



**University of
Zurich**^{UZH}

Department of Banking and Finance
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Extra-financial performance in socially responsible investment
Executive MAS Thesis in Banking and Finance

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Advisor: Annette Krauss

Full Text Version

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Preliminary note

Understandably, no SRI rating agency divulges internal knowledge about their classification rules and their ratings algorithms, which potentially represent comparative advantages.

According to bank-internal rules and following the guidance of the UBS legal department, I am not permitted to disclose UBS business secrets. Therefore, the data sample used during this study does not rely on UBS data sources.

As my work on this thesis has progressed, a number of people have guided, advised and supported me. My special thanks go to the financial analysts and SRI specialists Gianreto Gamboni and Agathe Bolli, who encouraged me to write this diploma thesis. I am also grateful to Mario Marconi, head of the Family Office at UBS AG, who gave me the opportunity to work in the VBI team and collaborate with the experts.

Executive summary

Recent years have seen an increase in the market volume and assets under management of socially responsible investments. Market expectations indicate that this growth will continue for the next few years. Swiss banks want to participate in this growth market.

Fund managers and investors need standardised evaluation procedures and reliable data to assess their investment universe in terms of extra-financial performance. A fundamental element to enable extra-financial performance analysis is the selection of appropriate key indicators. For this study, the Carbon Intensity Unit (CIU) is selected as key environmental, social and governance indicator.

The study develops a new framework to evaluate and decompose the contributors to extra-financial performance. The framework is applied to 76 large global equity funds using CIU data provided by Inrate. The study covers a three-year period from September 2008 to August 2011.

The extra-financial contributions from sector allocation and security selection are analysed, whereby SRI and non-SRI funds are compared.

The extra-financial risk component is measured using environmental reputational risk subscore data provided by RepRisk. The correlation between CIU and environmental reputational risk score within the funds selection is found to be positive.

Financial performance is measured using a risk-adjusted Jensen's alpha and the Sharpe Ratio. The financial results confirm previous research indicating that SRI funds suffer especially during the rebound phase. The relationships between extra-financial and financial performance are analysed and discussed using returns hypotheses.

The demonstration of extra-financial performance remains fundamental to the value proposition of SRI. This is what the investor needs to shift the investment focus onto long-term performance and integrate ESG issues. The aim of this study is to deliver a contribution to moving in this direction.

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List of abbreviations

AuM	Assets under Management	CFA	Chartered Financial Analyst
CH	Confederatio Helvetica	CIU	Carbon Intensity Unit
CO ₂	Carbon dioxide	DVFA	Deutsche Vereinigung für Finanzanalyse und Asset Management
DJSI	Dow Jones Sustainability World Index	EFA	Extra-financial analysis
EFP	Extra-financial performance	EPFL	Swiss Federal Institute of Technology of Lausanne
ESG	Environmental, social and governance	EU	European Union
FP	Financial performance	GHG	Greenhouse gas
ISIN	International Securities Identification Number	LCA	Life cycle assessment
LCI	Life cycle inventory	MDG	Millennium Development Goals
p.a.	Per annum (yearly)	PPP	Purchasing power parity
RRI	Reputational Risk Index	SHV	Shareholder value
SML	Security market line	SRI	Socially responsible investment
UN	United Nations	UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

1.1 Motivation

Financial performance is a necessity for each investor, but it is not a sufficient condition for a credible sustainable investment strategy. The most important characteristic of a sustainable investment strategy is that it explicitly aims to create value along the extra-financial performance (EFP) dimension. A conventional investment strategy does not. In this context, sustainable investments are expected to deliver:

- average financial performance in line with the broad market over a reasonably long investment period
- risk-adjusted returns
- EFP in the form of environmental, social and other added value.

Most of the research currently available focuses on the correlation between financial performance and environmental, social and governance (ESG) factors. These attempts to prove that corporate social performance affects overall business performance have ultimately been inconclusive as indicated by Margolis et al.¹ referring on 127 published studies between 1972 and 2002, and recently confirmed in research projects facilitated by the European Academy for Business in Society (EABIS²).

There are almost no quantitative studies on EFP and there is a lack of standards for measuring, monitoring and reporting investments' EFP. Very often SRI ratings are qualitative, subjective and not transparent; they do not allow for tracking the EFP of portfolios.

The hypothesis of this study is that sustainable investment strategies deliver EFP, and thereby create future value.

¹ Margolis, et al., 2003 S. 273

² EABIS, 2009 S. 7

1.2 Objectives of the thesis

This research is driven by a concrete business need in the area of measurement and valuation of EFP in SRI funds. The thesis focuses on practical aspects, with the following main objectives:

- Provide an understanding of how mainstream financial analysts incorporate ESG factor analysis into their financial reports
- Produce a framework for assessing and quantifying the EFP in selected socially responsible investments vs. non-socially responsible investments
- Study the correlation between ESG key performance indicators and financial performance
- Propose a toolkit for evaluating extra financial performance and improving marketing communication

1.3 Approach

The investigation starts by focusing on EFP, with the definition of the key indicators including information relating to environmental, social, organisational and economic aspects of companies. A similar approach is proposed by Wood for extra-financial analysis practices, in order to understand a company's future cash flows and profits³.

Using selected ESG indicators, the EFP analysis is applied to a limited set of global funds with the aim of investigating differences and patterns between SRI and non-SRI funds. A framework for analysing the determinants of fund EFP is developed and applied to a selection of funds. Regression analysis is used to investigate the degree to which the ESG indicators covary. The financial excess return of the funds is calculated using Jensen's alpha. Finally, PF and EFP values are compared for significant patterns.

This document is organised as follows.

Section 2 explains the concept and characteristics of SRI, the market growth in Switzerland and the relevance of ESG information in financial analysis.

Section 3 presents the selection criteria applied to the key EFP indicators, and describes the database created to measure EFP.

³ Wood, 2005 S. 34-35

Section 4 presents the framework developed to identify the contributions to EFP. It focuses on EFP from a fund manager or client adviser perspective. Section 5 and 6 apply the framework to a sample dataset using one EFP indicator. Section 7 presents and analyses the FP for the fund selection. Section 8 searches for patterns between EFP and FP. Section 9 concludes.

1.4 Scope and limitations

This master thesis has a practical orientation. The aim is to provide a contribution to filling gaps in today's analysis of SRIs. The acquisition of scientific literature on the extra-financial performance of socially responsible investments (SRI) has proven to be difficult. Existing publications mostly study these investments from a financial performance perspective and not from the extra-financial perspective. The theoretical foundation is established using a mixture of academic research, white papers and mimeos from international and private organisations. The usage of the framework to measure EFP and its validity are demonstrated using a selected sample of funds.

For the performance measurements all total returns of stock are collected on a monthly basis and expressed in Swiss francs. The total returns include reinvestments of all cash and bonus unit distributions. The risk-free rate is assumed to remain constant at 0.4%.

In order to maximise comparability in the data selection, the study concentrates on passive funds and excludes active fund management practices.

The name, the issuer and the provider of the funds have no relevance for the analysis. All funds are referenced with a notional fund code. For the sake of completeness, the detailed list of funds is presented in Table 7 in the Appendix.

2. SRI becoming mainstream

This section explains the main reasons for the expected growth in the SRI market, the concept and the characteristics of SRI and the integration of ESG-relevant information into the financial analysis framework.

2.1 Introduction

In the past few years, the market for SRI has been the subject of increasing interest on the part of institutional and retail investors in both Europe and the US. The evolution of SRI into a mainstream investment style has been significantly driven by government legislation. In the US, UK, Canada, and Australia, pension funds and insurance companies have been required to adopt SRI policies, increasing the demand for SRI vehicles.⁴

To cover the growing demand, new SRI products have been developed and launched, and the concept of SRI is continuously evolving.

Eurosif estimates the volume of Swiss SRI AuM in 2009 to be CHF 23 billion, with a major position of 55.4% invested by retail investors. Switzerland is the leader in the SRI thematic funds segment in Europe, with 55% of SRI AuM invested in sustainable funds⁵. Strong growth in SRI AuM, driven by institutional investors, has been predicted over the next few years.

2.2 Definition

The definition of SRI is very difficult, because of the variety of terms and expressions used to describe investment practice that incorporate ESG considerations. Common names that appear in the academic literature are: ethical investment, social investment, responsible investment sustainability/sustainable investment, and so on⁶. Originally introduced by the Church in the UK, today the term “*ethical*” has been almost fully replaced by the term “*social*”.

In this study, the term SRI is used as referenced in the Principles for Responsible Investment

⁴ Sparkes, et al., 2004 S. 46

⁵ Eurosif, 2010 S. 51

⁶ Eccles, et al., 2011 S. 1

promoted by the United Nations (UNPRI) since 2006. The fundamental belief is that ESG issues can affect the performance of investment portfolios⁷.

The investor has several instruments available to implement these principles, such as:

- voting during shareholder meetings
- actively engaging and entering into dialogue with companies
- positive screening and selection of the best achieving companies in a specific sector following ESG targets (commonly known as best-in-class approach)
- negative screening following own ethical principles and excluding investments in controversial companies with high reputational risk
- integration of ESG risks and opportunities into traditional financial analysis
- contributing to sustainable development by investing in mandates focusing on a specific product, process or theme.

According to the latest Eurosif study on corporate pension funds⁸, negative screening, voting and integration of ESG risks and opportunities are currently the most consistently implemented instruments across European countries.

2.3 Integration of ESG factors

There is a considerable body of research proposing frameworks to better integrate ESG factors into a company's financial performance. One interesting example is the European ESG Analyser⁹ developed by UBS Investment Research. The framework, not fully disclosed, focuses on core drivers of business industry models, and offers a complex sector-by-sector analysis of ESG issues.

This study tries to follow a simple approach based on the decision model available to the investor as presented in Figure 1. The interaction between theories and elements of traditional, behavioural and "sustainable" finance is graphically represented in the colour overlay. Essential contributions to the development of the traditional financial theory are: the observations on value and security prices published by Graham and Dodd (1934)¹⁰, the introduction of the notion of diversification by Markowitz¹¹ (1952), the development of Mean

⁷ UNEP Finance Initiative, 2011

⁸ Eurosif, 2011 S. 19

⁹ Hudson, et al., 2010

¹⁰ Graham, et al., 1988

¹¹ Markowitz, 1952

Variance Analysis by Tobin¹² (1952), the proposition of the Random Walk Theory and the notion of efficient markets developed by Fama¹³ (1965).

Behavioural finance represents the latest and most important development in finance theory. Originally introduced by Daniel Kahneman (Nobel Prize 2002) and Amos Tversky in 1987, it is based on so-called Prospect Theory and provides a new descriptive analysis of risk based on the perception of prospect and the evaluation of gains and losses¹⁴. According to this framework, Markowitz's "rational" and "expected-utility-maximizing" investor becomes more "human" and "behavioural".

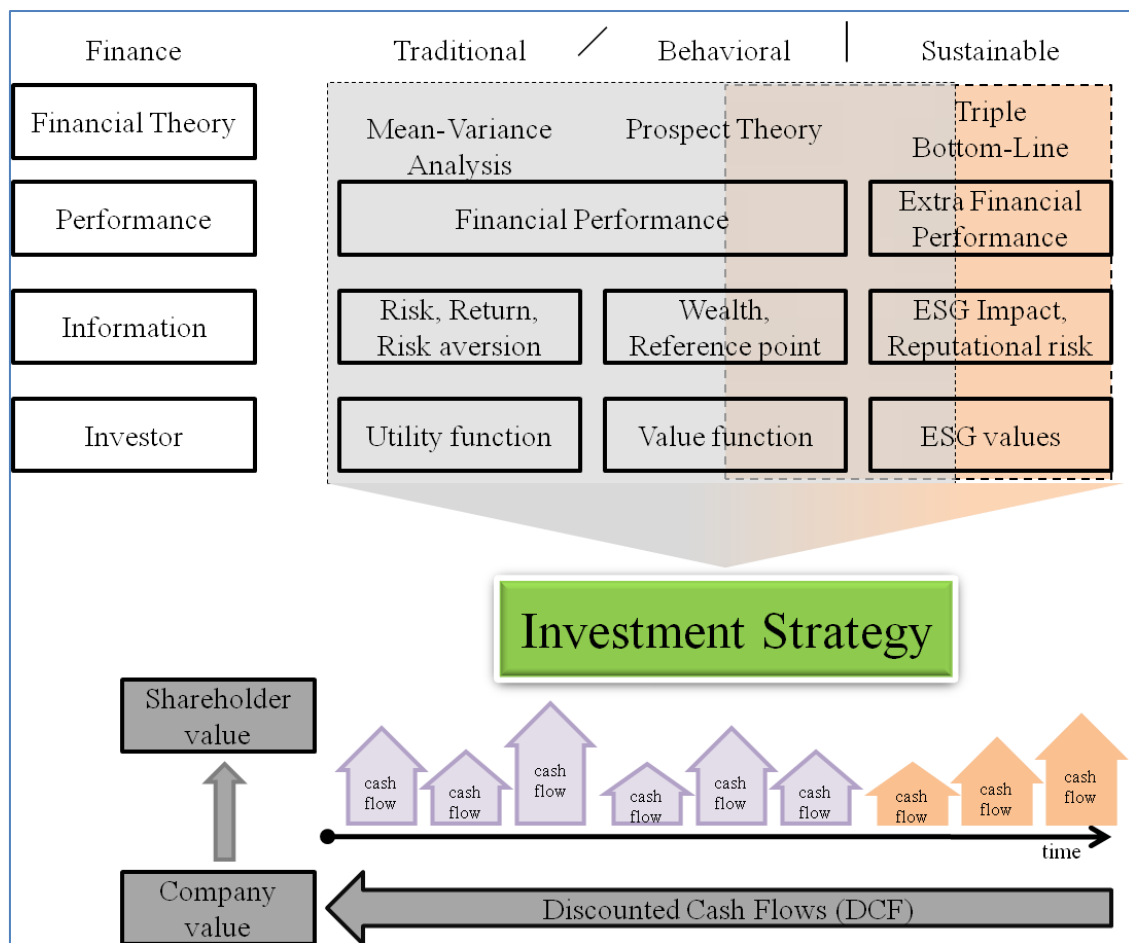


Figure 1: Integration of ESG factors in the financial analysis¹⁵

¹² Tobin, 1958

¹³ Fama, 1965

¹⁴ Kahneman, et al., 1987 S. 289

¹⁵ Source: own research

The processing of the information may be distorted by cognitive bias¹⁶ like framing or overconfidence, as well as by decision and behavioural bias influencing the investor's decisions. The relevance of social and psychological factors in systematic biases is commonly accepted in the academic literature. As discussed by Shiller¹⁷, this influence can contribute to the development of speculative bubbles, posing a threat to future stock markets. Today's broad offering of structured products as a solution to overcome these biases is evidence of the importance of behavioural factors in the markets. It is proven that intangibles are important for investors' decisions, therefore we can also expect the process of selecting SRI-relevant information to be influenced by cognitive biases. Finally, transposed to the socially responsible investor, it is difficult to make a clear distinction between rational and irrational behaviour. As presented in the next section, the data available to the decision process when evaluating the ESG impact of companies are often noisy and difficult to compare. We cannot exclude that investors are also induced to invest in ESG responsible companies by framing biases. There is a lack of empirical evidence and research on this topic.

For the scope of this study, the basic assumptions made are presented in Figure 1. Socially responsible investors' decisions are supposed to be driven by wealth and reference point information combined with ESG impact and reputational risk information. Driven by the necessity to integrate economic and social dimensions by achieving environmental progress, Elkington¹⁸ introduced the concept of Triple Bottom Line as Win-Win-Win strategy for sustainable development.

As shown in Figure 1, this new strategy where business, society and environment all win can be applicable to both traditional and behavioural finance. From a normative ESG point of view companies should provide long-term economic performance by avoiding short-term controversies with minimal environmental impact. In the past two decades, the role of civil society has gained importance in the ways business produce wealth. With the development of the World Wide Web, public information is easy accessible across the globe, increasing the interaction between stakeholder and shareholder. In the stakeholder perspective¹⁹, companies operate by public consent and are responsible to society as a whole via ESG considerations.

¹⁶ Hens, et al., 2008 S. 70

¹⁷ Shiller, 2003 S. 93

¹⁸ Elkington, 1994

¹⁹ Van Marrewijk, 2003 S. 97

Finally, the stakeholders, often represented by associations of civilians and NGOs, introduced new values and approaches, which investors today can no longer ignore. Companies which are able to integrate social and economic dimensions into their value proposition following the principle of shared value²⁰ can obtain a competitive advantage.

The investment strategy is the result of all decisions reflecting investor utility and/or value function combined with the investors' ESG values. Graham, the father of "value investing", considered realistic investments focusing on long-term returns the best strategy to avoid big losses. Both rules are still fundamental today, especially for SRI styles. The way a company is managed now dictates reputational risk and long-term business success. This effect is represented by the discounted cash flows and the future financial performance for the shareholder in the lower section of Figure 1.

2.4 Development during the credit crisis

Zarbafi²¹ sees reasons for stronger linkages between SRI and the 'corporate' and social responsibility of businesses, especially in the current global credit crisis.

In particular today, the discussions regarding investment and financial flows need to address climate change. Moving forward, during the financial crisis the UN²² suggested introducing new financial options, tools and mechanisms to enable an effective response to climate change. Reforms to governance and the global financial architecture present opportunities to shift governments' investments onto a more efficient and sustainable path. In 2010 the UNEP Finance Initiative²³ reported that investors had begun deploying significant capital into low-carbon investment opportunities in countries that have strong policies providing long-term certainty and enabling credible mid- to long-term risk assessment.

²⁰ Porter, et al., 2006 S. 7

²¹ Zarbafi, 2010 S. 54

²² United Nations, 2008 S. 105

²³ UNEP Finance Initiative, 2010 S. 3

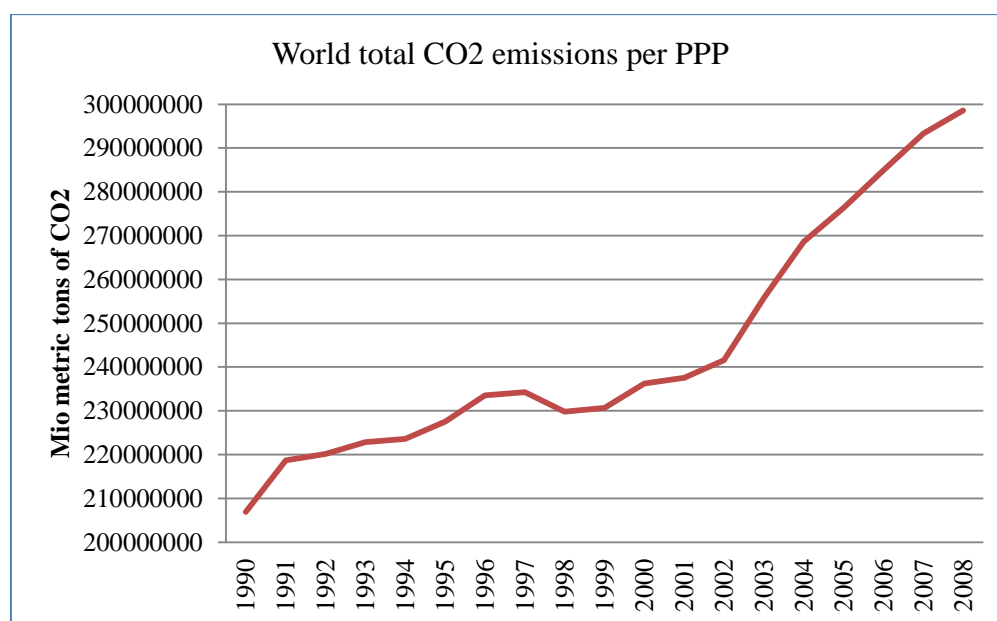


Figure 2: Increasing world total CO2 emissions 1990-2008²⁴

2.5 Evolving towards a low-carbon economy

Figure 2 depicts a steadily rising curve of world total CO2 emissions since 1990. This trend shows very clearly the failure in fulfilling the Kyoto protocol²⁵ agreements of 1998. The target agreed by 31 countries was to reduce overall CO2 emissions by at least 5% below 1990 levels in the commitment period 2008 to 2012. Now we can measure an increase of more than 40% per cent above 1990 levels; the world's economy is developing towards a steep wall. The positive trend of the curve between 2002 and 2008 also makes it clear that the greenhouse gas (GHG) emission problem will not be mitigated with CO2 reduction certificates alone.

The growing focus on low-carbon economies and environmental footprints is one of the results of political and environmental initiatives driven by the UN and the EU over the past decade. The Europe 2020 Strategy²⁶ for smart, sustainable and inclusive growth proposes the development of a low-carbon economy through improved ESG disclosure. One of the five Europe 2020 targets²⁷ involves the reduction of GHG emissions by 20% compared to 1990

²⁴ Source: own research using data from (United Nations, 2011)

²⁵ United Nations, 1998

²⁶ European Union, 2011

²⁷ European Union, 2011

and an increase in energy efficiency, with 20% of energy produced using renewable resources. Following the UNFCCC and the MDGs²⁸, the UN effectively supports an active reduction of global CO₂ emissions. Unfortunately, as presented in Figure 2, global GHG emissions have continued their ascent over the last decade²⁹. The evident failure in the implementation of the Kyoto Protocol³⁰ and the uncertainty in the carbon-credits markets³¹ reinforce the need for appropriate investment incentives and policies by governments and international institutions. The requirements for supportive instruments and policies to motivate companies to reduce GHG emissions is reinforced in the latest OECD work on “Financing Climate Change Action and Boosting Technology Change”³². The private sector will increase their investments especially in innovation and diffusion of environmentally sound technologies³³. It is an assumption of this study that this trend will strongly increase in the future. The measurement of ESG is discussed in next chapter.

²⁸ United Nations, 2008

²⁹ United Nations, 2011 S. 49

³⁰ United Nations, 1997

³¹ Bakker, et al., 2007 S. 77

³² OECD, 2011 S. 7

³³ United Nations, 2010 S. 20

3. EFP indicators and data

The aim of this section is to present the relationship between ESG factors and EFP indicators and applied selection criteria. The rationale behind the development towards a low-carbon society and the importance of the CIU indicator are explained. Finally, the data used for the investigation are presented.

3.1 Introduction

Back in 1983, the Brundtland Commission³⁴ described the requirements for a sustainable development of the world economy, and emphasised the need to find a balance between environmental, social and economic systems. This recommendation is still the basis for any SRI product today. EFP as described by Pontus³⁵ includes aspects which ordinary financial assessment and the mainstream financial community overlooks, but which are aspects that determine the future prosperity of the firm.

The EFP can be measured introducing scores on ESG factors. There are at least two elements to be considered:

- The impact, representing the contribution of the company to the extra-financial performance as factor impact
- The risk, representing the reputational risk to which the company is exposed

Each company has the opportunity to position itself in relation to these two elements. In this context, companies choosing cleaner technologies, focusing on business ethics, product responsibility and corporate governance should benefit from a better reputation and sustainable growth with long-term stable cash flows. Investors need to evaluate these risks in their portfolios. If an investor wanted to come as close as possible to a theoretically “perfect” investment with high return for low risk, he would be looking for companies with the best financial and extra-financial attributes.

³⁴ World Commission on Environment and Development, 1983

³⁵ Pontus, et al., 2009 S. 8

3.2 Choice of indicators

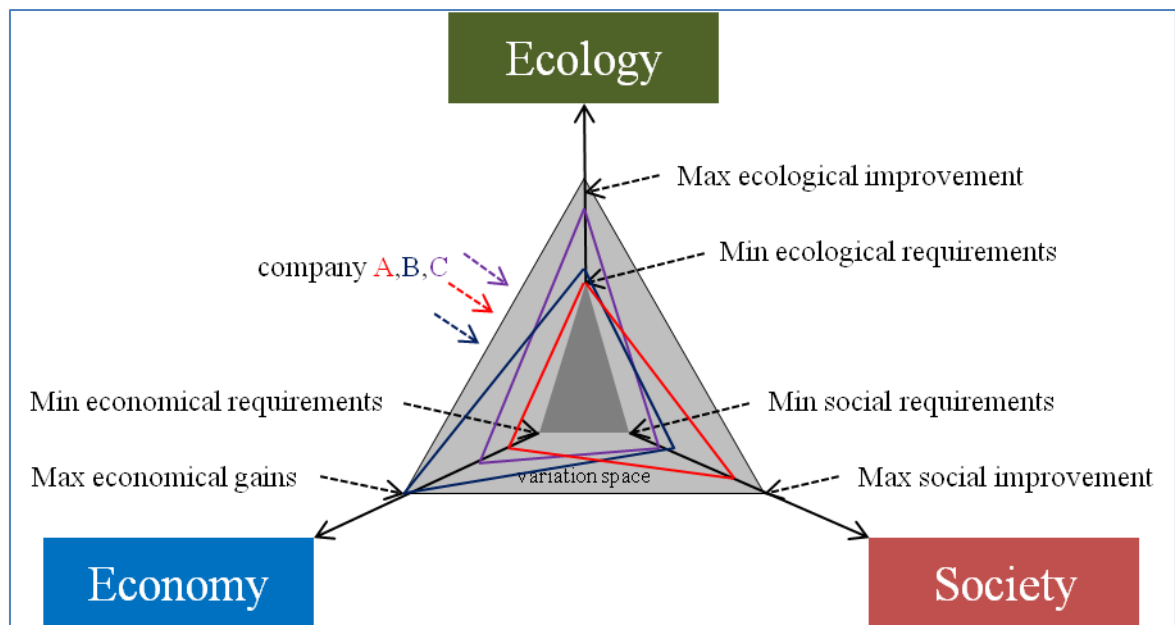
For the evaluation of EFP the choice of the correct indicators is key. The approach chosen for the definition of these indicators is similar to the criteria selection proposed by the DVFA³⁶.

Consequently, each choice of indicators on ESG must fulfil the following conditions:

1. Describe a relationship to risk and/or success of the company
2. Be significant for investment decisions
3. Be measurable and quantifiable
4. Be comparable and reliable for benchmarking
5. Be accepted by mainstream financial analysts and investors

The 3 main functions of EFP indicators can be summarised as follow:

1. Provide transparency on the productive capabilities and the risk exposure of the company.
2. Deliver additional information on ESG factors and EFP within the context of a long-term maximised increase of the shareholder value³⁷.
3. Represent ESG indicators that are relevant for the financial performance of the company.



³⁶ Bassen, et al., 2008

³⁷ Schäfer, 2008 S. 7

Figure 3: Magic sustainability triangle³⁸

The variation space in the centre of the “Magic sustainability triangle”³⁹ shown in Figure 3 depicts the influence of ESG factors on potential EFP indicators. Each company can be positioned in the grey triangle according to the company’s specific ESG impact. Using the conditions listed above, the following EFP indicators are taken into initial consideration:

Environmental indicators

- CO2 emissions
- Water consumption

Social indicators

- Number of jobs created by the company
- Staff turnover

Governance indicators

- Volatility of asset growth
- Leverage

The quality of the datasets available is the major initial constraint for a quantitative investigation. Without rating standards available, assessing the reliability and statistical significance of the rating scores is a major challenge and a potential source of error. In order to mitigate the risk of obtaining meaningless results, the constraints and limits of each EFP indicator are discussed with specialists from the rating companies and from UBS. The results of these discussions are summarised in the following table.

EFP Indicator	Relationship to risk (1)	Measurable (3)	Comparable (4)	Mainstream (5)	Data available
CO2 emissions	YES	YES	YES	YES	YES
Water consumption	YES	NO	YES	NO	NO
No. of jobs created	YES	YES	YES	NO	NO
Staff turnover	YES	YES	YES	NO	NO

³⁸ Source: own research adapted from Schäfer

³⁹ Schäfer, 2008 S. 4

Asset growth volat.	YES	YES	NO	YES	YES
Leverage	YES	YES	NO	YES	YES

Table 1: EFP indicator selection matrix⁴⁰

Comparability and availability of information are the key selection criteria for a potential EFP indicator. As shown in Table 1, the only comparable ESG-relevant data available on a global scale relate to CO2 emissions measured in CIUs, as explained in Section 3.3. Social indicators like “Staff turnover” or “No. of jobs created” are especially difficult to collect globally. One explanation for this is that the disclosure of socially relevant corporate data remains voluntary while environmental data, at least in the developed countries, must be disclosed by law. “Leverage” and “Volatility of asset growth” are commonly accepted and often used by CFAs to identify indicators for market stability and economic activity. At a local or regional level, they could both potentially be used as governance indicators. But these data are often not globally comparable due to regional differences in economic cycles and the typical sector rotation through them.

These problems are confirmed by other studies indicating that a common universal standard of indicators is missing⁴¹ and corporate reports are often too complex to allow company comparability over time⁴². Within the scope of this study, the only historical data available globally, on a standard scale and with company-level granularity are data related to environmental impact. The next sections will focus especially on this subject.

3.3 Data

SRI and ESG are relatively recent concepts and long time data series are not yet available. In order to obtain consistent and quantifiable results, the data collected for the study cover the period between August 2008 and September 2011. This period is exposed to extremes during two economic phases:

- the financial crisis between late 2008 and early 2009, characterised by credit risks and losses in a bear market

⁴⁰ Source: own research

⁴¹ Staub-Bisang, 2011 S. 84

⁴² Malcolm, 2008 S. 26

- the rebound between the first half of 2009 and mid-2011, characterised by high liquidity and a bull market

3.3.1 Funds data

All funds data are collected using Morningstar Direct. Geographically, the research scope is limited to global funds; regional investments in specific markets or sectors are excluded. Applying the criteria listed in Table 2, the sample of funds available from Morningstar is reduced from 3,229 initially to 55 SRI funds. All financial data are in the form of total monthly returns and are expressed in Swiss francs.

• Funds flagged Socially Conscious by Morningstar (for SRI funds only)
• Broad category Equity
• Fund size > 20 million for SRI funds
• Inception < 01.08.2008
• Number of Holdings > 20
• Benchmark: MSCI World or DJ Sustain World

Table 2: Selection criteria for fund selection⁴³

Morningstar⁴⁴ uses the Socially Conscious funds definition interchangeably with Socially Responsible funds. This group includes funds that may make investments based on environmental responsibility, human rights, or religious views. It also includes funds that avoid investing in alcohol, tobacco, gambling or the defence industry.

The category Equity indicates that the fund selection should include only the equity asset class, no major bonds or cash parts.

For comparison purposes, 25 non-SRI funds are additionally selected, following the same selection and the highest fund size. In total, the fund selection includes 80 global funds. This number is expected to provide enough data points for statistically significant analysis.

The complete list of funds is shown in Table 7 in the Appendix.

The benchmark published in the fund selection prospectus refers to the MSCI World or the Dow Jones Sustainability World. Detailed historical information on the composition of both

⁴³ Source: own research

⁴⁴ Morningstar

indices is available only under special licence from SAM or Dow Jones Indexes. In order to overcome this, the UBS-ETF MSCI World (Fund No. 92) is used as MSCI World proxy for EFP benchmarking. The assumption is that both the market portfolio and the MSCI World are efficient, following the efficient market theory as defined by Bodie⁴⁵. All relevant market information is fully incorporated into the prices of stocks (semi-strong form efficiency). The market is following a random walk (weak-form efficiency), where hexogeny of behavioural bias is possible.

3.3.2 RRI data

RepRisk AG⁴⁶ is owner and provider of the Reputational Risk Index (RRI) data: quantitative risk measures referring to environmental and social risks. The RRI scope is aligned with the principles addressed by the UN Global Compact and covers: environmental footprint, community relations, employee relations, corporate governance and product portfolio-related risks. A detailed list of controversial issues addressed by RRI is available in Figure 21 (Appendix).

Exclusively for this study, RepRisk AG provided the monthly ESG subscores used to calculate the RRI during the period between March 2008 and August 2011 and the Peak RRI for 2015 companies.

Each subscore indicates the exposure of the company with respect to environmental, social or governance criticism during the preceding two weeks, with a decay to zero in 18 months. The range is from 0 (no exposure) to 100 (very high exposure).

3.3.3 CIU data

Inrate⁴⁷ is an independent advisory and rating organisation active since 1990, and specialising in ESG analysis. In Inrate's Analysis Framework, the overall sustainability performance of a company is the result of a combination of a total of 153 sustainability metrics across all ESG factors. The environmental assessment of companies is based on the quantitative model env@IMPACT⁴⁸, developed in 2005 by Olivier Jolliet and François Maréchal at the "Ecole polytechnique fédérale de Lausanne (EPFL)" to measure GHG emissions. This approach

⁴⁵ Bodie, et al., 2009 S. 348

⁴⁶ www.reprisk.com

⁴⁷ www.inrate.ch

⁴⁸ Centre Info, 2011

measures the carbon intensity of companies over the whole value chain, integrating input/output analysis with LCA⁴⁹ and LCI⁵⁰ methodologies following 5 steps:

1. Assess the impact of the supply chain and production phase
2. Extend input/output analysis with life cycle assessment (LCA) and life cycle inventory (LCI) and adjust for potential double counting
3. Express carbon intensity of sectors in units
4. Analyse the company activity
5. Link company activity analysis to carbon intensity of sectors

“Collateral” emissions can be much more important than direct emissions; therefore the data need to reflect the lifecycle. The results are expressed in CIU per company as the total amount of GHG emissions in tons over the entire value chain per USD million of turnover. Exclusively for this study, Inrate provided the yearly CIUs of 1,656 large global companies for the years 2008, 2009 and 2010.

3.3.4 Database

In order to store and analyse the funds data extracted from Morningstar together with the data provided by Inrate and RepRisk, the database shown in Figure 4 is created and populated. Normally, the ISIN is used by all data providers as a unique security identifier because it cannot be issued to two different securities. Nevertheless, it is astonishing how many different ISINs can be found for the same company. Ratings are company-based and, to avoid mismatch with the security-based funds, a routine to clean the company mapping is developed. The “*company_helper*” table is created to identify all data referring to the same company and maximise the coverage in the funds. This very time-consuming procedure in the data handling might also be an explanation why studies including EFP indicators are so rare. To mitigate this problem, it would be advisable to introduce a new, unambiguous and mandatory standard international security identification code for companies.

⁴⁹ Green Design Institute, 2011

⁵⁰ UNEP, 2011

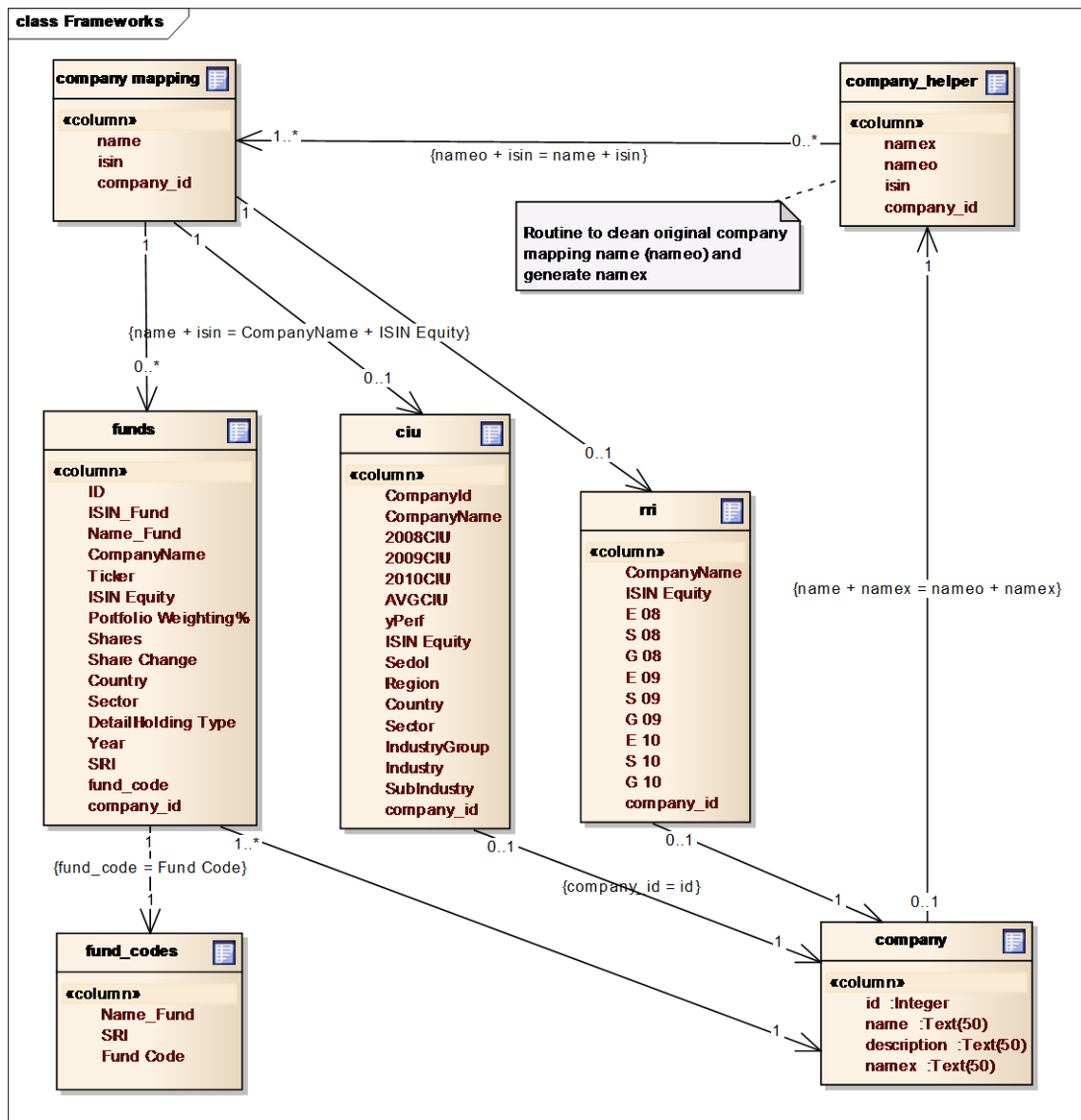


Figure 4: Class diagram model for the database⁵¹

3.3.5 Data coverage

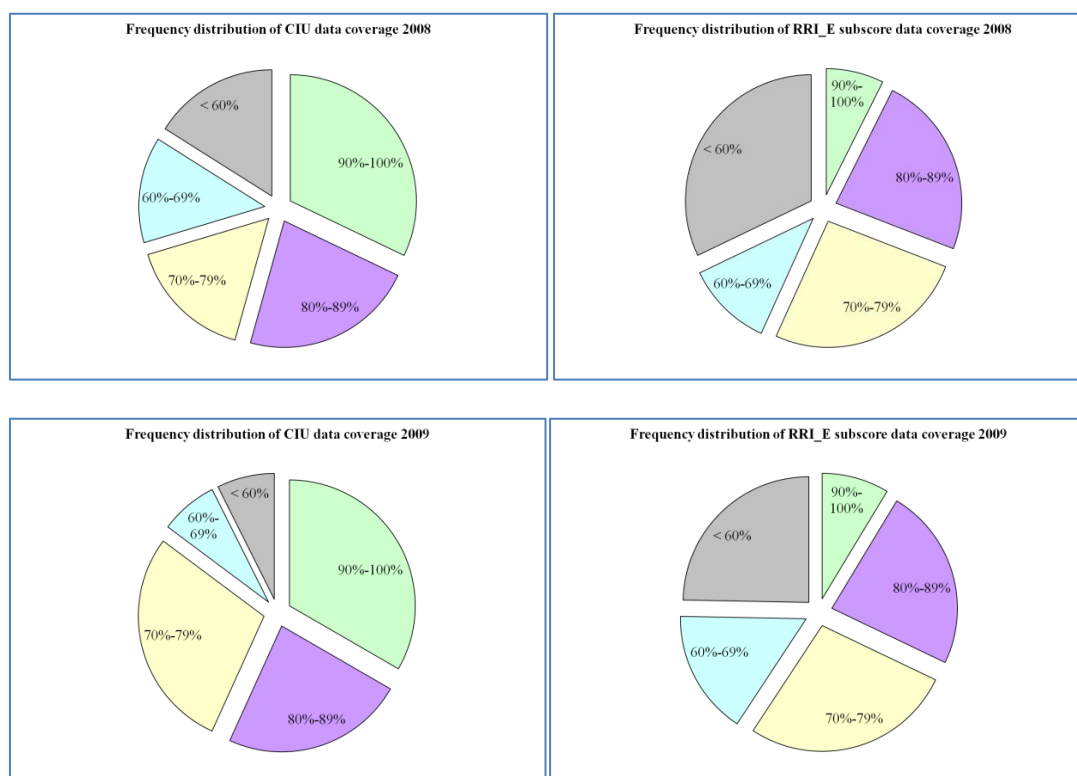
First, for each year the quality of the funds, CIU and RRI_E data available for the investigation is analysed. An overview is presented in Table 3. It is observable that between 2008 and 2010 the overall number of companies across the fund selection increased by around 10% per year. In particular, the number of companies with a higher (> 1%) and lower (< 0.1%) weighting within the funds both increased.

⁵¹ Source: own research

Companies weightings in funds selection	Number of distinct companies in funds selection			% funds companies with CIU data (Tot. 1657 companies)			% funds companies with RRI_E data (Tot. 2010 companies)			Intersection between CIU data and RRI_E with selection		
	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
w<0.1%	1451	1600	1856	33%	27%	25%	19%	13%	14%	10%	8%	7%
0.5%>w>=0.1%	588	493	471	60%	59%	49%	33%	32%	30%	25%	26%	21%
1%>w>=0.5%	349	415	358	58%	57%	64%	37%	34%	38%	31%	29%	31%
2%>w>=1%	386	492	572	69%	68%	64%	52%	51%	48%	46%	43%	41%
w>=2%	316	326	349	78%	75%	70%	68%	69%	64%	62%	61%	55%
Total	3090	3326	3606									
AVG				59%	57%	54%	42%	40%	39%	35%	33%	31%

Table 3: Overview of available company data

The sample with company CIU data provided by Inrate is 18% smaller than the sample provided by RepRisk. Nevertheless, across the current fund selection there are more companies with corresponding CIU data than companies with RRI_E data. The intersection between both indicators is on average lower than expected, with a value of 31% in 2010. The impact of the “missing” company data for each fund in the selection is analysed by calculating the funds data coverage. For this purpose, for each fund the specific company weightings with matching CIU or RRI_E data are added together. The overall fund selection is tailored by dividing the data coverage range into 5 categories: 90%-100%; 80%-89%; 70%-79%; 60%-69%; < 60%. Each fund is then assigned to a data coverage category, as shown in Figure 5. The 2010 results show 94% of the selected funds having a CIU data coverage of more than 60% but only 75% of the selection with the same RRI_E coverage.



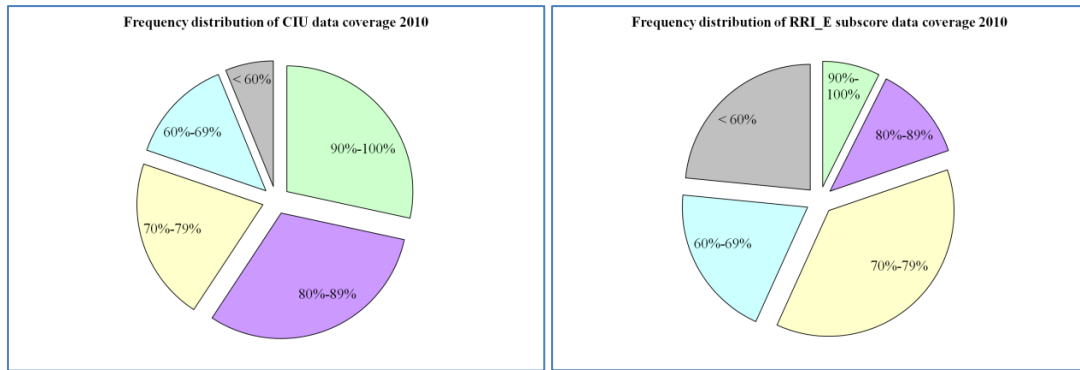


Figure 5: Data coverage of CIU (right) and RRI_Environmental subscores (left) ⁵²

The frequency distribution shows that, for both CIU and RRI_E, the data quality and the coverage in the funds has improved since 2008, confirming the observations made in Table 3. The main reasons for the insufficient coverage of certain funds is the cash and bonds part allocated in the fund.

Based on these results, in order to maintain high data quality a minimum value of 60% data coverage is set as prerequisite for the further consideration of funds in the analysis.

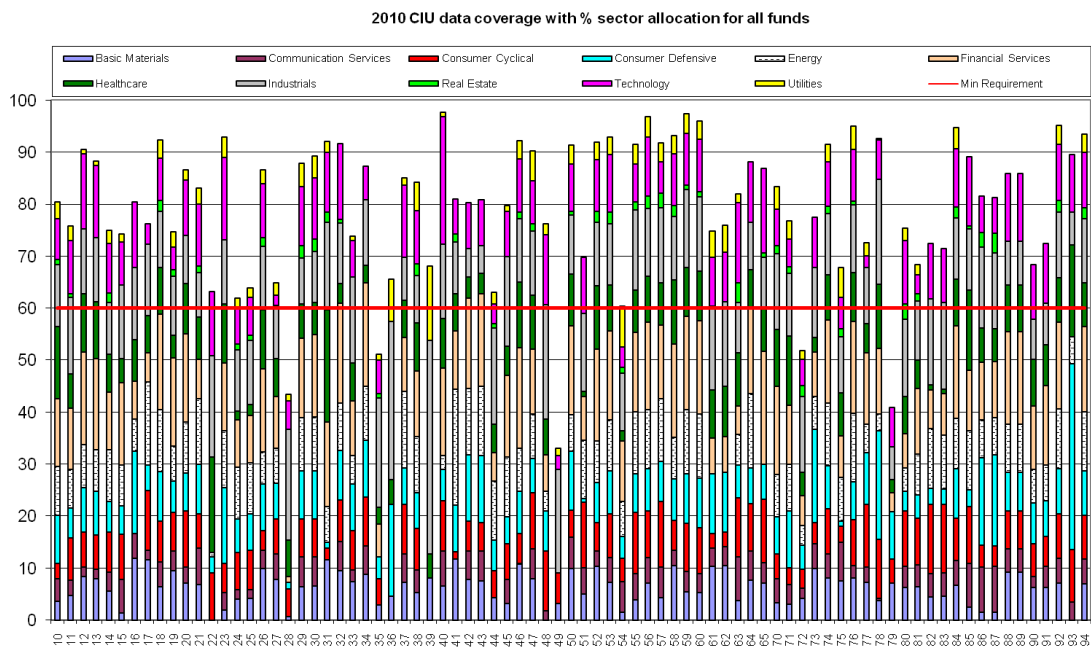


Figure 6: 2010 CIU data coverage with total sector allocation for all funds ⁵³

⁵² Source: own research using data provided by MorningStar, Inrate and RepRisk

Figure 6 shows the CIU data coverage for each fund which had been selected according to the criteria explained in Section 3.3.1. The SRI funds are listed on the left and numbered from 10 to 65, the non-SRI funds are listed on the right and numbered from 70 to 94. The following funds do not fulfil the 60% coverage requirement and are excluded from further EFP analysis:

No.28	SRI	Henderson Global Care Growth A
No.35	SRI	Living Planet Equity A
No.49	SRI	Skandia Ethical
No.72	non-SRI	Amundi International SICAV AU-C
No.79	non-SRI	Neptune Global Equity AAcc

⁵³ Source: own research using data from MorningStar

4. EFP framework

This section presents the methodology developed to calculate the CIU impact and the proposed framework for measuring the contributions of sector allocation and of security selection to EFP.

4.1 Methodology

The main purpose is to decompose the EFP, adapting a known approach accepted by mainstream financial analysts to decompose financial returns. The decomposition framework proposed in this investigation is derived from the idea developed by Brinson, Hood and Beebower⁵⁴ (BHB) to calculate the active contributions to the total financial performance.

The BHB attribution system decomposes the total return into three components:

- 1) Sector contribution
- 2) Security contribution
- 3) Interaction contribution

The sum of all three components expresses the results of investment decisions made by the fund manager during the portfolio construction and management process. The variability between portfolio and benchmark can be mainly determined by the asset allocation.

In order to apply the same principle to the EFP, the financial concept of “return” is replaced by the SRI concept of “ESG impact”⁵⁵, as shown in Equation 1. The fund ESG impact is defined as the weighted sum of all social and environmental impacts of all companies held by the fund.

$$\text{Fund ESG Impact} = \text{Benchmark ESG Impact} + \text{Active ESG Impact}$$

Equation 1: ESG impact

In Equation 1 the difference between each fund ESG impact and the benchmark ESG impact is defined as “active ESG impact”. A positive active ESG impact indicates that, with respect to a defined selection of ESG indicators, the fund has a worse EFP compared to the benchmark.

⁵⁴ Bianson, et al., 1986

⁵⁵ Not to be confused with the “ESG Impact Monitoring” service offered by MSCI.

4.2 Determinants of EFP

This section gives an overview of the generic framework for analysing the EFP of funds.

$$A: \text{Sector contribution} = (F \text{ Sector } w - B \text{ Sector } w) * (B \text{ ESG Impact})$$

$$B: \text{Security contribution} = (B \text{ Sector } w) * (F \text{ ESG Impact} - B \text{ ESG Impact})$$

$$C: \text{Interaction} = A \cap B$$

Equation 2: The determinants of a fund's EFP

The sector contribution measures the ESG impact of weighting a sector within the fund (F) differently than the benchmark (B). With this attribution approach, overweighting sectors with positive active ESG impact increases the sector contribution to the overall fund ESG impact. The sector contribution assumes that the fund contains the exact same securities as the benchmark, and that their within-sector weights are exactly the same as the benchmark. Equation 2 shows that the security contribution measures the impact of weighting specific securities differently than the benchmark. The security contribution assumes that the sectors are weighted in the same proportion as the benchmark, but that the individual securities are differently weighted than the benchmark.

Finally, the contribution from interaction measures the effects of interaction between sector allocation and security selection actions. It is generated whenever there is a decision to overweight/underweight both a sector and a security.

4.3 Using the framework

The application of the EFP framework is presented using the CIU as ESG indicator.

4.3.1 Definitions

The **Equity CIU Impact** (C_E) for each equity position E in the fund at a given time t is given by:

$$C_{Et} = W_{Et} * CIU_{Et}$$

Where:

W_E = Equity Weight

CIU_E = Carbon Impact Unit for Equity

The **Sector Weight** (W_S) for each sector S in the fund at a given time t is given by:

$$\forall \text{ equities } E \in S; \quad \mathbf{W}_{St} = \sum \mathbf{W}_{Et}$$

The **Sector CIU Impact** (C_S) for each sector S in the fund at a given time t is given by:

$$\forall \text{ equities } E \in S; \quad \mathbf{C}_{St} = \frac{1}{\mathbf{W}_{St}} * \sum \mathbf{C}_{Et}$$

The **Fund CIU Impact** (C_F) for each fund F at a given time t is given by:

$$\forall \text{ sector } SF \in F; \quad \mathbf{C}_{Ft} = \sum (\mathbf{W}_{SFt} * \mathbf{C}_{SFt})$$

The **Benchmark CIU Impact** (C_B) for the benchmark B at a given time t is given by:

$$\forall \text{ sector } SB \in B; \quad \mathbf{C}_{Bt} = \sum (\mathbf{W}_{SBt} * \mathbf{C}_{SBt})$$

The **difference** between Fund and Benchmark CIU Impact, therefore, is:

$$\mathbf{C}_{Ft} - \mathbf{C}_{Bt} = \sum (\mathbf{W}_{SFt} * \mathbf{C}_{SFt}) - \sum (\mathbf{W}_{SBt} * \mathbf{C}_{SBt}) = \sum (\mathbf{W}_{SFt} * \mathbf{C}_{SFt} - \mathbf{W}_{SBt} * \mathbf{C}_{SBt})$$

4.3.2 Contributions

Each term in the last summation equation can be rewritten in a way that shows how sector allocation versus security selection decisions for each fund contribute to overall EFP:

contribution from sector allocation (1)	$(\mathbf{W}_{SFt} - \mathbf{W}_{SBt}) * \mathbf{C}_{SBt}$
+ contribution from security selection (2)	$\mathbf{W}_{SBt} * (\mathbf{C}_{SFt} - \mathbf{C}_{SBt})$
+ contribution from interaction (3)	$(\mathbf{W}_{SFt} - \mathbf{W}_{SBt}) * (\mathbf{C}_{SFt} - \mathbf{C}_{SBt})$
= Total contribution to EFP (4)	$(\mathbf{W}_{SFt} * \mathbf{C}_{SFt} - \mathbf{W}_{SBt} * \mathbf{C}_{SBt})$

Equation 3: Total contributions to EFP

Equation 3 (1) measures the contribution of sector allocation to EFP. It shows how deviations from the benchmark in the sector weight of the fund add to or subtract from the total EFP.

Equation 3 (2) measures the impact of security selection to EFP. It shows how the sector CIU impact for the fund compared to the benchmark adds to or subtracts from the total EFP.

Equation 3 (3) measures the impact of the interaction between Equation 3 (1) and Equation 3 (2). Finally, Equation 3 (4) shows the total contribution to EFP from the determinants sector allocation, security selection and interaction. In this example, the EFP calculation is

presented for the CIU indicator. The same equations can be easily adapted for any other indicator (as long as comparable data for other indicator is available).

5. EFP using CIU data

This section presents the practical application of the framework introduced in the last section, using CIU as ESG indicator for the fund selection.

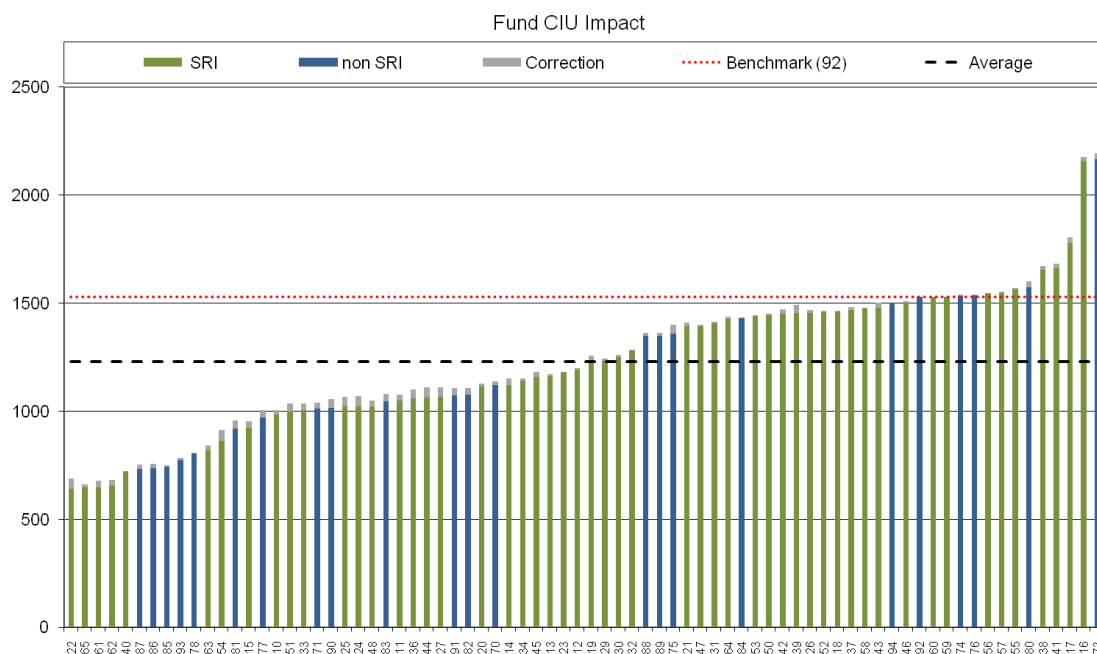


Figure 7: Fund CIU impact for all funds⁵⁶

Figure 7 illustrates the fund CIU impact in ascending order, with the benchmark represented by the dotted line and the average CIU impact represented by the dashed line.

For each fund the CIU impact value is calculated as the weighted sum of tons of CO₂ emissions per million USD for the companies held in the fund. The aggregation of companies with indirect CIU impact introduces a potential double-counting problem related to the input/output analysis with LCA and LCI mentioned in Section 3.3.3. For that reason, the fund CIU impact values represent the “worst case” scenario and must always be considered relative to each other. A detailed study published by Pictet⁵⁷ estimates the impact of double counting using a sustainable optimised portfolio and the MSCI World to be 40%. In the same study, Pictet uses a score of 1,552 CIUs for the MSCI World. This value is very close to the 1,522 CIUs calculated in this study for the benchmark, and confirms the valid choice of Fund No. 92 as MSCI World proxy.

⁵⁶ Source: own research using data provided by Morningstar(2010) and Inrate(2008-2010)

⁵⁷ Butz, 2008 S. 19

A clear pattern between SRI and non-SRI funds is not identifiable. Both groups contain funds with negative and positive deviation from the benchmark. The “Correction” part represents the estimated CIU impact for the uncovered investment part. For its calculation, the benchmark CIU impact is used as multiplier for the weights of companies not listed in the data provided by Inrate. With an average of 2%, its influence is negligible.

Figure 7 shows that the “best” funds (i.e. those with the lowest CIU impact) are SRI funds, but there are also many non-SRI funds with a clearly lower CIU impact than the average SRI CIU impact. The surprising observation is that the SRI label is not a guarantee for low-carbon emission investments as expected from the hypothesis in chapter 1.1. This behaviour is analysed in more detail using statistical analysis. Fund No. 16 (SRI) and Fund No. 73 (non-SRI) are initially identified as outliers and removed from the sample. Both funds have a very high CIU impact due to the investments in the basic material sector, as shown in Section 5.1. Figure 8 illustrates that the frequency distribution of the fund CIU impact is not symmetric.

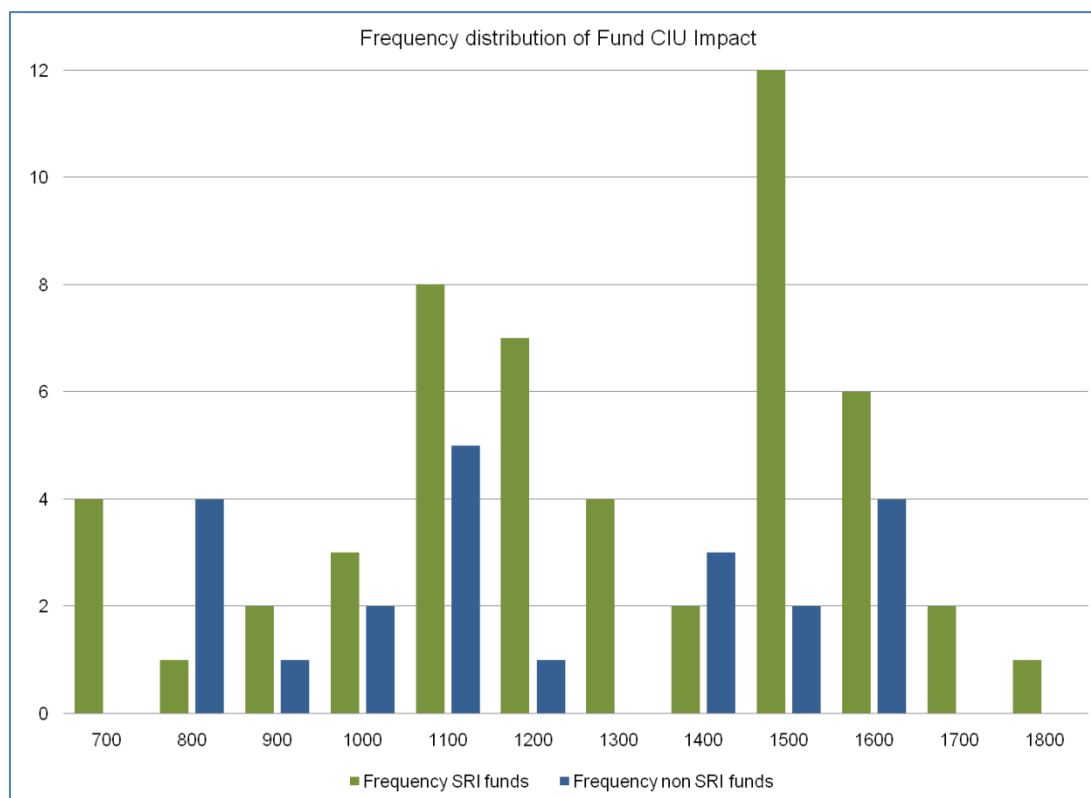


Figure 8: Frequency distribution of fund CIU impact⁵⁸

⁵⁸ Source: own research

The slightly negative skew pattern confirms the observation made on Figure 7, that the CIU impact distributes almost randomly across SRI and non-SRI funds. The Excel skew of -0.25 goes against expectations. In fact, with 70% of the fund selection labelled SRI, the expected distribution is positively skewed.

This situation cannot be conclusively attributed to a single reason. The statistical analysis of all holdings indicates an intersection percentage of 94% between SRI funds and non-SRI funds. There are at least two possible explanations for this large overlap of companies.

One explanation is systemic, related to benchmarking practices and investors' expectations on the financial performance of SRI funds. Often, SRI funds are offered as investment vehicles with the irrational promise that they will outperform a non-SRI benchmark over the long term. In this scenario, financial implications are more important than the extra-financial aspects, following Friedman's⁵⁹ principle whereby the only social responsibility of business is to increase stakeholder profits. With this approach, the SRI fund's manager defines the fund's holdings primarily on the basis of financial performance, without considering and benchmarking the impact of intangibles and ESG factors on the funds.

Another possible explanation might be that the best-in-class approach is nowadays common practice for the creation of funds and the distinction between SRI and non-SRI funds is not always clear-cut. Best-in-class is a relative approach, whereby the fund manager defines a minimum ESG rating threshold for the selection of companies within a given investment universe without exclusion. Being the best does not necessary mean having a sustainable ESG impact overall. So it is very common, especially in the universe of large global companies, to observe controversial companies with high carbon emissions having a correspondingly high ESG rating.

Table 4 illustrates this pattern with an example showing the average CIU values for the period between 2008 and 2010 for the ten major components of the DJSI. The DJSI has been calculated since September 1999 and represents the top 10% of the largest 2,500 companies in the Dow Jones Global Total Stock Market. The company's selection criteria follow a typical best-in-class approach based on long-term economic, environmental and social criteria. Comparing the CIU average values listed in the right column of Table 4, the presence of the energy multinational BHP Billiton among the top ten components of the DJSI becomes at least questionable.

⁵⁹ Friedman, 1970

Company	Sector	DJSI Weight*	Avg_CIU 2008-2010
Nestle S.A.	Consumer Defensive	2.67%	884
International Business Machines Corp.	Technology	2.61%	346
Johnson & Johnson U.S.	Healthcare	2.24%	289
General Electric Co. U.S.	Industrials	2.17%	2600
Novartis AG	Healthcare	2.00%	210
HSBC Holdings PLC (UK Reg)	Financial Services	1.94%	670
Coca-Cola Co.	Consumer Defensive	1.87%	682
BHP Billiton Ltd.	Basic Materials	1.78%	7864
Vodafone Group PLC U.K.	Communication Services	1.70%	148
Roche Holding AG Part. Cert.	Healthcare	1.53%	209

* : Source © CME Group Index Services LLC ; August 31, 2011.

Table 4: Averages CIU values for top ten components of DJSI⁶⁰

With respect to environmental factors, BHP Billiton is among the companies with the highest CIU impact. In descending order, its CIU value covers position 16 in the CIU data sample list of 1,656 companies available for this study.

The objective of the next sections is to search for additional relevant information and patterns, analysing each individual fund in more detail.

5.1 Sector allocation

A breakdown of the Morningstar equity sector is presented in the following table:

Sector	Description	Companies e.g.
Energy	Companies that produce or refine oil and gas, oil field and equipment services. It includes companies engaged in the mining of coal and pipeline operators.	BP, ExxonMobil, Royal Dutch Shell
Utilities	Companies that provides Electric, gas, and water utilities.	Electricité de France, Exelon, PG&E Corporation
Basic Materials	Companies that manufacture chemicals, building materials and paper products. It includes companies engaged in commodities exploration and processing.	ArcelorMittal, BHP Billiton, Rio Tinto
Real Estate	Companies engaged in mortgages, property management companies and REITs.	Kimco Realty Corp, Vornado Realty Trust, Westfield Group
Industrials	Companies that manufacture machinery, handheld tools, industrial products as well as companies engaged in transportations, logistic services, aerospace and defense.	3M, Boeing, Siemens
Consumer Cyclical	Companies engaged in residential construction, lodging facilities, restaurants and entertainment. It includes retail stores, auto and auto parts manufacturers.	Ford Motor Company, McDonald's, News Corporation
Consumer Defensive	Companies engaged in the manufacturing of food, beverages, household, personal products, packaging, or tobacco. It includes education and training services.	Philip Morris Intl, Procter & Gamble, WalMart Stores
Financial Services	Companies that provide financial services which includes banks, savings and loans, asset management companies, credit services, investment brokerage firms, and insurance companies.	Allianz, J.P. Morgan Chase, Legg Mason
Technology	Companies engaged in the design, development, manufacturing and support of computer operating systems, storage, networking, semiconductors and applications.	Apple, Google, Microsoft
Healthcare	Companies engaged in biotechnology, pharmaceuticals, research services, home healthcare, hospitals, longterm care facilities and medical equipment.	Astra Zeneca, Pfizer, Roche Holding
Communication Services	Companies that provide communication services with fixed line networks or wireless access. It includes companies that provide internet services.	AT&T, France Telecom, Verizon Communications

Table 5: Sector descriptions as defined by Morningstar (modified)

⁶⁰ Source: own research

Table 5 presents the criteria used for the sector designations in this study. Each security within the mix of funds is assigned to one sector.

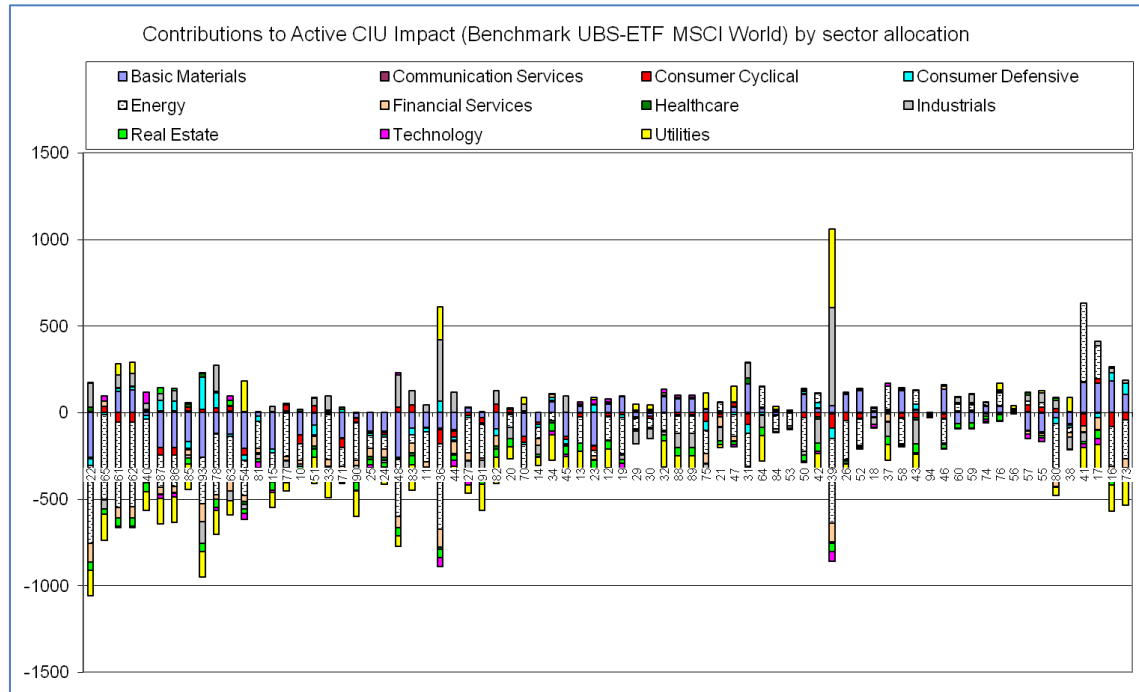


Figure 9: Contribution of sector allocation to active CIU impact⁶¹

Figure 9 shows the positive and negative contributions of the sector allocation to the active CIU impact for the same order of funds presented in Figure 7. The benchmark CIU impact is represented with a value of zero. A negative CIU impact value indicates a positive contribution to the EFP with respect to the benchmark, while a negative EFP contribution is represented by positive CIU impact values. A consistent pattern of high CIU impact contributions is visible across the sectors energy, basic materials and utilities. Funds with more than 20% weights invested in one of these three sectors exhibit a high fund CIU impact. An effective CIU impact reduction can be achieved by decreasing investments in at least one of these three sectors. The most significant CIU impact reduction is in fact observable across the SRI funds that exclude investments in the sectors basic materials and energy, as proposed in Fund No. 22 (energy excluded) and Nos. 65, 61 and 62 (basic materials excluded). Although all four funds have a CIU impact clearly below average, the exclusion of sectors implies the rejection of the best-in-class approach.

⁶¹ Source: own research using data provided by MorningStar and Inrate

This restriction is not applicable to the remaining fund selection, so the CIU impact across sectors is now analysed in more detail.

Figure 10 shows the percentages of CIU impact attributable to the sector allocation for all funds, grouped into quartiles, sorted from lowest to highest CIU impact.

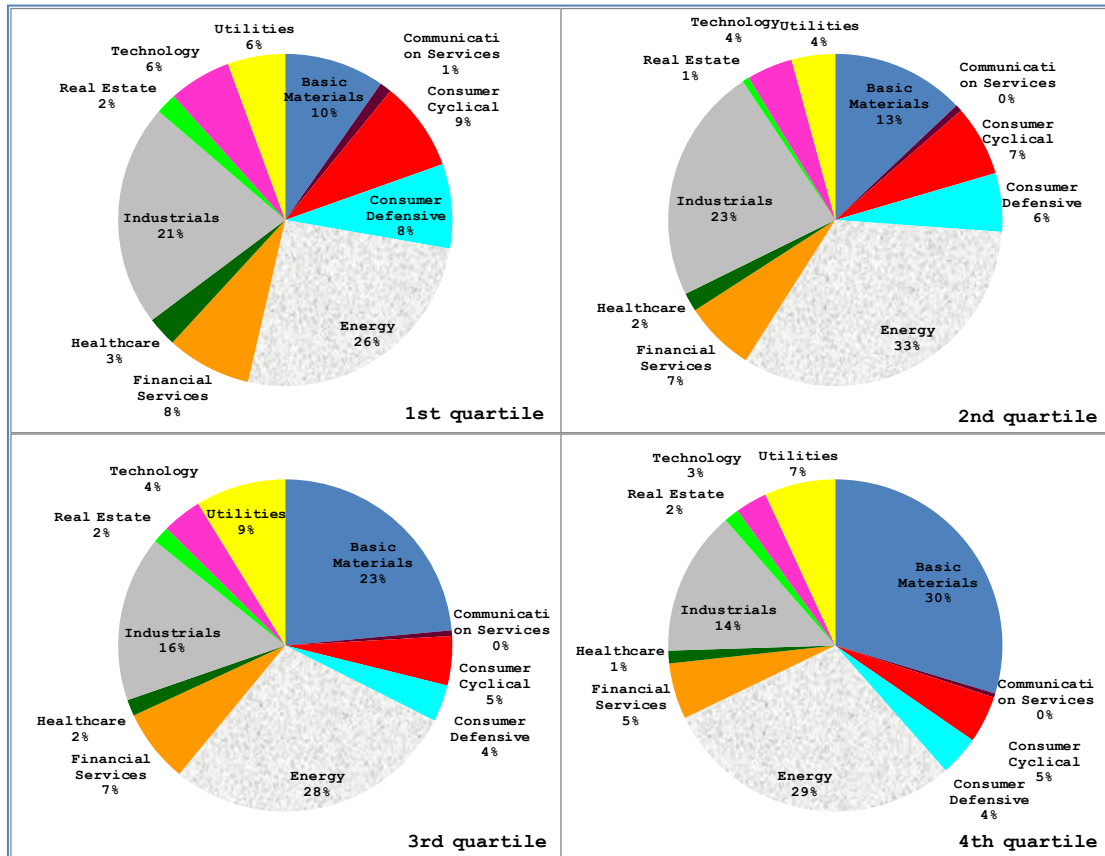


Figure 10: Sector CIU impact, grouped into quartiles of fund observations⁶²

The investment in basic materials increases consistently across the quartiles, with a maximum increase of 20% between the 1st and 4th quartiles. The 1st quartile shows very clearly that an exclusion of sectors is not a prerequisite for a low sector CIU impact. It is interesting to observe that investing in the consumer segment, but also in the industrials sector, can substantially lower the CIU impact.

The objective of the next sections is to look inside each sector and investigate the impact of security selection on the active CIU impact.

⁶² Source: own research

5.2 Security selection

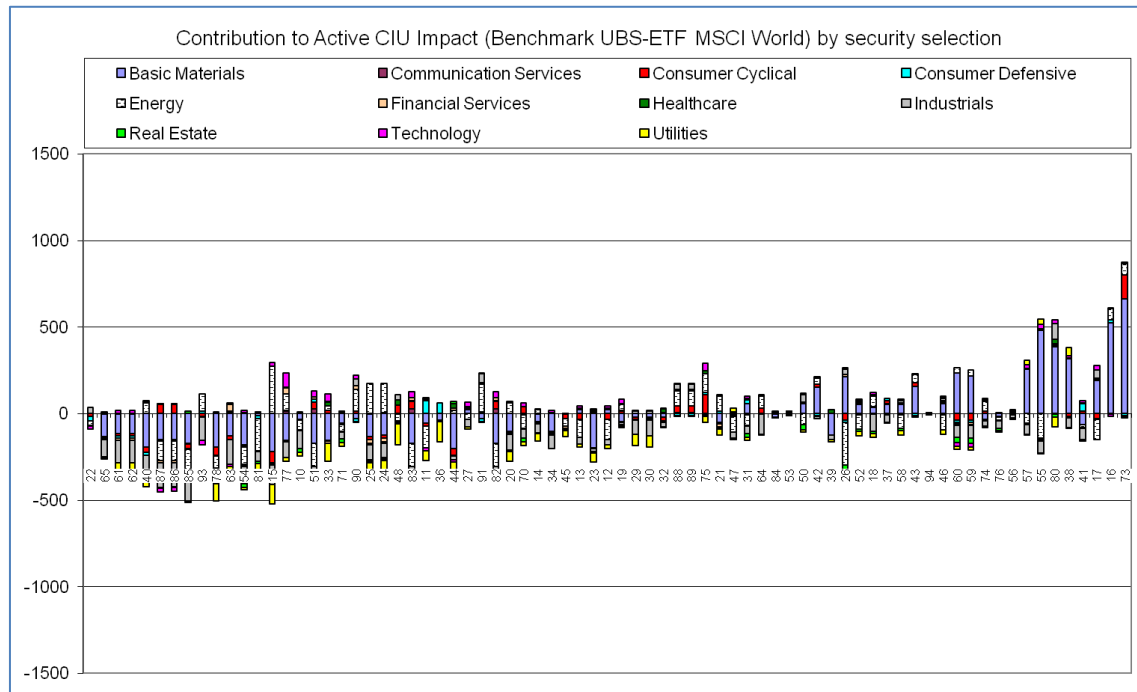


Figure 11: Contribution of security selection to active CIU impact⁶³

The ability to select securities belongs to the fundamental skills for an investment manager. For day traders, this ability is used in active trading. For long-term investors, these skills are used to outperform the market or a benchmark, ignoring day-to-day market fluctuations. This becomes especially true for EFP, where ESG indicators like CIU are available on a yearly basis and their movements are long-term only.

For the interpretation of this chart it is important to recall that, for all funds, their within-sector weights are assumed to be exactly the same as the benchmark. The first observation is that the average overall CIU impact contribution of the security selection is around 25%, compared to a 55% contribution from sector allocation. Second, it is clear that appropriate security selection in basic materials and industrials can significantly reduce the CIU impact. An example of this is provided by Fund Nos. 19, 62 and 32, as listed in Table 6.

⁶³ Source: own research using data provided by Morningstar and Inrate

Fund	Basic Materials Sector			Lowest CIU			Highest CIU			CIU Impact	
	Number of comp.	AVG CIU	Total weight %	CIU	comp. name	weight %	CIU	company	weight %	Tot	Unit
92	123	2640	7	292	First Quantum Minerals Ltd	0.043	26838	Arch Coal Inc	0.021	260	37
19	114	2163	9.6	292	First Quantum Minerals Ltd	0.064	19640	Mongolia Energy Corporation Limited	0.014	283	29
62	7	1960	10.5	459	Precious Woods	0.028	4860	Holcim	2.25	211	20
32	8	3137	9.5	574	Barrick Gold	1.6	6810	Xstrata	1.212	322	33

Table 6: CIU values and impact of security selection in the basic materials sector

In all three funds, the allocation to the basic materials sector is almost 30% greater than in the benchmark (Fund No. 92); nevertheless, selective stock picking from the sector results in a significantly lower CIU impact (−46% for Fund No. 62). These results are not surprising when we consider the big differences in CIU impact between and within sectors, as presented in the following figure.

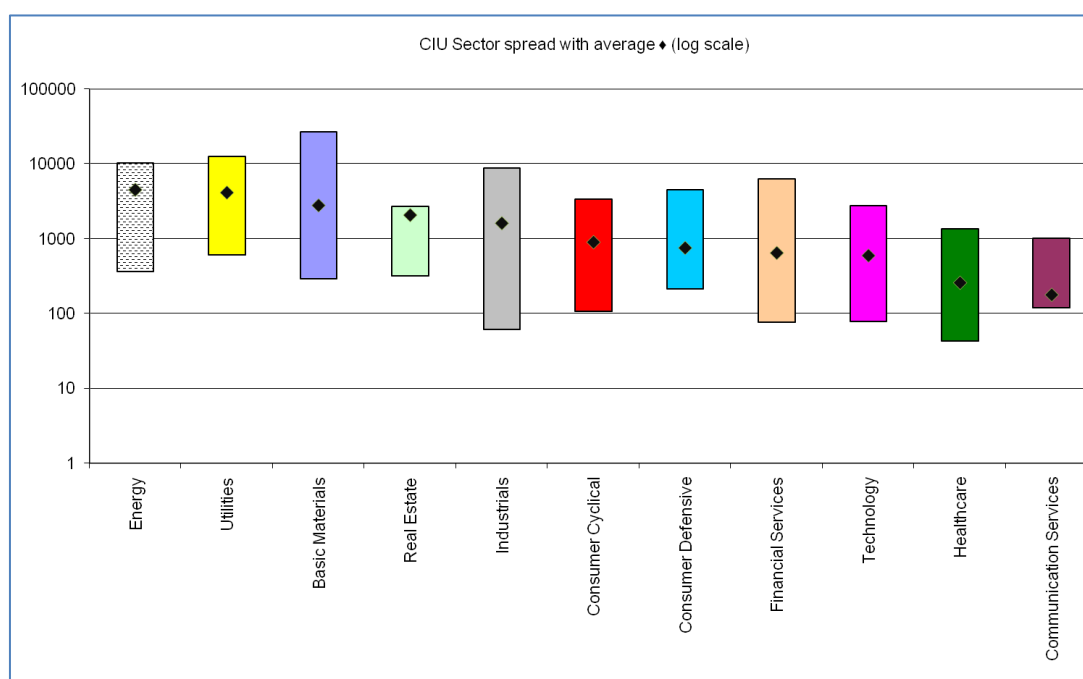


Figure 12: CIU spread (min-max) for each sector, with average mark⁶⁴

While the CIU spread is very different between sectors, it is interesting to observe that in every sector there are companies with CIU values below 700. With appropriate security selection, it is fundamentally possible to identify companies with very low CIU values in all sectors. The limiting factor is the degree of diversification required within each sector.

⁶⁴ Source: own research using data provided by Inrate

Especially in the energy, utilities and basic materials sectors, the number of companies with the lowest CIU impact is limited compared to the other sectors.

5.3 Interaction

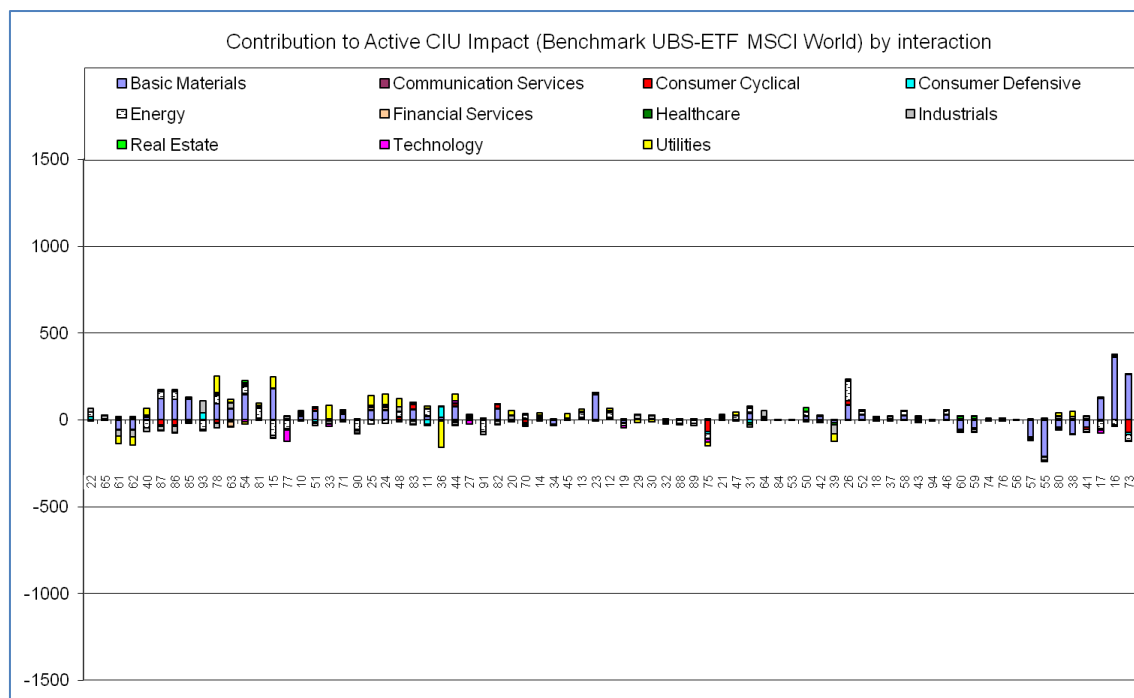


Figure 13: Contribution of interaction to active CIU impact⁶⁵

The interaction shown in Figure 13 is clearly smaller in magnitude than the previous CUI impact contributors. All funds have a contribution from interaction, confirming that all funds have a different sector and security weight from the benchmark. The reason why the major CIU impact is attributed to basic materials stems from the high CIU impact on this sector observed in Figure 12. A summary of all contributors to active CIU impact in absolute values is shown in Figure 22 in the Appendix.

5.4 Conclusion

The results in this section confirm that the analysis of sector allocation and security selection processes can be very useful for the SRI fund manager. When he believes that certain individual securities have a greater ESG impact than others, he can improve the sustainability of the SRI fund by selling these securities. The application of the framework using the CIU

⁶⁵ Source: own research using data provided by Morningstar and Inrate

impact data also indicates that the SRI label is no guarantee for environmentally sustainable investment. There are big differences between SRI funds with regard to their CIU impact. Under the assumption that CIU impact implies a form of firm-specific risk, then we could say that for most of the selected SRI funds the market is not efficient. In fact, the majority of these SRI investments do not hold a well diversified group of securities, and should not be recommended for a common SRI buy-and-hold strategy.

6. EFP and reputational risk data

The importance for fund managers to focus on ESG impact during sector allocation and security selection has been discussed in previous sections. Risk management remains a key activity in the process of building a fund. In the implementation of ESG, the fund manager faces the difficult and intensive task of assessing ESG-related risks and identifying the companies with the highest exposure. This section uses data provided by RepRisk as indicators for environmental reputational risk, and analyses their application to the fund selection.

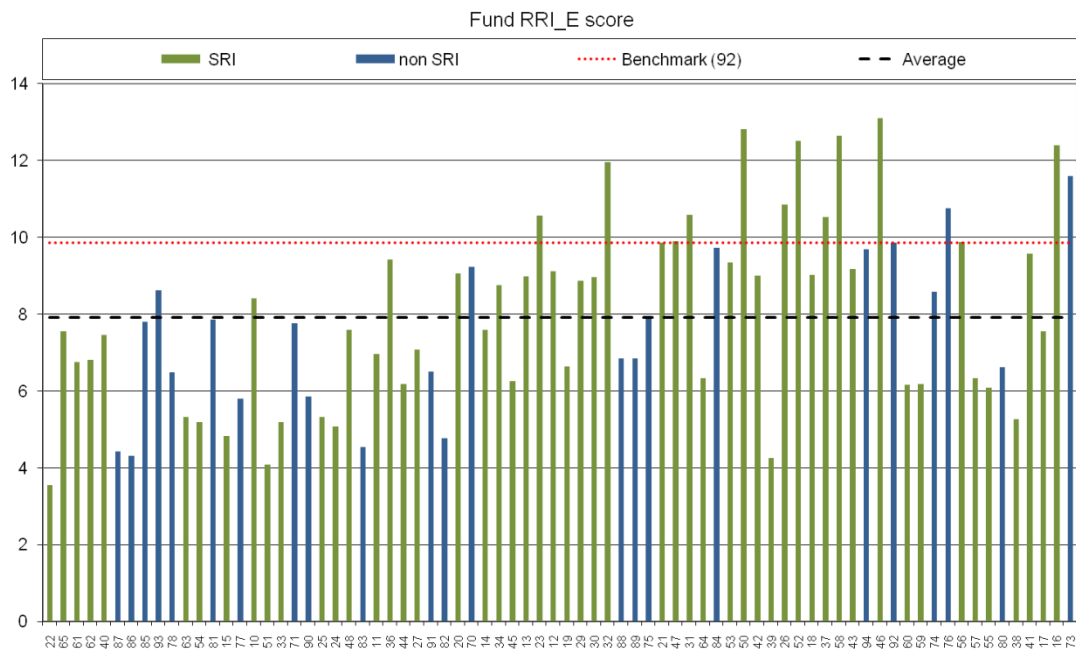


Figure 14: RRI_E score for all funds ⁶⁶

Figure 14 presents the cumulated RRI_E scores for the full fund selection following the same order used for the analysis of EFP using CIU. Each fund score equals the sum of all company-weighted RRI_E held by the fund. It is important to note the difference in the data availability and change frequency between RRI and CIU. RRI data change very often during a one-year period, they are updated continuously and they decay to zero over a period of two years. CIU data are available only on a yearly basis and remain almost static over the three-

⁶⁶ Source: own research using data provided by MorningStar and RepRisk

year period 2008-2010. One consequence is that for CIU data no value means that CIU company data are not available, while for RRI_E data the zero value is fully supported and indicates the lowest risk exposure. For that reason, the application of the EFP framework using the RRI_E data would be misleading and is rejected by the study. Although a clear pattern between SRI and non-SRI funds is not visible, Figure 14 remains interesting. The reputational risk is clearly lower for funds with a low CIU impact (left). Funds with a CIU impact above the average (see Figure 7) carry a 70% probability of having an above-average reputational risk. Funds with a CIU impact below the average carry a 25% probability of having an above-average reputational risk. The strength of the relationship between ESG impact and risk is illustrated in more detail in the following chart, using the regression analysis estimates.

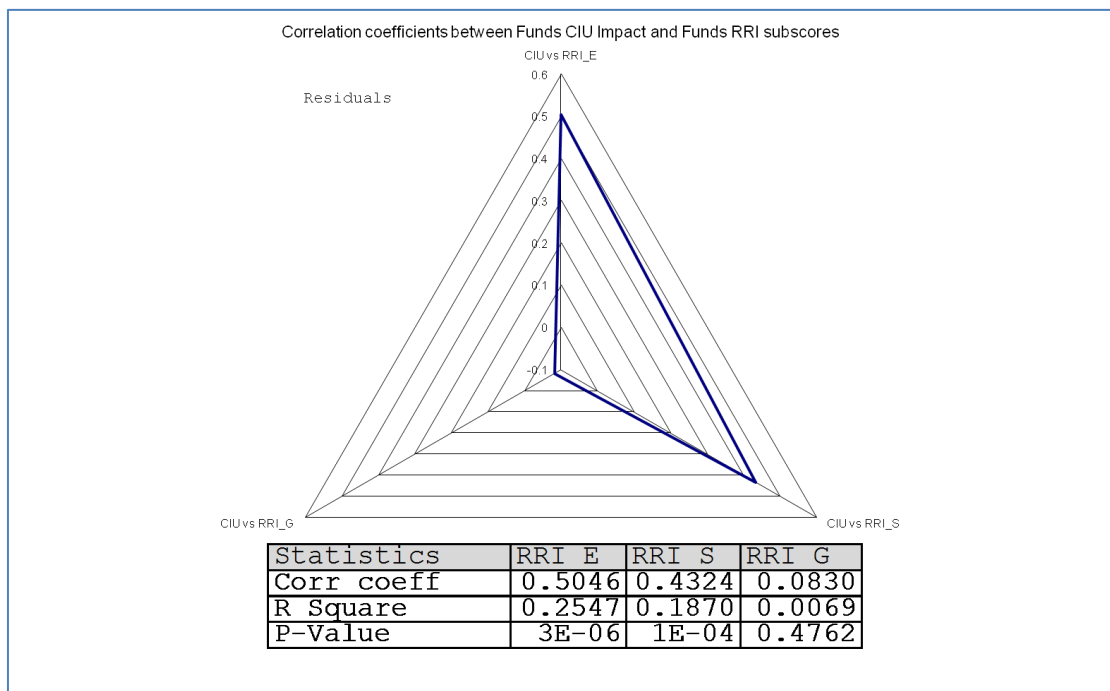


Figure 15: Correlation coefficients for a confidence interval of 95%⁶⁷

Figure 15 shows the correlation coefficients between CIU (average 2008-2010) and RRI E,S,G (2010) subscores for all fund selections. The three RRI subscores E,S and G represent the fund's exposure to E, S and G criticism, and are indicators of environmental, social, governance and reputational risks.

⁶⁷ Source: own research using data provided by Inrate and RepRisk

For the regression analysis, the RRI subscores are set as dependent variables, CIU is the independent variable. The results show that there is a medium positive correlation between the funds' RRI Environmental and Social subscores and the CIU impact. The statistical significance of the results is confirmed by the P-values, the t-test, and the distribution of residuals. The very low P-values indicate the very high probability that the regression output is randomly and the high reliability of the regression coefficients. This is true for the environmental and social subscores, but not for the governance subscores, where the results are not statistically significant. The proof that the residuals of the regression analysis for RRI_E and RRI_S are normally distributed without patterns is provided in Figure 23 in the Appendix. The overall regression accuracy is represented by the low R-Squared in the statistics of Figure 15. Twenty-five per cent of the variance of the RRI_E variable is explained by the variance of the CIU variable, the value for RRI_S is 18%. Ideally, for a strong relationship between variables we would expect a value of 60%. The R-Squareds of 25% for RRI_E and 18% for RRI_S are only of medium magnitude.

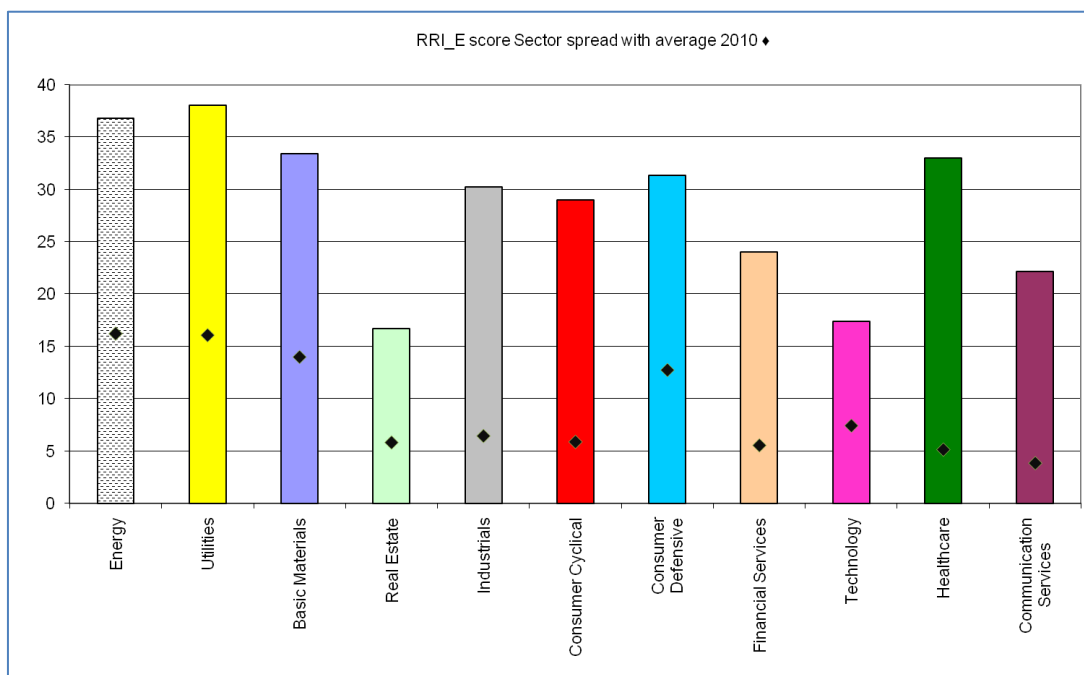


Figure 16: RRI_E spread (min-max) for each sector, with average mark

As reported by RepRisk (see Figure 21), the environmental footprint is one important determinant for environmental and social reputational risks. The challenge in interpreting and aggregating data becomes clear when the spreads on carbon impact unit presented in Figure 12 and on environmental reputational risk presented Figure 16 are compared. As expected, the highest average values for CIU and RRI_E refer consistently to the energy, utilities and

basic materials sectors. But Figure 16 also shows that the average environmental reputational risk for companies in the consumer defensive sector is almost as high as that for companies in the basic materials sector. One possible explanation for these unexpected patterns and for the medium strength in relationships might relate to the process and to the number of determinants used for the calculation of the RRI_E scores. When different indicators are combined, the risk of interactions levelling out the overall measured ESG impact increases. Discussing SRI approaches, Butz⁶⁸ indicates that while the implementation of SRI ratings in portfolio management often requires data aggregation, inflating the number of indicators inevitably diminishes the weight of each. The need for standardisation and greater transparency in the rating process remains the most important shortcoming and reason for criticism in the SRI universe⁶⁹. Based on the significance of the relationship between CIU impact and environmental reputational risk shown in this section, we would apply the weak form of the efficient market and expect that the CIU impact information is already incorporated into market prices. The next section presents the financial performance of the fund selection and investigates the relationship with the CIU impact and environmental reputational risk.

⁶⁸ Butz, 2005 S. 6

⁶⁹ Schäfer, et al., 2010 S. 26

7. Financial returns

This section presents the financial returns of the funds, focusing on Jensen's alpha adjusted by beta. The idea is to compare the financial return of all funds to the return of the MSCI World Index over the past three years using Jensen's alpha as the performance measure. The objective is to use the results from this section to analyse the relationship between financial and extra-financial performance for the fund selection.

7.1 Methodology

The observations are based on the measurement of Jensen's alpha, as described by Elton et al.⁷⁰, for the three-year period between September 2008 and August 2011.

The Jensen's alpha results are calculated in three steps:

1. Fund and benchmark selection
2. Estimation of the benchmark (β_{iL}) sensitivity of the funds with regression analysis of total returns
3. Calculation of Jensen's alpha for each fund using the single-benchmark model of Equation 4

$$R_{it} - R_{Ft} = \alpha_i + \beta_{iL}(R_{Lt} - R_{Ft}) + \epsilon_{it}$$

Where:

R_{it} = total return on the fund evaluated in period t

R_{Ft} = total return on the riskless asset in period t

R_{Lt} = total return on Large Cap stock index (L) in period t

α_i = Jensen's alpha

β_{iL} = sensitivity to the benchmark L

ϵ_{it} = random error

Equation 4: Calculation of Jensen's alpha

For each selected fund, beta (β_{iL}) is calculated as shown in Equation 5. It represents the sensitivity coefficient with the MSCI World index using the single-index model over the three-year period.

⁷⁰ Elton et al., 2011 S. 656

$$\beta_{iL} = \frac{\text{Cov}(R_{it}, R_{Lt})}{\sigma_{Lt}^2}$$

Equation 5: Calculation of beta

The Jensen's alpha shown in Equation 4 is given by the vertical deviation of each fund from the security market line (SML). It measures the difference between the expected rate of return on a fund and what that fund's expected return would be if it were positioned on the SML. If a fund has a positive Jensen's alpha then it lies above the SML with a risk-adjusted return superior to that of the market. It is important to note that funds with equal Jensen's alpha can have different systematic risk, and therefore do not necessarily have the same financial performance. Thus, in order to rank the fund selection based on the fund's financial performance, it is necessary to adjust the Jensen's alphas by the systematic risk. This involves dividing the Jensen's alphas by the corresponding fund beta .

7.2 Results

The linear relationships between funds and MSCI World total returns are estimated using linear regression. The statistical significance of the results is validated using R-Squared and the t-test with a 0.05 level of significance. The detailed list of all calculated betas and Jensen's alphas is presented in Table 8 in the Appendix. For all calculations the risk-free rate is assumed to be constant at 4% and the MSCI World Index is used as benchmark. The comparison between all betas indicates that the MSCI World proxy chosen for the study is almost perfectly correlated with the MSCI World. Generally, the betas of the funds are very close to 1, indicating that the systematic risk of the funds is very similar. One exception is observable for two funds: No. 33, the SRI fund with the smallest beta ($\beta = 1.3$), and No. 93, the fund with the highest beta ($\beta > 0.7$). One possible reason for these differences is illustrated in Figure 17 and relates to the sector allocation of these funds, which is very different from the sector allocation of the benchmark. Fund No. 93 has a 42% sector allocation to the consumer defensive sector. Typical for this sector are companies engaged in the manufacturing of food, beverages, household and personal products or education. When investors are pessimistic about the economy, the consumer defensive sector usually offers good protection, as is the case with Fund No. 93 between September 2008 and August 2009. During this economic contraction phase, the fund performed 15% better than the MSCI World, and this is the main reason for the low beta value. Fund No. 33 has a 25% allocation

to the industrial sector, which includes companies that manufacture machinery, industrial products and are engaged in transportation.

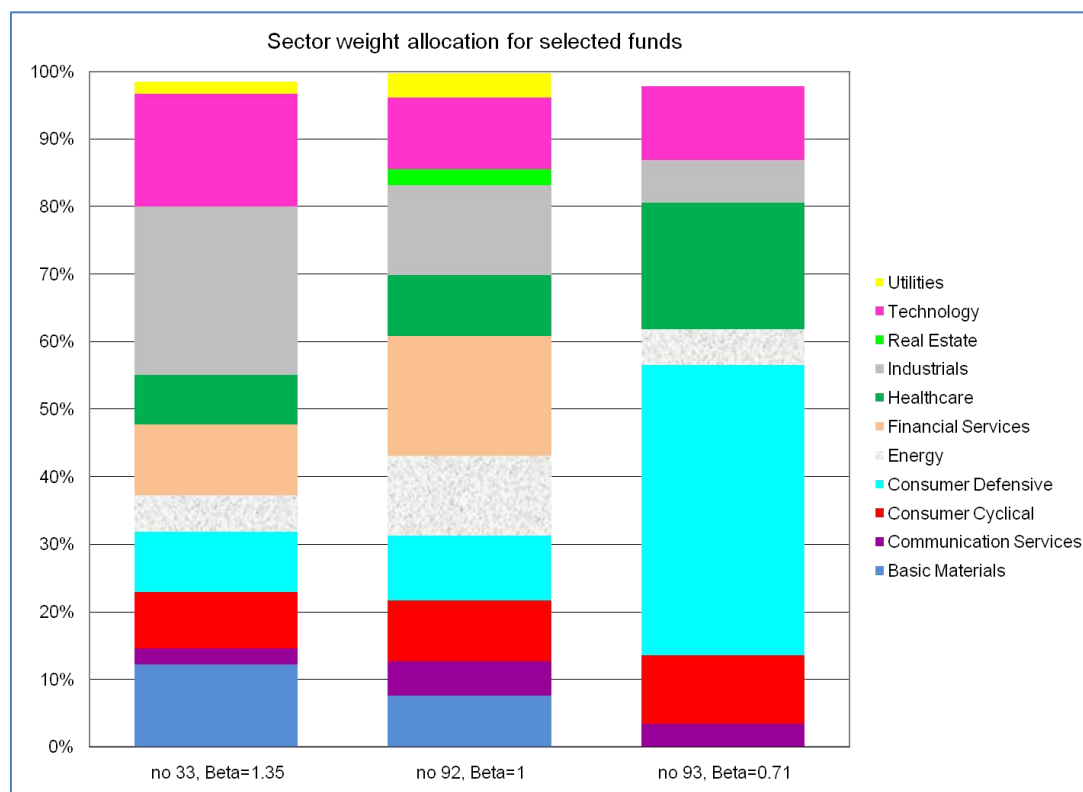


Figure 17: Sector allocation for Fund Nos. 33, 93 and 92 (MSCI World proxy) as at 31 March 2011⁷¹

This sector is typically preferred by investors during rebound and expansion phases, such as the period between September 2010 and August 2011, and this is the reason for the high beta value observed.

Figure 18 shows the risk-adjusted Jensen's alpha values for the SRI and non-SRI funds, ranked according to CIU impact. It is noticeable that the average financial performance of the SRI funds is clearly inferior to that of the non-SRI funds. As discussed by Lehman and Modest⁷², it should be noted that Jensen's alpha cannot be used to evaluate the manager, since alpha is not an indicator of a manager's stock-picking ability or market timing. This restriction is fulfilled by SRI investors, whose investment strategy has a long-term focus.

⁷¹ Source: own research using data provided by Morningstar

⁷² Lehman, et al., 1987 S. 237

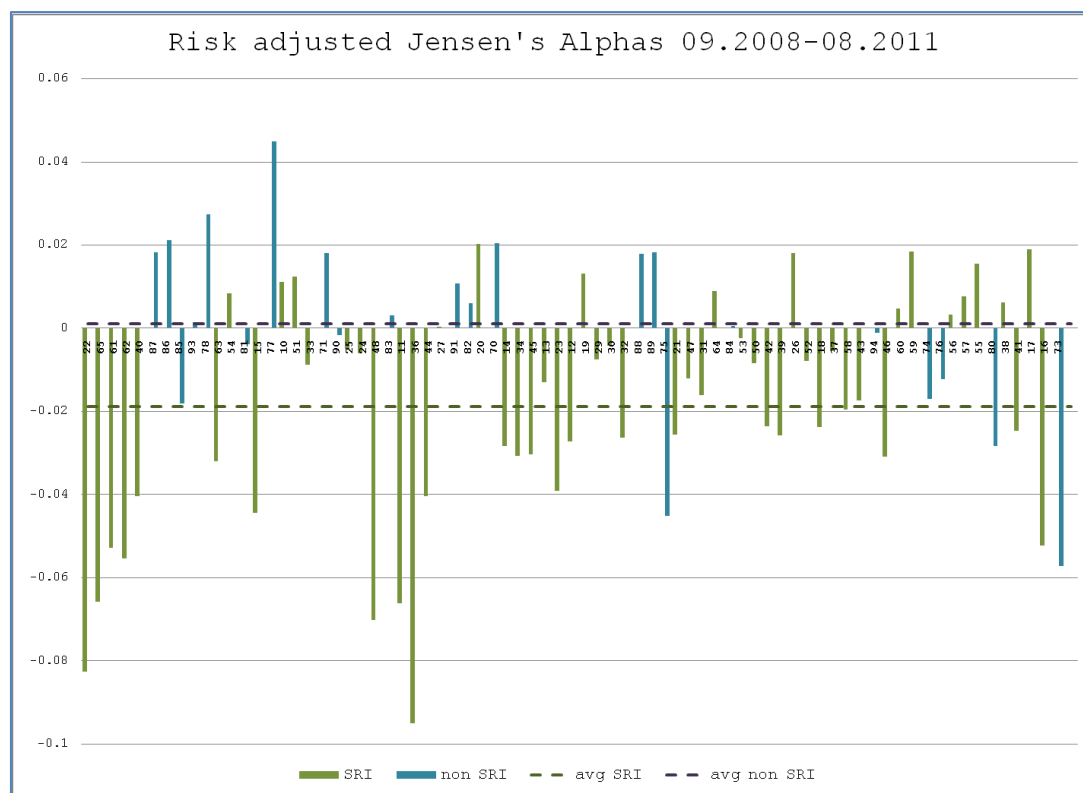


Figure 18: Jensen's alpha with benchmark MSCI for SRI and non-SRI funds

A clearly negative information ratio of SRI funds when using efficient SRI indices is also observed by LeSourd⁷³. One possible explanation is that correlations and risk/return properties of equities are underestimated when screening criteria are applied. Using monthly total returns, it is not possible to calculate a Jensen's alpha significantly different from zero in a statistical sense. For that reason, in order to analyse fund performance over the three-year period, the Sharpe Ratio is calculated as follows:

$$SR = \frac{R_{it} - R_{Ft}}{\sigma_{it}}$$

Where:

R_{it} = total return on the fund evaluated in period t

R_{Ft} = total return on the riskless asset in period t

σ_{it} = standard deviation of the fund evaluated in period t

Equation 6: Sharpe Ratio

⁷³ Le Sourd, 2011 S. 23-30

The rule with the Sharpe Ratio is to choose the investment with the highest value. The average results for SRI and non-SRI funds are shown in Figure 19.

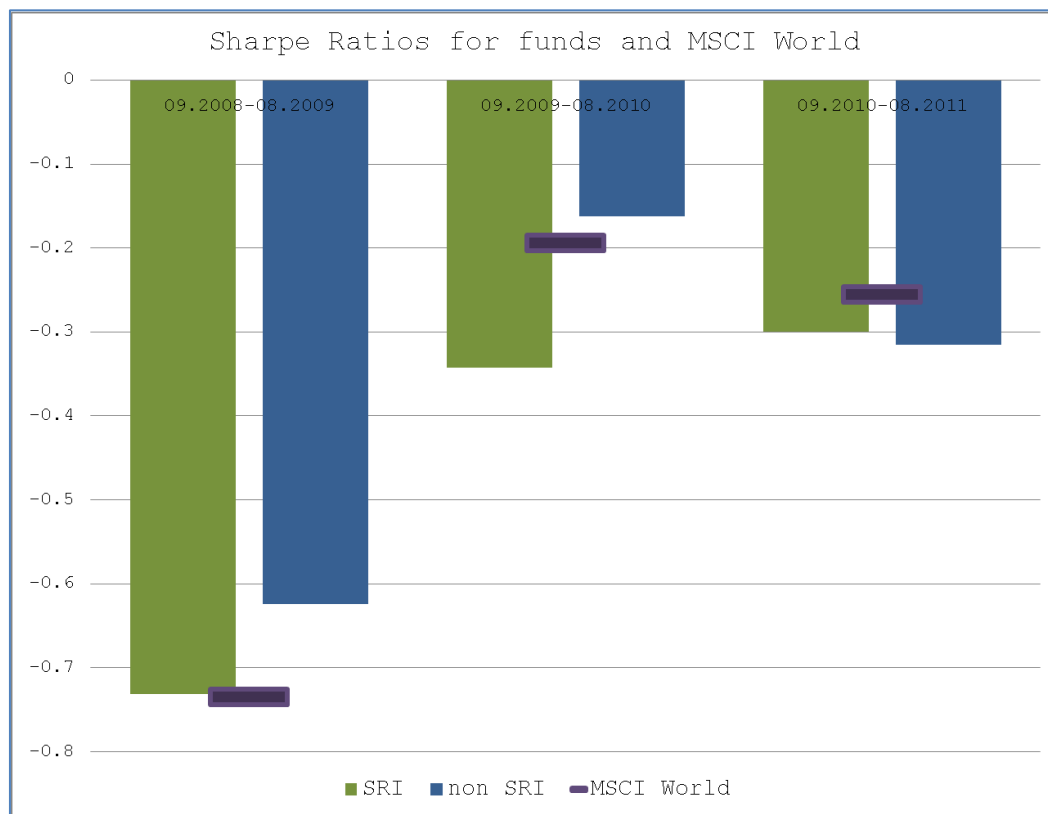


Figure 19: Average Sharpe Ratios for fund selection and MSCI World, base currency CHF

Analysing Figure 19, it can be observed that during the period 2008-2009, characterised by a world market correlated crash starting in October 2008, the SRI funds suffered more than the World Market Index and the non-SRI fund sample. This could be an indication that the risk factor was underestimated during the security selection for the SRI funds.

During the period of rebound in 2009, the SRI funds performed more or less in line with the MSCI World. For the last twelve months the results look different, with most SRI and non-SRI funds showing negative performance, although the SRI funds perform slightly better than the non-SRIs.

These results bear out the hypothesis that SRI delivers an average financial performance in line with the market portfolio, and risk-adjusted returns cannot be confirmed using a three-year data history. The trend over the past twelve months could indicate a change of direction.

8. Between extra-financial and financial performance

One key question for the investor remains the materiality of EFP and whether the ESG factors impact the financial valuation of companies. The difficulties in analysing the interdependence of EFP and business results are probably the major limiting factor for the development of a standardised framework. The more key ESG indicators for EFP are used the more complex becomes the model and the interpretation. This section uses a simple model based on the most critical environmental factor indicator, and suggests that it is possible to incorporate the EFP results into the SRI investment process.

8.1 Doing good

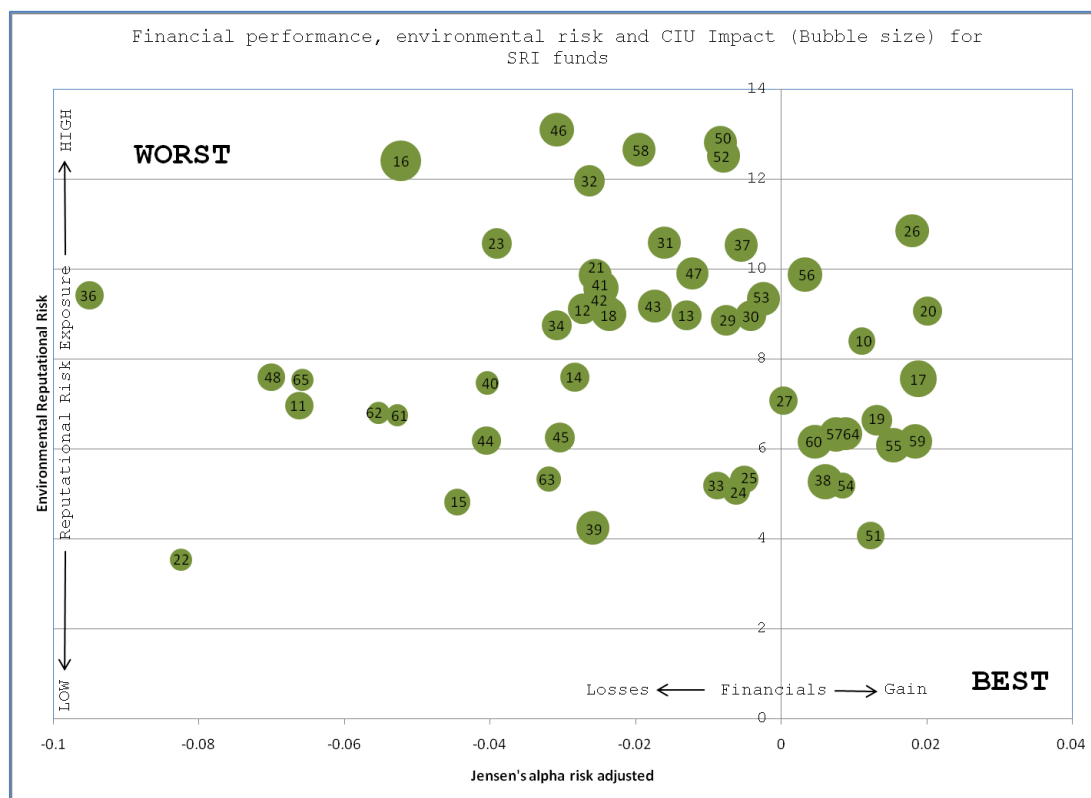


Figure 20: Reputational risk, CIU impact and financial performance of SRI funds⁷⁴

Figure 20 represents the distribution of the selected SRI funds along the risk-adjusted Jensen's alpha and rated according to environmental reputational risk.

⁷⁴ Source: own research

The size of the bubbles in the chart corresponds to the total fund CIU impact and, as demonstrated in Section 6, is positively correlated to RRI_E. The worst funds are those that have high RRI_E scores and produce losses for the investor, the best funds are those that have the lowest RRI_E score and produce gains. Almost three-quarters of the SRI funds deliver a below-market performance. Also in practice, SRI strategies are often criticised for underperforming the market. This claim is not surprising, especially when short time periods are surveyed and considering the exclusion of active portfolio management from SRI practices. Negative alphas using the Fama-French three-factor model are also reported by Amenc⁷⁵ in a study of 69 SRI funds between 2002 and 2009.

Adopting the same approach proposed by Statman⁷⁶ for interpreting the relative performance of SRI portfolios, the distribution in Figure 20 could be explained by considering three stock returns hypotheses:

1. Doing good but not well
2. Doing good while doing well
3. No effect

The funds close to the “Best” corner are very likely following the second hypothesis. They held companies providing high EFP, which produces a financial advantage relative to the SRI peer group. Otherwise the funds with high environmental reputational risk are consistent with the first hypothesis, rejecting companies associated with controversial activities with a financial disadvantage to other SRI funds. In the centre of Figure 20, the net effect takes place following the third hypothesis with almost no financial effect. With the majority of the SRI funds following the best-in-class approach, it is not surprising to find this area very populated.

8.2 SRI investment strategies

The observation period of three years is too short to produce statistically significant results on investment strategies. Although it is not the aim of this study to propose trading strategies, this section does offer some possible scenarios. Using the information available in Figure 20 for a longer time period, a simple trading strategy could be selling funds with high RRI_E scores and buying funds with low RRI_E scores. Similar long-short strategies have been

⁷⁵ Amenc, et al., 2010 S. 23

⁷⁶ Statman, et al., 2008

applied by other studies considering more complex ESG rating criteria. One example is proposed by Kempf & Osthoff⁷⁷, who found significant abnormal returns from investing in S&P 500 stocks in the period 1992-2004 following SRI criteria. There is a growing belief that the financial implications of EFP are strictly related to the nature of EFP. In the analysis of 154 listed US companies between 1997 and 2004, Guenster⁷⁸ found a positive relationship between “eco-efficiency” and operating performance, whereby markets incorporate environmental performance with a drift. From this perspective, innovative companies are better positioned to create long-term added value and reduce the risk exposure for the shareholder. Global climate change is creating an increasingly “carbon-emissions-constrained”⁷⁹ environment, giving rise to specific risks and opportunities across all sectors. A survey⁸⁰ of European institutional investors planning to increase the percentage of AuM by SRI policy in 2010 reports that fund managers need to consider carbon limits in the valuation of companies. This belief confirms the carbon impact reports published by the UNEP Finance Initiative⁸¹, whereby the CO2 prices are expected to double by 2012. Thus, investment strategies will become more complex in the future and investment consultants will need to take a holistic view, considering ESG and traditional financial factors together.

⁷⁷ Kempf, et al., 2007 S. 908-922

⁷⁸ Guenster, et al., 2010 S. 24

⁷⁹ Humphreys, 2007 S. 9

⁸⁰ Fabozzi, et al., 2010 S. 73

⁸¹ UNEP Finance Initiative, 2009 S. 34

9. Concluding remarks

Now, more than ever before, clients' demand for SRI instruments is growing. Fund managers and investors need standardised evaluation procedures and reliable data to assess their investment universe. Every SRI strategy must rely on real and consistent data; the most critical and differentiating source of information are the EFP results. A fundamental milestone to enable EFP analysis is the selection of appropriate EFP indicators. The criteria applied to assess potential indicators for global equity funds reduce the suitable data sources for CIU data. This selection highlights the difficulty of finding comparable data available on a global scale. The evolution towards a low-carbon economy creates risks and opportunities that affect all sectors, from basic materials to real estate. This study introduces a new framework for evaluating and decomposing the contributions to EFP for funds. The results of the analysis demonstrate the importance of accurate sector and company analysis during the construction and management of the fund. The analysis of the fund's holdings shows a big overlap between securities listed in SRI and non-SRI funds. This is evidence of the wide-scale application of the best-in-class approach to company selection in fund construction practice. As a result, the comparison of SRI versus non-SRI funds is difficult and mostly inconclusive. The hypothesis of the study that sustainable investment strategies deliver EFP, and create future value can't be confirmed. While the lowest CIU impact and environmental reputational risk are both assigned to SRI funds, there are also several SRI funds with very high CIU impact and risk values. The correlation between CIU impact and the RRI_E score for the funds is found to be positive and is statistically significant. This relationship is important because it indicates causality between the measured carbon impact of companies and the media-captured environmental criticism. The analysis of the financial performance confirms previous research that SRI funds suffer especially in the rebound phase. Market efficiency cannot be confirmed; the calculated Jensen's alphas are not connected to CIU impact or RRI_E scores. The effect of EFP on long-term financial returns and the creation of competitive advantage cannot be measured, due to the limited sample of data available over the time period of three years.

The implementation of the framework to measure the contributors to EFP is shown using a single ESG key indicator. Assuming that there are metrics available which fulfil the selection criteria, it is easily possible to apply the framework to several ESG key indicators.

Nowadays, long-term investors that do not take ESG issues into account increase the riskiness of their portfolio and forgo a better risk/return relationship. The achievement of EFP

does not necessarily imply the creation of an immediate extra-financial return. More important is the creation of intangibles and financial return in the long term. The market still fails to fully incorporate EFP into company valuations. A lack of global standards and transparency on SRI ratings and on evaluation processes for companies and for the investor communities are recognised problems. Although progress in this area has been achieved over the past few years, much remains to be done. More standards and more control probably do not fit well with all rating companies' business cases. As shown in this study, the best-in-class approach, one of the most common SRI strategies, is questionable in EFP terms. Overall, the investor's understanding of EFP is very superficial, increasing the risk that the SRI label will be misused. Financial analysts and risk managers need to better consider the relevance and implications of extra-financial issues in the future.

The WEF⁸² discussion about Responsible Investment Futures concludes that SRI will be an integral part of deeper changes in the investment community.

The demonstration of EFP remains fundamental to the value proposition of SRI; this is what the investor requires to shift the focus onto long-term performance and integrate ESG issues into business and investment decisions. Hopefully, this study can contribute to moving in the right direction.

⁸² World Economic Forum, 2005 S. 52

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Appendix

Environmental Footprint	Community Relations	Employee Relations	Corporate Governance	Product-Portfolio Related Risks
Global Pollution and Climate Change	Human Rights Abuses, Corporate Complicity	Forced Labor	Corruption, Bribery, Extortion, Money Laundering	Controversial Products and Services
Local Pollution	Impacts on Communities	Child Labor	Executive Compensation	Products (Health and Environmental Issues)
Impacts on Ecosystems and Landscapes	Local Participation Issues	Freedom of Association and Collective Bargaining	Misleading Communication, e.g. "Greenwashing"	
Overuse and Wasting of Resources	Social Discrimination	Discrimination in Employment	Fraud*	
Waste Issues		Health and Safety Issues	Tax Evasion*	
Animal Mistreatment		Poor Employment Conditions	Anti-competitive Practices*	
Violation of International Standards				
Violation of National Legislation				
Supply Chain (Environmental, Social, and Legal Issues)				

Figure 21: RepRisk scope as of May 1st 2010; Source: RepRisk

(<http://www.reprisk.com/repriskscope/>)

Name	ISIN	Fund code
Aberdeen Global Responsible World Eq A2	LU0278938138	10
Agipi Monde Durable	FR0010500603	11
Allianz DuurzaamWereldFonds	NL0009497965	12
Allianz RCM Global Sust A EUR	LU0158827195	13
Amundi HK Green Planet I	HK0000034162	14
Aviva Investors SF Global Growth SC1	GB0030029952	15
Carnegie Worldwide Ethical 1A	LU0122292328	16
Delphi Verden	NO0010317282	17
DexiaEqs L Sust World C Acc	LU0113400328	18

DFA International Sustainability Core 1	US2332031994	19
DnB NOR Global Etisk V	NO0010337538	20
DWS Invest Responsibility LD	LU0145639620	21
EcofiDéveloppement Durable I	FR0010596759	22
ESPA Vinis Stock Global T	AT0000646799	23
F&C Stewardship International 1 Inc	GB0030833767	24
F&C Stewardship International I	LU0234761939	25
FolksamGlobalaAktiefond	SE0000891889	26
GuideStone Funds International Eq GS2	US40171W4472	27
Henderson Global Care Growth A	GB0005027221	28
ING (L) Invest Sustainable Gr P Acc	LU0119216553	29
ING DuurzaamAandelenFonds	NL0006311789	30
Invesco Umwelt-u.Nachhaltigkeits-Fonds	DE0008470477	31
KCD-Union NachhaltigAktien	DE0005326532	32
LBBW NachhaltigkeitAktien I	DE000A0JM0Q6	33
LIGA-Pax-CattolicoUnion	LU0152554803	34
Living Planet Equity A	LU0169371266	35
MAM Actions Environnement	FR0000970949	36
NordeaEtisktUrval Global	SE0000543100	37
NykreditInvest Globale SRI AktierUdb	DK0016286230	38
Palatine Or Bleu A	FR0010341800	39
RaiffeisenFutura Global Stock A	CH0011981005	40
Raiffeisen-Ethik-Aktien R A	AT0000677901	41
RobecoDuurzaamAandelen	NL0000288843	42
SAM Sustainable Global Active Fd EUR C	LU0188782675	43

Sarasin OekoSar Equity - Global A	LU0229773345	44
Sarasin Sustainable Equity - Global A	LU0097427784	45
SEB Ethical Global Index D	LU0047324644	46
SEB EtiskGlobalfond	SE0000434151	47
SEB ÖkoLux A	LU0036592839	48
Skandia Ethical	GB00B0JZPC21	49
Sparindex DJ Sustainability Index	DK0010297464	50
Sparinvest SICAV Ethical GI Val EUR I	LU0362355439	51
SPP Aktieindexfond Global Sustain	SE0000671919	52
SSgA World SRI Index Equity Fund I	FR0010596718	53
St James's Place Ethical Acc	GB0006074891	54
Storebrand Global	NO0008000973	55
Storebrand Global Indeks I	NO0010297328	56
Storebrand Global Quant Equity	NO0010346422	57
Sustainable World Index Fund	NL0009347566	58
SwedbankRoburEthica Global MEGA	SE0001003864	59
SwedbankRoburEthicaOffensiv	SE0000709156	60
Swisscanto (CH) EF Green Invest A	CH0009074300	61
Swisscanto (LU) PF Green Inv Equity B	LU0136171559	62
Triodos Sustainable Equity R	LU0278271951	63
UBS (Lux) EF Eco Performance (CHF) P-acc	LU0076532638	64
ZKB Nachhaltigkeits Vision Fonds	CH0028360268	65
Aberdeen Global World Equity A2	LU0094547139	70
Aberdeen World Equity A Acc	GB0031682403	71
Amundi International SICAV AU-C	LU0068578508	72

Carnegie Worldwide 1A	LU0086737722	73
Dexia Quant Eqs World C Acc	LU0235267860	74
DWS (CH) - Aktien Global	CH0003531974	75
HSBC GIF Gbl Equity I	LU0164942087	76
JPM Global Focus A EUR Acc	LU0210534227	77
MFS Investment Global Equity USD	LU0214841644	78
Neptune Global Equity A Acc	GB0030679053	79
Sarasin EquiSar - Global A	LU0088812606	80
Sarasin International Equity Inc A Acc	GB00B13GWH22	81
Sparinvest SICAV Global Value USD I	LU0294897425	82
Sparinvest Value Aktier	DK0010079631	83
SSgA World Index Equity Fund I EUR	FR0010482901	84
Templeton Growth Euro A Acc €	LU0114760746	85
UBS (CH) EF Global Opportunity P	CH0002788500	86
UBS (D) EF - Global Opportunity	DE0008488214	87
UBS (Lux) IF Key Sel Global Eq AA EUR	LU0155225690	88
UBS (Lux) IF Key Sel Global Eq AA USD	LU0154864812	89
UBS (Lux) KSS Global Equities USD P-acc	LU0161942395	90
UBS Global Equity B	US90262H5697	91
UBS-ETF MSCI World A	LU0340285161	92
ValueInvest LUX Global A Cap	LU0135991064	93
Vanguard Global Stock IdxInst EUR	IE00B03HD191	94

Table 7: Mapping between fund name and fund code

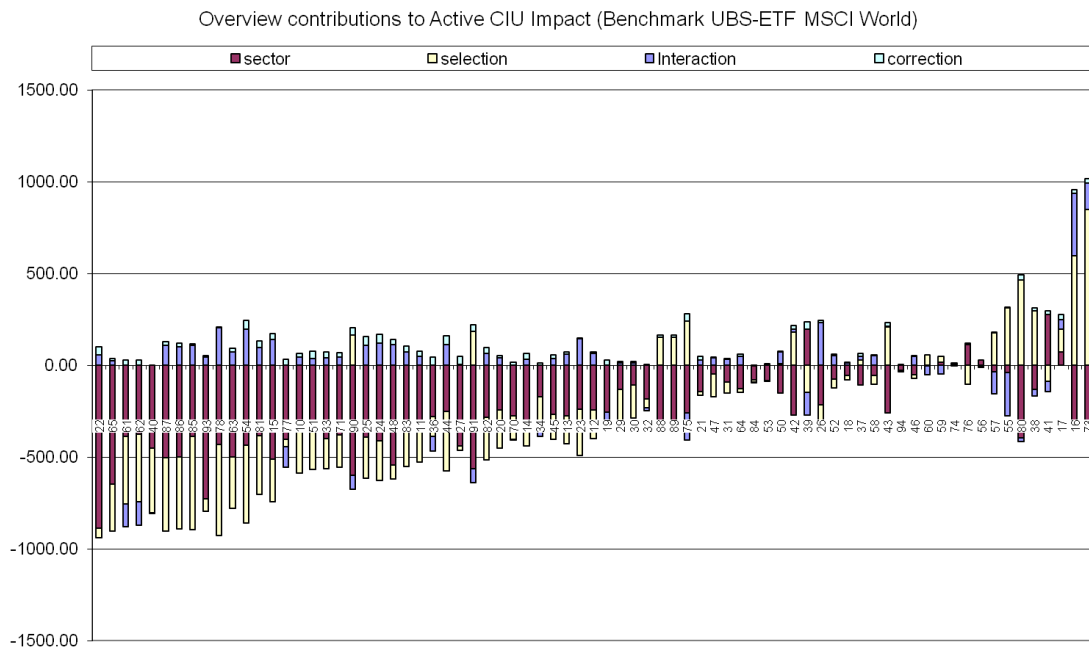


Figure 22: Overview contributors to Active CIU Impact; Source: own research using data provided by Morningstar and Inrate.

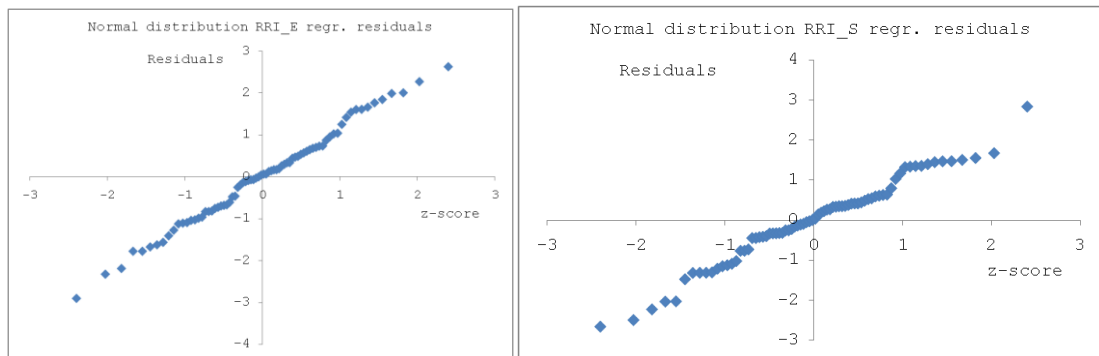


Figure 23: Normal distribution of regression residuals for CIU/RRI_E and RRI_S regression analysis; Source: own research.

Fund nr.	Correlation	Beta	Jensen's Alpha (α)	α risk adjusted	Fund nr.	Correlation	Beta	Jensen's Alpha (α)	α risk adjusted
22	0.8888	1.1054	-0.0913	-0.0826	19	0.9658	1.0909	0.0143	0.0131
65	0.9698	1.0505	-0.0692	-0.0658	29	0.9884	0.9906	-0.0075	-0.0076
61	0.9358	1.0797	-0.0570	-0.0528	30	0.9617	0.9665	-0.0041	-0.0042
62	0.9418	1.0844	-0.0601	-0.0554	32	0.9784	1.0279	-0.0271	-0.0264
40	0.9781	1.0507	-0.0425	-0.0404	88	0.9874	1.0972	0.0196	0.0179
87	0.9758	0.9839	0.0180	0.0183	89	0.9878	1.0997	0.0199	0.0181
86	0.9696	0.9451	0.0199	0.0210	75	0.9084	0.9016	-0.0408	-0.0453
85	0.9822	1.0016	-0.0183	-0.0182	21	0.9617	0.9368	-0.0240	-0.0256
93	0.9227	0.7157	0.0009	0.0013	47	0.9709	1.0872	-0.0133	-0.0122
78	0.9763	0.9175	0.0250	0.0272	31	0.9412	1.0117	-0.0163	-0.0161
63	0.9550	1.0657	-0.0341	-0.0320	64	0.9780	1.0851	0.0096	0.0089
54	0.9664	1.1364	0.0095	0.0084	84	0.9966	0.9988	0.0005	0.0005
81	0.9704	0.9443	-0.0037	-0.0039	53	0.9967	1.0129	-0.0025	-0.0024
15	0.9543	0.9707	-0.0432	-0.0446	50	0.9805	1.0326	-0.0087	-0.0084
77	0.9541	1.1237	0.0504	0.0448	42	0.9542	1.0086	-0.0239	-0.0236
10	0.9654	1.0329	0.0114	0.0111	39	0.9186	0.9690	-0.0251	-0.0259
51	0.9383	1.0983	0.0135	0.0123	26	0.9747	1.0543	0.0190	0.0180
33	0.9357	1.3508	-0.0119	-0.0088	52	0.9784	1.0748	-0.0085	-0.0079
71	0.9649	1.0107	0.0182	0.0180	18	0.9859	1.0949	-0.0262	-0.0239
90	0.9827	1.1026	-0.0018	-0.0016	37	0.9776	1.0673	-0.0059	-0.0055
25	0.9708	0.9842	-0.0050	-0.0051	58	0.9720	0.9704	-0.0190	-0.0196
24	0.9453	1.0065	-0.0062	-0.0062	43	0.9831	1.0325	-0.0180	-0.0174
48	0.9256	1.1762	-0.0825	-0.0702	94	0.9967	1.0012	-0.0013	-0.0012
83	0.9510	1.1079	0.0033	0.0030	46	0.9677	1.0795	-0.0333	-0.0309
11	0.9612	1.1137	-0.0738	-0.0662	92	0.9967	1.0015	-0.0009	-0.0009
36	0.9116	0.8813	-0.0838	-0.0951	60	0.9730	1.0049	0.0046	0.0046
44	0.9658	1.0212	-0.0414	-0.0405	59	0.9821	1.0159	0.0187	0.0184
27	0.9584	1.0380	0.0003	0.0003	74	0.9960	1.0383	-0.0177	-0.0170
91	0.9811	1.1105	0.0118	0.0107	76	0.9627	0.9968	-0.0123	-0.0123
82	0.9403	1.1093	0.0065	0.0059	56	0.9958	1.0123	0.0033	0.0033
20	0.9908	1.0760	0.0216	0.0201	57	0.9916	1.0759	0.0081	0.0075
70	0.9622	0.9732	0.0198	0.0204	55	0.9873	1.0961	0.0168	0.0154
14	0.9875	1.0267	-0.0292	-0.0284	80	0.9848	0.9851	-0.0279	-0.0283
34	0.9474	0.9688	-0.0299	-0.0309	38	0.9718	1.1061	0.0067	0.0060
45	0.9783	1.0552	-0.0321	-0.0305	41	0.9365	1.1679	-0.0290	-0.0248
13	0.9661	0.9766	-0.0127	-0.0131	17	0.9553	1.0420	0.0196	0.0188
23	0.9233	0.9381	-0.0367	-0.0391	16	0.9522	0.8640	-0.0452	-0.0523
12	0.9643	1.0102	-0.0275	-0.0273	73	0.9474	0.8575	-0.0491	-0.0572

Table 8: Correlations, betas and Jensen's alpha measures; Source: own research using total return data extracted from Morningstar