$ .

In this model, an investor holds a risk free deposit, a market portfolio,  $r_t^{smb}$  and  $r_t^{hml}$ . She also follows a momentum strategy, and invests in four passive assets that could generate positive alphas (i.e. CMS) or explain the fund's variance (i.e. IP1, IP2 and IP3). Testing whether  $\alpha_{PS,i} = 0$  is equivalent to testing whether the mean-variance frontier after adding the mutual fund coincides with that of the initial

investment opportunity set. Note that Eq. (16) cannot be interpreted as a pricing model, because  $r_t^{sua}$  is the return on SUAs rather than on the mimicking portfolios of risk factors.

Furthermore, it is straightforward to show that the alpha in the Carhart (1997) model ( $\alpha_{C,i}$  in Eq. (14)) can also be computed from the estimates of Eq. (16):

$$\alpha_{C,i} = \alpha_{PS,i} + \beta_{ui}' a_i \quad (17)$$

where  $\alpha_{PS,i}$  and  $\beta_{ui}$  are obtained from regression (16), and  $a_i$  is the intercept in a multiple regression of the four SUA returns on the other passive returns:  $r_t^m - r_{f,t}$ ,  $r_t^{smb}$ ,  $r_t^{hml}$  and  $r_t^{pr1yr}$ . A non-zero  $a_i$  indicates mispricing of SUA, which would lead to a non-zero  $\alpha_{C,i}$  if  $\beta_{ui} \neq 0$ . In Eq. (17), the Carhart (1997) alpha  $\alpha_{C,i}$  is decomposed into two elements: the manager's skills in active stock selection ( $\alpha_{PS,i}$ ) and the exposure to the seemingly unrelated passive assets ( $\beta_{ui}' a_i$ ).

#### ***e. Empirical Findings on Mutual Fund Performance***

Since the publication of Jensen (1968), academics have debated the issue whether or not active portfolio management adds value to investors. The majority of studies conclude that actively managed mutual funds, on average, underperform passively managed portfolios tracking market indices. For example, Gruber (1996) finds that the average mutual fund in the US underperformed the market indices by 65 basis points per year over the period from 1985 to 1994. Furthermore, Carhart (1997) shows that fund returns are negatively correlated with fund expense levels and trading activities.

Using a different approach, some studies investigate the performance of the *stocks* held in mutual fund portfolios, rather than the performance of mutual funds. These studies (e.g. Grinblatt and Titman (1989)) show that fund managers that actively trade possess significant stock-picking talent, i.e. fund managers have the ability to choose stocks that outperform their benchmarks. Wermers (2000) provides a comprehensive analysis of performance of US mutual funds over the period from 1975 to 1994. He finds that mutual funds hold stocks that outperform the market by 1.3% per annum, but the funds' net returns (i.e. after deducting fees) underperform by 1% per annum. Of this 2.3% difference in performance, 0.7% is due to the underperformance of non-stock holdings (e.g. cash), 0.8% is due to fund expenses (i.e. management fees) and the other 0.8% can be explained by transaction costs. The results suggest that fund managers pick stocks well enough to cover their costs, which supports the claim that there is value in active portfolio management.

### **4.3 Related Performance Measures**

The previous subsection presented various models which can evaluate whether or not a mutual fund manager has superior stock selection skills to beat a set of passive benchmark assets. In this section, we

discuss two additional methodologies used to evaluate mutual fund performance, namely a test of market-timing ability and return-based style analysis.

### *a. Market-Timing*

Asset pricing models such as the CAPM predict that a portfolio's excess return is a linear function of the excess return of the market portfolio. However, if a mutual fund manager has the ability to time the market, i.e. to increase the fund's exposure to the market portfolio prior to a market increase and to decrease the exposure prior to a market decline, the fund's return will be a non-linear function of the market return. To test for the market-timing ability of a fund manager, Treynor and Mazuy (1966) add a quadratic term to the standard CAPM regression in Eq. (12):

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i(r_t^m - r_{f,t}) + \gamma_{TM,i}(r_t^m - r_{f,t})^2 + \varepsilon_{i,t} \quad (18)$$

where  $\gamma_{TM,i}$  measures timing ability. If a mutual fund manager increases the fund's market exposure prior to a market increase or reduces the market exposure prior to a market decline, the fund's return will be a convex function of the market return, and  $\gamma_{TM,i}$  will be positive.

Henriksson and Merton (1981) propose to test the market-timing ability by employing the following regression:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i(r_t^m - r_{f,t}) + \gamma_{HM,i}I\{r_t^m > r_{f,t}\}(r_t^m - r_{f,t}) + \varepsilon_{i,t} \quad (19)$$

where  $I\{r_t^m > r_{f,t}\}$  is an indicator variable that equals one if  $r_t^m > r_{f,t}$  and zero if  $r_t^m \leq r_{f,t}$ . In this model, a fund manager decides between two levels of market exposure:  $\beta_i$  is the fund's market exposure when the excess return of the market portfolio is negative, and  $\beta_i + \gamma_{HM,i}$  is the market exposure when the excess market return is positive. Consequently,  $\gamma_{HM,i}$  measures the difference in the exposures between during the market upturn and the downturn. A positive  $\gamma_{HM,i}$  indicates that the fund manager is able to time the market.<sup>13</sup>

### *b. Return-based Style Analysis*

It is widely known that asset allocation is important in determining the return of an investor's portfolio. Asset allocation is referred to as the determination of the portfolio weights across a number of

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<sup>13</sup> Note that the non-linear terms in Eq. (18) and (19) are not returns on benchmark assets or investment strategies, and consequently the alphas in both tests of timing ability do not answer the question whether or not an investor can extend the mean-variance frontier of initial assets by investing in the mutual fund. A positive  $\gamma_{TM,i}$  or  $\gamma_{HM,i}$  can be interpreted as market-timing ability of a mutual fund manager. The above two studies analyze monthly returns of mutual funds and find little evidence of timing ability. However, using daily returns of mutual funds, Bollen and Busse (2001) demonstrate that mutual funds exhibit significant timing ability.

asset classes. Examples of such asset classes are growth stocks, value stocks, bonds, sector portfolios or country portfolios. Although mutual funds report their investment objectives (styles), the actual asset allocation of mutual funds does not always correspond to the reported style (Brown and Goetzmann (1997)). Return-based style analysis, introduced by Sharpe (1992), is a popular way to estimate mutual funds' investment styles and exposures to major asset classes. In style analysis, the following regression is estimated:

$$r_{i,t} = \alpha_i + \beta_i R_t + \varepsilon_{i,t} \quad (20)$$

$$\text{s.t. } \beta_i' l_K = 1 \quad (20a)$$

$$\beta_i \geq 0 \quad (20b)$$

where  $r_{i,t}$  is the return of mutual fund  $i$  in period  $t$ ,  $R_t$  is the return of  $K$  asset classes, and  $\varepsilon_{i,t}$  is the idiosyncratic fund return independent of all  $K$  asset classes, implying that OLS estimates of  $\alpha_i$  and  $\beta_i$  are consistent.

Regression (20) under both the portfolio restriction (Eq. (20a)) and the no short-selling constraint (Eq. (20b)) is referred to as *strong style analysis*.  $\alpha_i + \varepsilon_{i,t}$  is also known as the tracking error, which measures the difference in expected return between the mutual fund and the mimicking portfolio. Thus,  $\alpha_i$  is the average tracking error.  $\beta_i$  reflects the relative portfolio weight of the mimicking portfolio, a portfolio that yields the lowest tracking error variance. *Semi-strong style analysis* refers to the case when only a portfolio constraint is imposed, and *weak style analysis* is referred to the case without constraints.

In the semi-strong style analysis, De Roon, Nijman and Ter Horst (2004) show that the  $\alpha_i$  equals the generalized Jensen's alpha (Eq. (5)) of an investor with the zero-beta rate being the expected return on the Global Minimum-Variance (GMV) portfolio. If one of the benchmark assets is a risk free deposit, the return on the GMV portfolio equals the risk-free rate. In this case,  $r_{i,t}$  and  $R_t$  in Eq. (20) can be replaced by the returns in excess of the risk-free rate, and testing whether  $\alpha_i = 0$  is equivalent to testing whether the initial frontier of  $K$  benchmark assets spans the frontier of the extended assets.

In the strong style analysis, the interpretation of alpha is similar to semi-strong style analysis, except that the benchmark portfolios become the subset of benchmark assets for which the positive constraints are not binding. Note that if the actual factor loadings are positive, the no short-selling constraint leads to efficiency gains; otherwise imposing the no short-selling constraint may lead to biased estimates of factor loadings. Moreover, given that the estimated style coefficients are truncated at zero, the confidence intervals of the estimated coefficients should to be adjusted as the standard errors are not normally distributed. Note that style analysis uses a multifactor model to explain fund returns, which only works well if fund returns are highly correlated with the returns of benchmark assets. Sharpe (1992)

reports that style analysis cannot explain the returns of under-diversified portfolios such as sector funds well.<sup>14</sup>

## 5. Portfolio-level Analysis on SRI

Most academic research on socially responsible investments focuses on analyzing their performance. Whether SRI portfolios underperform or outperform their conventional peers is the major research question. In this section, we review the empirical findings on the performance and money-flows of socially responsible mutual funds.

### 5.1 Research Hypotheses and Methodologies

Ethical funds apply various screening processes to retain stocks complying with specific social, environmental, ethical and corporate governance criteria. These screens may have important implications for the performance of ethical funds. Essentially, there are three hypotheses about the performance of SRI portfolios relative to non-SRI portfolios. The first two hypotheses are about risk-adjusted returns (alphas), while the last hypothesis is about the risk exposures (betas) of SRI portfolios.

The first hypothesis is that *SRI portfolios underperform conventional portfolios*. SRI screens impose a constraint on the investment universe that is available to non-SRI investors. This constraint limits the diversification possibilities and consequently shifts the mean-variance frontier towards less favorable risk-return tradeoffs than those of conventional portfolios. Hong and Kacperczyk (2005) nevertheless show that ‘sin’ stocks in the US, i.e. companies involved in producing alcohol, tobacco and gambling, have historically outperformed the stock market by 9.1% per annum. Divesting from this underpriced ‘sin’ part of the stock market may negatively influence the risk-return tradeoffs of the SRI funds in comparison to conventional funds. Moreover, the SRI screening processes bring about additional expenses to fund investors, which also reduce SRI returns. Note that this hypothesis implies that *more stringent social screening will lead to a less favorable financial performance*.

The second hypothesis is that *SRI portfolios outperform their conventional peers*. As discussed in Section 3, the empirical research shows that the information on corporate governance and environmental performance may be underpriced by the stock markets. Portfolios constructed by means of corporate governance, environmental and social criteria may outperform their benchmarks. Therefore, *SRI screening processes generate value-relevant non-public information* that helps fund managers to select securities and consequently generate better risk-adjusted returns (alphas) than conventional mutual funds.

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<sup>14</sup> In the case of hedge funds, there should be no short-selling constraint (Eq. (20b)). The portfolio constraint (Eq. (20a)) can bias the estimates of style analysis as hedge funds actually use leverage and short-selling strategies. In addition, hedge funds have low correlations with major asset classes. To account for this problem, Fung and Hsieh (1997) extract five principal components from hedge fund returns, and construct five style factors whose returns are highly correlated with the principal components.

This is the case where investors are doing (financially) well while doing (socially) good, i.e. investors earn positive risk-adjusted returns while at the same time participating in a just cause. There are two arguments supporting this 'outperformance' hypothesis: first, sound social and environmental performance is a positive signal of good managerial skills, which translates into favorable financial performance; second, social and environmental screening reduces the possibility of incurring high costs during corporate social crises or environmental disasters. These arguments imply that more stringent social screening may lead to better financial performance. A key assumption underlying the 'outperformance' hypothesis is that conventional portfolio managers do not use the above value-relevant information, which is at odds with the market efficiency story.

The third hypothesis is that *SRI portfolios have different risk exposures and therefore different expected returns than conventional portfolios*. Social and environmental factors may be correlated with pricing risk factors. For example, companies with sound environmental performance may have a lower book-to-market ratio than companies with poor environmental performance (Dowell, Hart and Yeung (2000)). Consequently, an environmentally responsible portfolio may have a lower risk exposure to the book-to-market factor in the Fama-French (1993) pricing model than a conventional portfolio. Therefore the risk exposures and expected return of an SRI portfolio may be different from those of a conventional portfolio. Note that social, environmental or ethical screens may have a different impact on the risk exposures of SRI portfolios.

Finally, it should be noted that the methodology used to evaluate SRI fund performance has evolved. Early research measures the performance of an SRI portfolio using a single index model like the CAPM (Luther, Matatko and Corner (1992), Hamilton, Joe and Statman (1993) and Sauer (1997)). In addition, most studies compare the performance of SRI funds with that of a reference group of conventional mutual funds. It was common to identify the reference group by a "matched-pair" analysis: an SRI fund is matched to a conventional mutual fund with similar investment objective and fund size (Mallin et al. (1995), Gregory et al. (1997), Statman (2000), and Kreander et al. (2005)). Recently, several studies applied multifactor models, such as the four-factor model proposed by Fama and French (1993) and Carhart (1997) to evaluate SRI performance. Multifactor models provide important insights into the exposure of SRI mutual funds to pricing risk factors such as size, book-to-market and momentum factors (Bauer et al. (2005), and Geczy et al. (2003)). We will discuss the findings of these papers in the following sections.

[Insert Table 4 about here]

## **5.2 Performance of SRI Funds in the US**

### ***a. Risk-Adjusted Returns of SRI funds***

There are several studies evaluating SRI fund performance in the US. Hamilton, Joe and Statman (1993) investigate the performance of 32 SRI funds and 320 randomly selected non-SRI funds in the US for the period of 1981-1990. The CAPM-based Jensen's alpha is measured against the value-weighted NYSE index. For the 17 SRI funds with a longer history, i.e. established before 1985, the average alpha is  $-0.06\%$  per month, which is higher than the average monthly alpha ( $-0.14\%$ ) of the corresponding 170 non-SRI funds. Meanwhile for the 15 SRI funds with a shorter history, i.e. established after 1985, the average alpha is  $-0.28\%$  per month, which is worse than the average monthly alpha ( $-0.04\%$ ) of the 150 non-SRI funds. Note that the difference in average alphas between SRI funds and non-SRI funds is not statistically significant.

For the period of 1990-1998, Statman (2000) investigates the performance of 31 SRI funds in the US. The reference group contains 62 non-ethical funds that have a fund size similar to the ethical funds. The two groups of funds have similar average expense ratios:  $1.50\%$  for SRI funds and  $1.56\%$  for non-SRI one. Jensen's alpha is measured against the S&P 500 Index, while the author also shows that choosing the Domini 400 Social Index (DSI 400), the most well known SRI Index, as a benchmark does not change the results. The average monthly alpha is  $-0.42\%$  for SRI funds and  $-0.62\%$  for non-SRI funds, while the difference between them is not significant at the  $5\%$  level. The finding suggests that the performance of SRI funds is not significantly different from that of non-SRI funds, although investing in neither SRI funds nor non-SRI funds can extend the mean-variance frontier of initial assets including the market portfolio and a risk-free deposit. In addition, the paper also documents that the DSI 400 index has a higher Sharpe ratio than the S&P 500 index ( $0.97$  vs.  $0.92$ ), which indicates that a mean-variance optimizing investor should prefer investing in the first index.

#### ***b. Diversification Cost of Investing in SRI Funds***

Comparing the average performance of SRI funds to that of non-SRI funds does not necessarily provide useful information to an investor who can selectively invest in a subset of mutual funds. Unlike the above-mentioned studies, Geczy, Stambaugh and Levin (2003) investigate the diversification cost of an investor who invests in SRI funds but not in conventional mutual funds for the period 1963-2001. The authors construct optimal portfolios of mutual funds for mean-variance investors with short-sale constraints. In a Bayesian framework, each optimization uses the predictive distribution of fund returns conditional upon a range of prior beliefs about model mispricing and manager skills. Then, the optimal portfolio of funds selected from 35 SRI funds is compared to the optimal portfolio selected from a universe of 894 non-SRI funds. The diversification cost of imposing the SRI constraint is measured by the difference between the certainty-equivalent returns (Eq. (2)) on the two portfolios. This financial cost can be interpreted as a lower bound on the value of the non-financial utility that an investor should derive from socially responsible investing.

This study reveals the significant financial costs of imposing the SRI constraint on mean-variance optimizing investors. It also demonstrates that the SRI cost depends on investors' beliefs in asset pricing

models and fund managers' stock-picking skills. To an investor who strongly believes in the CAPM and rules out selection skills, i.e. a market index investor, the financial cost of the SRI constraint is just 5 basis points per month. To an investor who still disallows skill but instead believes in multifactor pricing models such as the four-factor model, the cost of the SRI constraint is at least 30 basis points per month. The SRI constraint imposes large costs, more than 1.5% per month, on investors whose beliefs allow selection skill, i.e. investors who rely heavily on individual funds' historical risk-adjusted returns to predict future performance. Moreover, further restricting the SRI universe to the funds that screen out "sin" stocks (e.g. alcohol, tobacco or gambling) increases the monthly cost of the SRI constraint by an additional 10 basis points.

In addition, Geczy et al. (2003) also show that there are important differences in some basic characteristics and the risk exposures between SRI and non-SRI funds. For the funds in their sample, the average expense ratio of SRI funds is higher than that of non-SRI funds (1.33% vs. 1.10%), whereas the average annual turnover of SRI funds is much lower than that of non-SRI funds (81.5% vs. 175.4%). The SRI funds have a smaller size than non-SRI funds: the average asset under management (across time and across funds) amounts to \$149 million and \$257 million, respectively. In order to make their results comparable to earlier research, the authors also compare the performance of an equally weighted portfolio of 35 SRI funds to an equally weighted portfolio of 894 non-SRI funds. The monthly alpha, measured by the Fama-French-Carhart model extended with seemingly unrelated assets (Eq. (16)), of the first portfolio is higher than that of the second one (0.21% vs. 0.08%), but the difference is insignificant. This finding is consistent with the results of other studies, namely that SRI funds perform no worse than non-SRI funds. Meanwhile, the risk exposure of the SRI portfolio to the size factor (SMB factor) is higher than that of the non-SRI portfolio (0.20 vs. 0.16). This implies that SRI funds are biased towards small-cap companies. The exposures to the momentum factor and book-to-market factor are similar for the two portfolios.

### *c. Impact of Investment Screens on SRI Fund Performance*

The above-mentioned studies compare the performance of SRI funds with non-SRI ones, but they do not distinguish between SRI funds that use different investment screens. However, as discussed in Section 5.1, investment screens may affect the risk-exposures and risk-adjusted returns of SRI funds. In the academic literature, few attempts have been made to investigate the impact of investment screens on SRI fund performance. Goldreyer, Ahmed and Diltz (1999) study the performance of 49 SRI funds for the period of 1981–1997, which include 29 equity funds, 9 bond funds and 11 balanced funds. The average Jensen's alpha of the 29 SRI equity funds is –0.49% per annum, whereas that of 20 non-SRI equity funds is 2.78%. The difference between the two average alphas is not significant, which indicates the performance of these two groups of funds is not dissimilar. The most interesting finding of this paper is that the SRI funds using positive screens outperform SRI funds that do not employ positive screens. The average monthly alpha for equity SRI funds with and without positive screens is –0.11% and –0.81%, respectively. The difference is statistically significant with a t-statistic of 3.36. This finding, although it is

based on a small sample of 29 funds, supports the hypothesis that investment screens affect the performance of SRI funds.

A recent study by Barnett and Salomon (2006) examines whether or not more stringent social screens lead to better financial returns of 67 SRI funds. The authors document a non-linear relationship between fund performance and investment screens. When the number of social screens (both positive and negative ones) increases, the fund's annual return declines at first, but then rebounds as the number of screens reaches a maximum. Note that this paper examines expected returns rather than risk-adjusted returns. Given that the expected return consists of both risk-adjusted returns and loadings on risk premium, it would be interesting to see how investment screens influence each of these two components separately.

### **5.3 Performance of SRI Funds in the UK**

A few studies investigate the performance of ethical funds in the UK. Luther, Matatko and Corner (1992) study 15 ethical funds in the UK for the 1984-1990 period. Jensen's alphas of the ethical funds have a mean of 0.03% per month, which is not significantly different from zero. This implies that ethical funds have a similar performance as the benchmark assets. The authors also document that the ethical funds have relatively high portfolio weights on small-cap companies. To control for the potential small-cap bias of ethical funds, Luther and Matatko (1994) measure the Jensen's alphas of 9 ethical funds in two ways, either against the FT All Share Index or against a Small-Cap Index. The authors find that the R-squared is higher in the first regression than the second one, which supports the hypothesis that the SRI portfolio is biased towards small-caps. Still, the average alphas measured in both these ways are not significantly different from zero.

Unlike the above-mentioned UK studies, Mallin, Saadouni and Briston (1995) compare the Jensen's alphas of 29 ethical funds to those of 29 non-ethical funds with a similar fund size and age. The monthly alphas of ethical funds range from -0.28% to 1.21%, while 22 out of the 29 alphas are positive. The alphas of non-ethical funds, 23 of which are positive, range from -0.41% to 1.56% per month. There is little evidence that the two groups of funds have different risk-adjusted returns. Gregory, Matatko and Luther (1997) examine 18 ethical funds out of the above 29 funds for the 1986-1994 period. The reference group contains 18 non-ethical funds that have similar fund size, age, and investment area to the ethical funds. To account for the small-cap bias, Jensen's alphas are calculated based on two factors, namely the FT All Shares Index and the Hoare Govett Small Cap Index. The two-factor model has a higher adjusted R-squared than the single-factor model, and that most of the ethical funds have a significant exposure to the small-cap factor. The alphas of ethical funds range from -0.71% to 0.24% per month, but almost none are statistically significant. Moreover, in a regression with both ethical and non-ethical funds, the indicator variable of ethical funds does not have significant impact on fund performance

after controlling for fund age, size, and the market risk. This implies that the difference in performance between an SRI fund and a non-SRI fund is again not statistically significant.

#### **5.4 Performance of International SRI Funds**

There are several recent studies investigating the performance of SRI funds in countries other than the US and UK. For the short period of 1996-1998, Kreander, Gray, Power and Sinclair (2005) study the performance of 40 SRI funds in Europe using weekly data. The countries covered in the sample include Belgium (1 fund), Germany (4 funds), Netherlands (2 funds), Norway (2 funds), Sweden (11 funds), Swiss (2 funds) and the UK (18 funds). The reference group to the SRI funds consists of 40 non-SRI funds that are from the same countries and have similar fund size, age, and investment universe as the SRI funds. The average Jensen's alpha of SRI funds and non-SRI ones is similar (0.20% vs. 0.12% per month), and the difference is statistically insignificant. This finding is consistent with the results of previous studies showing that the performance of SRI funds and non-SRI funds are very similar. In addition, the authors test the market timing ability of SRI and non-SRI fund managers, using the Henriksson and Merton (1981) model (Eq. (19)). The timing coefficients are also similar for the two types of funds (-0.29 vs. -0.28), and each of them is significant at the 0.05 level. However, the signs of the timing coefficients are negative, which seems to signify that both SRI and non-SRI fund managers time the market in the wrong direction.

[Insert Table 5 about here]

Bauer, Koedijk and Otten (2005) compare the performance of 103 SRI funds with 4,384 non-SRI funds over the period 1990-2001. The SRI funds come from Germany (16 funds), the UK (32 funds) and the US (55 funds). The sample is survivorship free, as it includes dead funds (all of which are non-SRI funds). Ignoring dead funds would overestimate the average returns of the non-SRI funds in by 0.01%, 0.02%, 0.03% per month for the three countries, respectively. Fund performance is measured by the four factor model (Eq. (14)). As documented in previous studies, ethical funds have a smaller size and charge higher management fees than conventional funds. The average monthly alphas of SRI funds are 0.29%, 0.09% and -0.05% for German, UK domestic and US domestic funds, respectively. The US domestic ethical funds significantly underperform conventional domestic funds, while the difference between the US international ethical funds and the US international conventional funds is insignificant. The UK ethical funds, both domestic and international funds, significantly outperform conventional funds. The difference in average alphas between German SRI and non-SRI funds is insignificant. The authors conclude that there is little evidence that SRI funds significantly over- or underperform non-SRI funds.

In addition, Bauer et al. (2005) also document that German and US ethical funds passed through a learning phase: after significant underperformance in the beginning of the 1990s, they matched conventional fund performance over the 1998-2001 period. Older ethical funds (launched before the end

of 1997) outperform younger ethical funds (launched since 1998). Meanwhile, SRI funds have different risk exposures than non-SRI funds. German and UK ethical funds typically invest more in small-cap stocks than US ones. All SRI funds are more growth- than value-oriented. Another interesting finding is that while the older ethical funds clearly deviated from conventional funds with respect to the exposures to market risk, size and book-to-market factors, younger funds follow less pronounced investment styles.

Another performance study of international SRI funds is performed by Schroder (2004). His sample includes 30 US funds and 16 German and Swiss funds. A two-factor model is employed with both a blue-chip index and a small-cap index as benchmarks to estimate the alphas. The monthly alphas range from  $-2.06\%$  to  $0.87\%$ . Thirty-eight out of the 46 alphas are negative, but only 4 are significant at the 5% level. This suggests that SRI funds do not significantly underperform the benchmark portfolio consisting of both large stocks and small stocks. Using the strong-form style analysis introduced in Section 4.3 (Eq. (20)), Schroder (2004) also studies the exposures of SRI funds to the small-cap index and a number of industry indices. For a portfolio minimizing the tracking-error risk, the average exposures to the small-cap index are 42% for German and Swiss SRI funds and 32% for the US funds. This finding confirms the small-cap bias for SRI funds, especially for the German and Swiss funds. More interestingly, the average exposure to non-cyclical service and consumer goods (such as food, beverage, healthcare and telecom) industries is relatively high for all SRI funds. In addition, German and Swiss funds also have high exposures to utilities (such as electricity, gas and water), whereas the US funds have high exposures to the financial and IT sectors.

Some of Schroder's results are consistent with those of Bauer et al. (2005): the European SRI funds are biased towards small stocks, while the US ones are biased towards large firms. The paper also tests the market timing ability of SRI fund managers by a conditional version of the Treynor and Mazuy (1966) model (Eq. (18)). The significance level of the timing coefficients suggests that only 5 out of the 46 funds demonstrate positive timing ability, while 7 fund managers time the market in the wrong direction (6 of whom are German and Swiss fund managers).

There are two studies investigating the performance of SRI funds outside the US and Europe. Both studies measure the risk-adjusted returns by the conditional version of Carhart (1997) model. Bauer, Otten and Tourani Rad (2006) find that, for the period of 1992-2003, Australian domestic ethical funds underperform their domestic conventional counterparts by  $-1.56\%$  per year, while the Australian international ethical funds outperform their conventional peers by  $3.31\%$  per year. However, none of these differences are statistically significant. For Canadian SRI funds, Bauer, Derwall and Otten (2006) show that the difference in average alphas is insignificant between the 8 SRI funds and 267 non-SRI funds ( $-0.21\%$  vs.  $-0.18\%$  per month). Hence, their findings show that SRI funds do not out- or underperform their conventional counterparts in Australia and Canada.

Using a database consisting of 463 SRI mutual funds in the US, UK, Continental Europe and Asia-Pacific, Renneboog, Ter Horst and Zhang (2007) study the risk and return characteristics of SRI mutual funds around the world. They hypothesize that investors may be willing to pay a premium for firms

meeting ethical/social standards. Consequently, such firms may be priced above their fundamental value, which results in underperformance by SRI funds. The authors also provide evidence in support of this hypothesis: SRI funds in many European and Asia-Pacific countries strongly underperform domestic benchmark portfolios. For instance, the risk-adjusted returns of the average SRI funds in Belgium, France, Ireland, Japan, Norway, Singapore, and Sweden are on average less than  $-5\%$  per annum. In addition, passive portfolios of ethical firms in Europe, i.e. companies included in the European ethical indices, significantly underperform the four benchmark factors by about  $4.5\%$  per annum. While the risk-adjusted returns of SRI funds in the UK and US are not statistically different from those of non-SRI funds, the holdings of these SRI funds may be very similar to those of conventional funds as  $97\%$  of the return variations of the UK and US SRI funds can be replicated by portfolios mimicking the four risk factors. Meanwhile, the results show that investors are willing to pay a premium for ethical firms for two reasons. First, they pay for the risk reduction by the ethical screening of firms. Second and more importantly, the behavioral bias of ‘aversion to unethical corporate behavior’ plays a role, as the premium paid is much higher than what is required to compensate risk.

Furthermore, Renneboog et al. (2007) find that the total wealth invested in ethical funds in Europe (excluding the UK) and the Rest of World is reduced by about  $6\%$  per annum on a risk-adjusted basis. Part of ethical investors’ wealth is transferred to the fund managers who charge management fees of about  $1.5\%$  per annum. On the existence of a ‘smart money’ effect in the SRI fund industry, the results are mixed: although ethical investors are unable to identify the funds that will outperform their benchmarks *ex ante*, there is some fund-selection ability in identifying ethical funds that will perform poorly. In addition, the SRI constraints on the investment universe have a minimal impact on risk diversification, and there is little evidence of market timing ability by SRI fund managers around the world. Although SRI portfolios have a lower Sharpe ratio and are less (mean-variance) efficient than conventional portfolios, SRI funds now hold a more diversified range of assets in their portfolios and gradually converge towards conventional funds. Moreover, the screening activities of SRI funds affect funds’ expected returns: funds with more SRI screens have better returns even after controlling for well-known return predictors. An interesting result is that employing an in-house research team on SRI issues increases fund returns by  $1.2\%$  per annum, which supports the hypothesis that the screening process generates value-relevant non-public information. It also appears that the SRI screens have significant impact on funds’ risk factor loadings.<sup>15</sup>

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<sup>15</sup> There is also another line of research that investigates the performance of SRI portfolios by constructing portfolios using firm-level information. For instance, Grossman and Sharpe (1986) compare the returns of a value-weighted South Africa-free portfolio to those of a comparable unscreened portfolio, and find that the difference in returns between these two portfolios is insignificant. Using KLD social data at the firm level, Guerard (1997) and Stone, Guerard, Gultekin, and Adams (2001) document that there are no statistically significant differences in returns between SRI screened portfolios and unscreened portfolios. Given that we focus on the performance of ethical mutual funds, we do not discuss these studies in detail.

To conclude, in this subsection we present empirical evidence of the performance of SRI mutual funds. For SRI funds in the US and UK, there is little evidence that the risk-adjusted returns of SRI funds are different from those of conventional funds. However, SRI funds in Continental Europe and Asia-Pacific strongly underperform benchmark portfolios. Furthermore, SRI funds have specific tilts in industry compositions and risk exposures.

### **5.5 Money-Flows of International SRI Funds**

As described in the Sections 5.2 to 5.4, most of the existing empirical studies on SRI funds focus on SRI fund performance. In spite of the fact that these SRI funds experienced a tremendous growth in most developed economies around the world, little is known about how investors select funds with explicit non-financial attributes. Investors in SRI funds may care more about social or ethical issues in their investment decisions than about fund performance.

Some recent studies on the behavior of investors in conventional mutual funds show that both financial and non-financial fund attributes affect the choice of a particular mutual fund. Risk-adjusted as well as raw past performance significantly affect the money-flows of mutual funds (Chevalier and Ellison, 1997; Goetzmann and Peles, 1997; Sirri and Tufano, 1998; Gorjaev, Nijman and Werker, 2005). While the top performing mutual funds attract most of the inflows, the weakly performing funds are hardly affected by outflows. This indicates that once money is invested, it tends to be rather sticky (Gruber, 1996). Furthermore, non-financial attributes, like mutual fund visibility (Sirri and Tufano, 1998) and mutual fund advertising (Jain and Wu, 1999), have a significant impact on the money-flows to mutual funds. Berk and Green (2004) introduce a Bayesian model to explain why investors chase past performance. According to this model, rational investors use past performance to update their information on managerial ability, which explains the strong money-flows to the best performing funds.

The first study on the determinants of money-flows in the SRI fund industry was conducted by Bollen (2006), which concentrated on a univariate analysis of money-flows and past returns for US SRI funds. This study shows that, in the US, the volatility of money-flows is lower in SRI funds than in non-SRI funds. Furthermore, the money-flows of SRI funds are less sensitive to lagged negative returns than flows in conventional funds, but more sensitive to lagged positive returns.

Using a database consisting of 410 SRI mutual funds around the world, Renneboog, Ter Horst, and Zhang (2006) study the money-flows into and out of the SRI fund industry. They find that SRI investors chase past returns, past return rankings, and persistence in past performance, as do investors in conventional mutual funds. In particular, SRI funds that can be denoted as persistent winners receive about 30% more money inflows than persistent losers. Unless a fund persistently underperforms, SRI investors care more about past positive returns than about past negative returns. They also show that a higher screening intensity attracts more money-inflows than funds employing few screens. An interesting difference between SRI funds and conventional funds is the effect of fund fees on the money-flows. The

decision to invest in an SRI fund is less affected by management fees and load fees than the decision to invest in conventional funds. This may incentivize fund management companies to enter the SRI market as ethical investors seem to be willing to pay for the management of portfolios consistent with their social objectives.

The variability in the money-flows is a serious concern of mutual fund managers because it can depress fund performance due to the costs of trading the shares of the funds' portfolios which are triggered by the net purchases or sales of shares in the funds. Renneboog et al. (2006) find that smaller, younger or riskier SRI funds have higher money-flow volatility, partly resulting from the higher marketing efforts of these funds. Furthermore, the money-flow volatility is higher for SRI funds that experienced good recent performance, belong to a larger fund family or to a family with top performing funds. This may be due to the fact that myopic investors prefer funds belonging to a large family because switching between funds within the family can usually be done at low cost. An interesting result is that shareholder activism and in-house research of an SRI fund significantly lowers the monthly flow volatility by 1.4% and 0.6%, respectively. Apparently, these two attributes attract more stable investors to the fund.

The authors also examine whether or not SRI investors are able to select (invest their money in) funds that will generate high future performance. The results show that the SRI funds attracting most flows are not generating higher returns. This finding is reinforced by the analysis of the impact of past flows on persistence in (future) returns: they demonstrate that the probability that funds arise as persistent winners is reduced when these funds attract large past money inflows. They interpret this evidence by the emergence of decreasing returns of scale in fund investments. Thus, it seems that ethical money is not financially smart in the sense that the mutual fund reallocation decisions of SRI investors reduce their wealth. But there is one caveat to this conclusion: they find a positive relation between the use of SRI screens and future performance: the screening intensity of SRI funds improves returns. In particular, an SRI fund with 8 more screens is expected (all else equal) to have a higher abnormal return of 38 basis points per month (i.e. 4.6% annually) than SRI funds employing few screens. Apparently, funds with more SRI screens attracting higher money-inflows have better future returns than funds focusing on one or a few investment screens.

## **6. Conclusion**

This paper surveys the literature on socially responsible investments (SRI). Over the past decade, SRI has experienced an explosive growth around the world, and national governments in many western countries have taken regulatory initiatives regarding SRI. Particular to the SRI funds is that both financial goals and social objectives are pursued.

The literature on corporate social responsibility (CSR) shows that, in general, good corporate governance, sound environmental standards, and good management towards stakeholder relations can

create value for shareholders. Participating in other social and ethical issues is likely to destroy shareholder value.

Most existing research on SRI fund performance finds little evidence that the risk-adjusted returns of SRI funds in the US and UK are different from those of conventional funds. However, there is some evidence that SRI funds in continental Europe and Asia-Pacific strongly underperform benchmark portfolios. Finally, the studies on the money-flows of SRI funds show that the volatility and money-flows is lower in SRI funds than in conventional funds, and that SRI investor's decision to invest in an SRI fund is less affected by management fees and funds' risk than conventional fund investors.

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**Table 1: Asset under management of SRI funds and portfolios**

Panel A of this table presents the number (N) of retail SRI mutual funds and their assets under management (AUM, in billion US\$), and Panel B reports the AUM of SRI screened portfolios (including the SRI AUM by pension funds and insurance companies). In Panel A, the European countries included are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Norway, Poland, Spain, Sweden, Switzerland, The Netherlands, and the UK, whereas in Panel B due to data availability, Belgium, Finland, Ireland, Norway, Poland and Sweden are not included. Data in this table are collected from the following sources: US: SIF (1995, 1997, 1999, 2001, 2003, 2005); Europe: SiRi (2002, 2003, 2005), Eurosif (2003); Canada: SIO (2002, 2004); Australia: EIA (2001, 2002, 2003, 2005).

Year	US		Europe		Canada		Australia	
	N	AUM (\$b)	N	AUM (\$b)	N	AUM (\$b)	N	AUM (\$b)
Panel A: SRI retail mutual funds								
1984			4					
1989			20					
1994			54					
1995	55	12						
1996							10	0.1
1997	144	96						
1998								0.2
1999	168	154	159	11				
2000					27	6.6		
2001	181	136	280	13			46	0.9
2002					44	6.7		
2003	200	151	313	15			63	1.1
2004						12.5		
2005	201	179	375	30				
Panel B: SRI retail and institutional fund portfolios								
1995		639						
1997		1185						
1999		2159						
2000						33		
2001		2323						1.0
2002						34		
2003		2164		288				1.8
2004						55		
2005		2290						5.8

**Table 2: SRI regulations**

This table summarizes the regulatory initiatives regarding SRI taken by national government in western countries.

<b>Country</b>	<b>SRI related regulations</b>
Australia	In a 2001 bill it is stated that all investment firms' product disclosure statements should include a description of "the extent to which labor standards or environmental, social or ethical considerations are taken into account." Since 2001, all listed companies on the Australian Stock Exchange are required to make an annual social responsibility report.
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.
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'.
Italy	Since September 2004 pension funds are required to disclose non-financial factors (including social, environmental and ethical factors) influencing their investment decisions.
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.
Sweden	Since January 2002, Swedish national pension funds are obliged to incorporate environmental and ethical aspects in their investment policies.
UK	In July 2000, the Amendment to 1995 Pensions Act came into force, requiring trustees of occupational pension funds in the UK to disclose in the Statement of Investment Principles "the extent (if at all) to which social, environmental and ethical considerations are taken into account in the selection, retention and realization of investments". The Trustee Act 2000 came into force in February 2001. Charity trustees must ensure that investments are suitable to a charity's stated aims, including applying ethical considerations to investments. In 2002, The Cabinet Office in the UK published the Review of Charity Law in 2002, which proposed that all charities with an annual income of over £ 1 m should report on the extent to which SEE issues are taken into account in their investment policy. The Home Office accepted these recommendations in 2003. The Association of British Insurers (ABI) published a disclosure guideline in 2001, asking listed companies to report on material SEE risks relevant to their business activities.
US	Section 406 of the Sarbanes-Oxley Act, which came into effect in July 2002, requires companies to disclose a written code of ethics adopted by their CEO, chief financial officer and chief accountant.

**Table 3: SRI screens**

This table summarizes the investment screens used by SRI mutual funds. In the last column, the ‘-’ refers to a negative screen, whereas ‘+’ refers to a positive one. Data are compiled from Social Investment Forum (2003: 42) and the Natural Capital Institute (www.responsibleinvesting.org).

<b>Screens</b>	<b>Definitions</b>	<b>Type</b>
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 4: Research methodologies of SRI studies**

This table summarizes the research methodologies of studies on socially responsible mutual funds.

Study	Country	Period	No. of Funds	Performance Measures	Market Indices	Reference Group (non-SRI funds)
Luther, Matatko and Corner (1992)	UK	1984-1990	15	CAPM	FT All Share Index or MSCI World Index	No comparisons with non-SRI funds.
Luther and Matatko (1994)	UK	1984-1992	9	CAPM	FT All Share Index or a Small Cap Index	No comparisons with non-SRI funds.
Hamilton, Joe and Statman (1993)	US	1981-1985 1986-1990	32	CAPM	Value-weighted NYSE Index	320 non-SRI funds, randomly selected
Mallin, Saadouni & Briston (1995)	UK	1986-1993	29	CAPM	FT All Shares Index	29 non-SRI funds, matched by fund size and age
Gregory, Matatko and Luther (1997)	UK	1986-1994	18	A two-factor model with two indices	FT All Shares Index and Hoare Govett Small Cap index	18 non-SRI funds, matched by fund size, age, investing area and fund type.
Goldreyer, Ahmed and Diltz (1999)	US	1981-1997	49	CAPM	Wilshire 5000 Equity Index (for equity funds)	180 non-SRI funds, matched by investment objective, fund size and market beta.
Statman (2000)	US	1990-1998	31	CAPM	S&P 500 or DSI 400 Index	62 non-SRI funds, matched by fund size.
Geczy, Stambaugh and Levin (2003)	US	1963-2001	35	CAPM Fama-French (1992) Carhart (1997) Pastor and Stambaugh (2002): IP1-4	CRSP NYSE/ AMEX/ NASDAQ Index	894 non-SRI funds, including dead funds
Schroder (2004)	US, Germany Switzerland	1990-2002	46	A two-factor model with two indices Timing: Treyner and Mazuy (1966) Conditional: Ferson and Schadt (1996)  (Strong) Style Analysis	MSCI World Index and Salomon Smith Barney World Index (for international funds)  S&P 500 and Wilshire Small Cap 250 Index (for domestic US funds)	No comparisons with non-SRI funds.

Kreander, Gray, Power and Sinclair (2005)	Belgium, Germany, Netherlands, Norway, Sweden, Switzerland and UK	1996-1998 (weekly)	40	CAPM  Timing: Henriksson-Merton(1981)	MSCI World Index.	40 non-SRI funds, matched by fund size, age, country, and investment universe.
Bauer, Koedijk and Otten (2005)	Germany, UK and US	1990-2001	103	CAPM  Carhart (1997)  Conditional: Ferson and Schadt (1996)	MSCI World Index or DJ Sustainability Global Index (for international funds);  FT All Share Index or EIRIS ethical balance (for UK domestic funds)  S&P 500 or DSI 400 (for US domestic funds)	4384 non-SRI funds (Germany 114, UK 396, US 3874), including dead funds
Renneboog, Ter Horst and Zhang (2006)	17 countries around the world	1992-2003	410	CAPM	Worldscope value-weighted Equity Index	649 non-SRI funds in the UK
Bauer, Otten and Tourani Rad, (2006)	Australia	1992-2003	25	CAPM  Carhart (1997)  Conditional: Ferson and Schadt (1996)	Worldscope value-weighted Equity index or Westpac Monash Eco Index	281 non-SRI funds including dead funds.
Bauer, Derwall and Otten (2006)	Canada	1994-2002	8	CAPM  Carhart (1997)  Conditional: Ferson and Schadt (1996)	Worldscope value-weighted Equity Index or Jantze Social Index	267 non-SRI funds including dead funds.
Barnett and Salomon (2006)	US	1995, 1997, 1999 (yearly)	67	Average return	No benchmark index.	No comparisons with non-SRI funds.
Renneboog, Ter Horst and Zhang (2007)	19 countries around the world	1991-2003	463	CAPM  Carhart (1997)  Conditional: Ferson and Schadt (1996)  Timing: Treynor and Mazuy (1966)	Worldscope value-weighted Equity Index	716 non-SRI funds in the UK and 12,624 non-SRI funds in the US

**Table 5: Empirical findings of SRI studies**

This table summarizes the empirical findings of studies on socially responsible mutual funds.

Study	Country	Findings
Luther, Matatko and Corner (1992)	UK	The Jensen's alphas of ethical funds have mean of 0.03% per month (not significantly different from 0). Ethical funds have relatively high portfolio weights on small-cap companies.
Luther and Matatko (1994)	UK	The Jensen's alphas of ethical funds are measured against the FT All Share Index or against a Small-Cap Index. R-squared is higher in the first regression than the second one, which implies that the SRI portfolio is biased towards small-caps. The average alphas measured in both ways are not significantly different from zero.
Hamilton, Joe and Statman (1993)	US	For 17 SRI funds established before 1985, the average alpha is -0.06% per month, which is higher than the average monthly alpha (-0.14%) of 170 non-SRI funds (the difference is not significant). Meanwhile for the 15 SRI funds with shorter history, i.e. established after 1985, the average alpha is -0.28% per month, which is worse than the average monthly alpha (-0.04%) of the corresponding 150 non-SRI funds.
Mallin, Saadouni and Briston (1995)	UK	The monthly alphas of ethical funds range from -0.28% to 1.21%, while 22 out of the 29 alphas are positive. Alphas of non-ethical funds, 23 of which being positive, range from -0.41% to 1.56% per month (difference is not statistically different).
Gregory, Matatko and Luther (1997)	UK	The alphas of ethical funds range from -0.71% to 0.24% per month (almost all are not significant). In a regression with both ethical and non-ethical funds, the ethical fund dummy does not have a significant impact on fund performance after controlling for fund age, size, and the market risk. Most of the ethical funds have a significant exposure to the small-cap factor.
Goldreyer, Ahmed and Diltz (1999)	US	The average Jensen's alpha of 29 SRI equity funds is -0.49% per annum, whereas that of 20 non-SRI equity funds is 2.78%. The difference is not significant. SRI funds using positive screens outperform the SRI funds that do not (the average monthly alphas are -0.11% and -0.81%, respectively, and the difference between them is statistically significant).
Statman (2000)	US	The average monthly alpha is -0.42% for SRI funds and -0.62% for non-SRI funds; the difference is not significant (t-statistics = 1.84). The DSI 400 index has a higher Sharpe ratio than the S&P 500 index (0.97 vs. 0.92).
Schroder (2004)	Germany, Switzerland, and US	The monthly alphas range from -2.06% to 0.87%. 38 out of the 46 alphas are negative; only 4 of them are significant at 0.05 level. SRI funds do not significantly underperform the benchmark portfolio consisting of both large stocks and small stocks. Note that 11 out of the 16 German and Swiss funds have higher exposures to the small-cap index than to the large-cap index. Only 5 out of the 46 funds have positive timing ability, while 7 fund managers time the market in the wrong direction.
Geczy, Stambaugh and Levin (2003)	US	The average expense ratio of SRI funds is higher than that of non-SRI funds (1.33% vs. 1.10%), whereas the average annual turnover of SRI funds is much lower than that of non-SRI funds (81.5% vs. 175.4%). The SRI funds have much smaller size than non-SRI funds: the average asset under management (across time and across funds) is \$149 million and \$257 million respectively.  The monthly alpha of the SRI portfolio is higher than that of the non-SRI portfolio (0.21% vs. 0.08%), but the difference is insignificant. Meanwhile, the risk exposure of the SRI portfolio to the size factor (SMB factor) is higher than that of the non-SRI portfolio (0.20 vs. 0.16).  To a market index investor the financial cost of the SRI constraint is 5 basis points per month. The SRI constraint imposes large costs, more than 1.5% per month, on investors whose beliefs allow selection skill. Moreover, further restricting the SRI universe to the funds that screen out "sin" stocks (e.g. alcohol, tobacco or gambling) increases the monthly cost of the SRI constraint by 10 basis points or more.
Kreander, Gray, Power and Sinclair (2005)	Europe	The average Jensen's alphas of SRI and non-SRI funds are 0.20% and 0.12% per month, respectively (difference is statistically insignificant). In addition, the market timing coefficients are similar for the two types of funds (-0.29 vs. -0.28), and each of them is significant at the 0.05 level. However, the signs of the timing coefficients are negative, which implies that both SRI and non-SRI fund managers time the market in the wrong direction.

Bauer, Koedijk and Otten (2005)	Germany, UK, and US	<p>Ethical funds have smaller size and higher expense ratio than conventional funds. The average monthly alphas of SRI funds are 0.29%, 0.09% and -0.05% for Germany, UK domestic and US domestic funds, respectively. The US domestic ethical funds significantly underperform conventional domestic funds, while for US international funds the difference in returns between ethical and conventional funds is insignificant. The UK ethical funds, both domestic and international funds, significantly outperform conventional funds. The difference in average alphas between German SRI and non-SRI funds is insignificant. Overall, there is little evidence of significant differences in risk-adjusted returns between SRI and non-SRI funds.</p> <p>For German and US ethical funds: after significant underperformance in the early 1990s, they match conventional fund performance over 1998-2001. Older ethical funds (launched before 1998) outperform younger ethical funds. German and UK ethical funds are heavily exposed to small-cap stocks while US funds are less so. All SRI funds are more growth- than value-oriented.</p>
Renneboog, Ter Horst and Zhang (2006)	World-wide	<p>Ethical money chases past returns. In contrast to conventional funds' investors, SRI investors care less about the funds' risks and fees. Funds characterized by shareholder activism and by in-house SRI research attract more stable investors. Membership of a large SRI fund family creates higher flow volatility due to the lower fees to reallocate money within the fund family. SRI funds receiving most of the money-inflows perform worse in the future, which is consistent with theories of decreasing returns to scale in the mutual fund industry. Finally, funds employing a higher number of SRI screens to model their investment universe receive larger money-inflows and perform better in the future than focused funds.</p>
Bauer, Otten and Tourani Rad (2006)	Australia	<p>Domestic ethical funds underperform domestic conventional funds by -1.56% per year. International ethical funds outperform their conventional peers by 3.31% per year. None of these differences are significant.</p>
Bauer, Derwall and Otten (2006)	Canada	<p>The difference in average alphas is insignificant between the SRI funds and non-SRI funds (-0.21% vs. -0.18% per month).</p>
Barnett and Salomon (2006)	US	<p>When the number of social screens used by an SRI fund increases, the fund's annual return declines at first, but rebounds as the number of screens reaches a maximum.</p>
Renneboog, Ter Horst and Zhang (2007)	World-wide	<p>Consistent with investors paying a price for ethics, SRI funds in many European and Asia-Pacific countries strongly underperform domestic benchmark portfolios. For instance, the risk-adjusted returns of the average SRI funds in Belgium, France, Ireland, Japan, Norway, Singapore, and Sweden are on average less than -5% per annum. Ethics is a distinct factor that determines the expected equity returns, consistent with ethical firms being less risky. SRI investors are unable to identify the funds that will outperform in the future, whereas they show some fund-selection ability in identifying ethical funds that will perform poorly in the future. SRI funds are gradually converging to conventional funds by holding a more diversified range of assets in their portfolios. Finally, the screening activities of SRI funds have a significant impact on funds' risk-adjusted returns and loadings on risk factors.</p>