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Dedication

This thesis is dedicated to my mother, who is always there for me.

Acknowledgement

I would like to thank everyone who supported me during my studies and the writing process of this thesis, especially my family and friends.

Moreover, I am very grateful to *Österreichische Kontrollbank AG* for their continuous support and the provision of the relevant financial data.

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1. Introduction

Consumers and investors alike are becoming increasingly aware of the environmental, social and ethical responsibilities which companies are taking. Moreover, they recognize and strengthen their influential power on corporate and political decision makers, as not only the amount of profit is at the center of attention, but also how and with what these profits are actually made. The increase in public concern is reflected in the voluntarily motivated corporate responsibility (CSR) commitments communicated by companies in all sectors. For instance, already in 2007 the *Centrum für Corporate Citizenship Deutschland* found that 96 percent of the questioned German companies, independent from the company size, answered that they engage in some form of CSR (Heuberger 2007, 7).

At the same time, socially responsible investments recorded high rates of growth throughout the last decade and thus gained in importance in virtually all major economic regions (Vigeo 2010, SBI 2011). From 2002 to 2009 an increase of SRI assets under management from less than 1,000 billion to 5,000 billion euros was reached in the European Union (Eurosif 2010, 11, 22). Although constant growth in this sector was disrupted by the financial crisis, from 2009 to 2010 the volume of sustainable mutual funds in Europe grew again from 53.3 to 75.3 billion euros, making up 879 SRI funds in total (Vigeo 2010, 7,10). In Austria the combined volume of sustainable mutual funds, mandates and other sustainable financial products increased by 17.4% to 2.43 billion euros in 2010, accounting for 1.7% of all mutual and special funds (Forum Nachhaltige Geldanlagen 2011, 25).

Overall, these numbers strongly point towards an increased demand for investments consisting of responsible companies' shares, predominantly driven by institutional asset owners, legislation and public attention through NGO's and media (EFAMA 2011, 5). At the same time, experts in this field forecast persistent and strong growth in the segment of SRI for the following years (Forum Nachhaltige Geldanlagen, 2011). The present thesis responds to this circumstance by addressing a topical issue that is of relevance to everyone interested in grasping the necessity to align economic and social responsibilities. As an introduction to the topic, the problem statement, the aim and purpose as well as the chapter description of the thesis are outlined in the next sections.

1.1 Problem Statement

When the U.S. American mortgage bubble burst in 2007 it triggered a chain of events that caused tremendous turmoil on the global financial markets. First it affected the U.S.

economy and soon after spilled over to the rest of the world. The global and regional equity indexes reacted accordingly and divergences in performance evolved (Silipo 2010; Bekaert 2011; Bartram and Bodnar 2009). From the time of its launch to the market collapse in September 2008 the OeKB Sustainability Fund Index OeSFX was able to outperform its benchmark, the MSCI World index, in terms of total returns. However, soon after both indexes bottomed out and recovery had set in in March 2009, this earlier advantage seemed to be lost as the sovereign debt crisis, one of the grave ramifications of the global credit crisis, started to unsettle the markets in the major economic regions (Shahrokhi 2011; Grammatikos and Vermeulen 2011).

Both indexes are characterized by a globally oriented asset allocation. While the MSCI World represents a diversified equity portfolio of about 600 securities in the developed world, the sustainability fund index is composed of investment funds with socially and environmental focus (Österreichische Kontrollbank 2011; MSCI 2011b). More precisely, the portfolio of the OeSFX is characterized by featuring only funds in this particular asset class which comprise companies that comply with international humanitarian guidelines and strictly exclude the trade and production of arms and the generation of nuclear energy (Österreichische Kontrollbank 2011).

In respect to risk and return patterns, socially responsible investments are still not unequivocally considered equivalent to its conventional counterparts. Nonetheless the prevalent view for its proponents is that the long term alignment with social, ethical and environmental objectives gives corporate responsible companies a cutting edge (Michelson et al. 2004). What is more, investors in this field are considered to not only base their investment decision on earnings prospects but to extend their horizon by environmental, social and corporate governance criteria in order to reward companies committed to sustainability (Friesenbicher and Reithofer 2001, 66-69; Franck, Pätzold and Henning-Thurau 2002, 33-35; Pinner 2003, 28). Sustainability indexes focus on this particular market segment and therefore provide representative information regarding the performance of the underlying securities (SRI Gabriel 2005, 59). Transaction costs of the fund management do not bias the results and allow for direct comparison to benchmark indexes constituted by conventional shares (Schröder 2007).

1.2 Aim and Purpose of the Thesis

Socially responsible investments consist of those companies, which disclose exemplary dealings with social, ethical and environmental concerns (Eurosif 2010, 8-9).

Eligible companies must provide a CSR record that renders them particularly attractive to investors who attach a lot of importance to issues such as conservation of the environment, social and humanitarian engagement, ethical and fair products or services, to name but a few. This study therefore initially aims to introduce the reader to the field of socially responsible investing by emphasizing its distinctive characteristics in contrast to conventional asset classes.

Furthermore it points to potential problems arising in the context of the application of the term “socially responsible (investment)” and the assessment of eligible companies. Although companies have widely recognized the necessity to adopt socially responsible measures, the credible implementation rests on the individual company’s priorities and is moreover also prone to “greenwashing” (Parguel, Benoit-Moreau and Larceneux 2011; Siltaoja 2006). Therefore, rating institutions and their methodologies are looked at in more detail, as they are in the crucial position to identify truly responsible corporations and establish transparency on the market (Gabriel 2008, 29-32; Schäfer 2005).

The central aim of the study is to examine the OeSFX’s financial performance in comparison to its global benchmark within a timeframe of six years and eight months, starting with the launching date of the OeSFX. During this observation period phases of great turmoil have occurred on the financial markets. As a consequence, the global credit crunch and the sovereign debt crisis have been reflected on sustainability indexes just as on conventional equity indexes. Therefore, in order to better understand the index movements, the crucial events occurring in this period and its implications are depicted in chronological order. Dividing the overall time series into meaningful sub-periods reveals how the indexes developed during different economic phases. In so doing, the period around the nuclear reactor accident in Fukushima, Japan, in 2011 is also taken into consideration in the analysis, as this event gives rise to a positive influence on the OeSFX's performance.

The performance difference to the MSCI World benchmark is examined by various approaches. Firstly, technical analysis of the indexes allows for identifying trends and patterns in their total return performance throughout all periods, particularly with regard to regional, sector specific and capitalization related aspects. For this purpose, time series of relevant indexes with the respective objective targets are added to the analysis and the OeSFX’s and its benchmark’s relative composition is calculated from a database containing the available fund data. All other datasets are directly obtained from the index providers, either from their website or through individual requests.

Furthermore, returns alone are not sufficient to evaluate the performance of investments, so that the focus has to be shifted to a two dimensional approach, wherein the risk aspect is integrated into the analysis. Therefore the mean-variance analysis and the market model estimation underlying the assumptions of the capital asset pricing model serve as well-founded concepts for measuring the risk adjusted performance of the indexes. This way the risk-return relationship to conventional assets is assessed and can be linked to the dominating hypotheses about the performance of SRI.

1.3 Chapter Description

The present paper is divided into eight chapters. Following the introduction, chapter 2 presents the definitions of the terms and concepts underlying socially responsible investments. The third chapter deals with modern portfolio theory and the capital asset pricing model, both of which play fundamental roles in portfolio management. Chapter 4 allows for a better understanding of the role of ethical and sustainability investments in today's financial world. In the first place however, it is necessary to specify the factors that qualify an investment as particularly ethical and/or sustainable. As a next step, chapter 5 highlights that with the rise of socially responsible investing, conventional benchmarks are no longer suited to account for the peculiarities of these investments and, as a consequence, sustainability indexes have been designed to capture the differences made to the market performance.

Chapter 6 is dedicated to the most recent crises affecting financial markets all over the globe. The causes, key events and implications of the financial and economical crisis from 2007 to 2009 and of the sovereign debt crisis which occurred quickly thereafter, are vital in gaining a comprehensive picture of the development of the OeSFX and its benchmark. Finally, in chapter 7, the results obtained from the financial performance analysis of the relevant indexes are graphically and analytically presented and chapter 8 concludes with a short market outlook for socially responsible investments.

2. Definitions

The following section outlines the definitions of and position occupied by ethics and sustainability in the field of business. Particular attention is drawn to the concept of Corporate Social Responsibility (CSR) and its implementation. These topics remarkably gained in importance in the last decades as companies continuously take advantage of declaring themselves outstandingly socially responsible. CSR is a fundamental idea behind socially responsible investment and thus also needs to be critically discussed as it serves as a basis for upcoming chapters.

2.1 Business Ethics

A vast number of publications offer a range of profound definitions and explanations for the basic principle of ethics. Kline's (2010) interpretation, for example, strongly relate the term "ethics" to moral issues and describe it as being a rule of fair and just acting to ensure peoples cohabitation based on mutual respect and dignity. However it should be emphasized that ethics itself does not judge, but rather founds guiding rules for the identification, assessment and selection of values (Kline 2010, 8). Thus, ethical choices are made by instrumentalizing these guidelines and consciously applying them. Moreover the conception of ethics depends on the cultural circle and bears the characteristics of its time (Karmasin 1996, 27). In contrast, the related concept of morality is based on ethical analysis and mainly aims at providing the society with a behavioral code (Kline 2010, 7).

Regional differences influence and shape the characteristics of ethical business North America, Europe and Asia pursue different approaches in several key areas of business ethics (Crane and Matten 2010, 26-31). The implementation of ethical codes of conduct takes other forms in countries dominated by individualism than in those characterized by collective principles. The USA in contrast to the usually strongly regulated European states, mostly applies the individualistic approach, wherein responsibility for ethical guidelines is frequently handed over to corporations. Asia, on the other side, is traditionally hierarchy bound and big companies' top level management usually occupies a highly influential position (Crane and Matten 2010, 26-28).

2.2 Sustainability

The terms “sustainability” and “sustainable” have found their way in everyday language and are increasingly used by individuals as well as by all kind of public and private organizations (Crane and Matten 2010, 32). The first, and also widely accepted definition for sustainability, however, was only elaborated in the 1980s, when the World Commission on Environment and Development of the United Nations (1987) published a report called “Our Common Future”. Within the commission, the term of sustainable development is specified as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The report was a consequence of the growing awareness towards social inequalities and environmental degradation through the over-utilization and misuse of natural resources (World Commission on Environment and Development, 1987).

The subdivision into three different dimensions marks another important feature of sustainability and is referred to as the “triple bottom line”. Environmental, economic and social attributes of sustainability are interdependent and thus have to be equally considered to achieve long term stability (Hitchcock and Willard 2007, 8-9). The link between sustainability and the environment is large, given the increasing scarcity of natural resources. In order to guarantee future generations’ living standards we need to adjust production and consumption patterns. Addressing environmental issues effectively requires a system that rewards lower material input instead of dwindling numbers of staff (Hitchcock and Willard 2007, 13). From an economic perspective, sustainability focuses on the long term performance of businesses, for which the management carries the key responsibility for each undertaking (Crane and Matten 2010, 35). This responsibility includes the use of natural and human resources, affecting environment and people alike. The third component of the triple bottom line, social sustainability, is closely related to the economic stability and development as to a clean environment and the secure supply of energy. Increasing social inequalities among the growing world population create a source for upheavals and conflicts of all kinds. It must be emphasized that the rising awareness about the limits of growth and the fact that natural resources such as fossil fuels, metal and minerals will come to an end in the foreseeable future, provide a breeding ground for social unrest. Accordingly, social justice has to have top priority to guarantee peace but can only be achieved when unsustainable political, economical and social structures are eliminated (Hitchcock and Willard 2007, 14-15; Crane and Matten 2010, 36).

In the context of the *Frankfurt Hohenheim Guidelines*, Reisch and Ott (2001) refer to cultural sustainability as yet another dimension. This additional fourth pillar of sustainability was only introduced in the late 1990s and focuses on the preservation of cultural diversity and the “knowledge of order”, in which values, traditions and the fundamental philosophy of a society are incorporated (Reisch and Ott 2001, 15-16).

2.3 Corporate Sustainability

Companies, which internalize the concept of corporate sustainability (CS) are by implication bound to consider the long term effects of their activities on environment and society (Benn and Bolton 2011, 63). Applying the Brundtland Commission’s definition of sustainability to companies, Dyllick and Hockert (2002, 133-134) note that it is a corporation’s inherent purpose to meet the needs of its present and future stakeholders alike. The claim on a sustainability oriented business may only be raised when activities are not solely short term and profit seeking but rather long term beneficially to stakeholders and the natural environment (Zink 2008, 8).

Dyllick and Hockert (2002) narrow down the definition of CS by categorizing the term into the following fields: economically, ecologically and socially sustainable. From the economic point of view, companies are required to “[...] guarantee at any time cash flow sufficient to ensure liquidity while producing a persistent above average return to their shareholders.” The consumption of resources at a rate below the natural reproduction reflects the key aspect of ecological sustainability. In addition, the ecosystem must not be compromised by emissions that can neither be absorbed nor assimilated. With regard to the third dimension, a company promoting human and social capital conveys a high degree of social sustainability, if its economic decisions go hand in hand with public consent (Dyllick and Hockert 2002, 133-134).

2.4 Corporate Social Responsibility

The emergence of Corporate Social Responsibility (CSR) in literature can be traced back to the second half of the twentieth century, starting from the U.S. when the focus shifted from the philanthropic approach to the idea that companies carry an overall responsibility of business (Carroll 2008, 25). But even before CSR was formally recognized, there was evidence for businessmen’s voluntary support of community amenities such as orphanages and medical care for employees (Carroll 2008, 22; Blowfield and Murray 2011, 7). Since then, definitions are manifold and the efforts in this field wide-ranging (Blowfield and Murray

2011, 7-8). However, there are some characteristics that are typically attributed to CSR (Crane, Matten and Spence 2008, 7-8).

Davis (1973, 313) quite clearly emphasized the element of voluntarism when contending that “[...] social responsibility begins where the law ends [...]”. Therefore each activity which merely fulfills legal requirements cannot be qualified as voluntary and as a result does not constitute a part of CSR. Another aspect, which is part of the understanding of social responsible behavior, is the internalization of externalities, such as water pollution and CO₂ emissions. Companies thereby have to compensate the damage caused to an uninvolved, third party and bear the costs for the reparation (Tolhurst 2010). In contradiction to what one of the most prominent opponents of CSR, Milton Friedman, stipulates, namely that a corporation shall only be oriented towards its shareholders’ expectations, stakeholder theory holds that a company’s management philosophy must also take the needs of other stakeholders into account in order to be successful (Freeman 2008, 111; Friedman 1970).

Furthermore, Crane, Matten and Spence (2008) name the “alignment of social and economic responsibilities” as an additional attribute that is reflected in the concept of CSR. Or more precisely, they claim that economical and social/environmental objectives are not to be seen as conflicting and shall thus be pursued mutually (Crane, Matten and Spence 2008, 8). This argument can be related to a widely recognized theory of CSR, developed by A. Carroll in 1979. He distinguishes between four elements of corporate responsibility, which are built upon one another, so that the economic, legal, ethical and philanthropic responsibilities of business constitute a metaphorical pyramid. Carroll (1991) postulates that responsible corporations are to implement all four layers of CSR into their business policy.

In any case, it is not enough to only state a commitment to certain values and practices, most essentially, they also have to be incorporated in the core business functions. Philanthropic activities alone do not capture the whole idea behind CSR. Furthermore a responsible company has to implement its moral beliefs into day-to-day operations. The European Commission (2001) shares and clearly underlines this point by relating to CSR as “a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (Commission of the European Communities 2001, 6).

2.4.1 Benefits of CSR

Consumers have been shown to influence companies’ CSR policy by making their purchase decisions dependent on ethical considerations (Crane and Matten 2010, 368-369). In

particular, media is contributing to raising the transparency of business processes, offering the information attentive consumers need to make moral choices (Cornelissen 2008, 44). Hence it is not surprising that corporations get involved in CSR in order to improve their public image and to increase the value of their brands, consequently fostering customer loyalty (Mullerat 2010, 139-140). On the other hand, the violation of moral standards may bring about consumer's aversion and compromise profitability (Crane and Matten 2010, 51).

What is more, the implementation of resource awareness and sustainable patterns of production, consumption and disposal bring about cost savings and gains in efficiency (Business Link 2011). Reusing, recycling and reducing waste are among the key strategies in material management. The U.S. Environmental Protection Agency (2009) puts it simply in their 2020 vision report by underlining the “[...] need to shift from waste management to material management” (United States Environmental Protection Agency 2009, 3).

Yet another positive effect of adopting socially responsible strategies concerns higher employee motivation and commitment to the company's values, as long as they are consistent with their own. CSR helps to establish long-lasting relationships to suppliers, consumers, employees and all other stakeholders (Mullerat 2010, 140). The internationally conducted study by GlobeScan (2005) about attributes of socially responsible companies concludes that even “fair employee treatment” is on top of the list.

Additionally, CSR also aims at benefiting the community in a direct way. Charitable activities became part of what is called “strategic philanthropy” (Crane, Matten and Spence 2008). This concept is very common in the U.S.A and mainly involves monetary and non-monetary donations, employee volunteering and setting up partnerships with NGOs (Crane, Matten and Spence 2008, 267; Mullerat 2010, 141).

Socially responsible companies are also less vulnerable to external events such as fines and compensation payments, which are due to harmful business practices. At the same time they enjoy a better reputation and show more stable performance, which is reflected in the relatively smaller variance of their returns (McGuire, Sundgren and Schneeweis 1988; Lin, Yang and Liou 2009). More insight into the financial effects of companies' CSR efforts is provided in the following section.

2.4.2 CSR and Financial Performance

For investors it is of interest to comprehend the interaction between social and financial performance. A lot of research has been dedicated to finding the direction of causation as well as the magnitude. In general, the results are by far not coherent, revealing

positive, negative or no correlations at all. Negative correlation is usually associated with the high costs of CSR activities that reduce profit. Neutral or zero correlation is an indicator for a too complex relationship, as it could be captured by two variables only. The third explanation suggests a positive connection so that CSR simply offers more benefits than costs, reduces security costs, and the management acts efficiently from the social and financial perspective (Bruckner and von Pföstl 2006). Moreover, given the funds available due to strong financial performance, larger companies are expected to be in the position to 'afford' CSR (Bruckner and von Pföstl 2006, 35-61; Scholtens 2008). The size-related effect however was challenged by Orlitzky (2001), who based on more than 15,000 observations found that after controlling for the size variable, the correlation between social and FP still held. The benefits of CSR are thus considered to unfold independent of the company size (Orlitzky 2001).

Orlitzky, Schmidt and Rynes (2003) provide severe evidence of a positive association between CSP and FP after studying more than 33,000 observations across industries, and thereby affirm the rewarding effects of CSR and encourage responsible managers to pursue CSP (Orlitzky, Schmidt and Rynes 2003). In another meta-analysis, Bruckner and von Pföstl (2006) evaluated 97 different studies that focused not only on CSR but also on sustainability and environmental performance and its link to profitability over the last forty years. Overall, the conclusions were not consistent, yet the incoherent outcome reflects the still prevailing public disagreement in this field. The majority of the studies published in the 1970s imply a positive link, whereas the subsequent two decades were characterized by a severe lack of consensus in that matter. Results obtained after 2000 still contest distinct relationships but show a positive tendency. This outcome is quite in line with Wood (2010), who after reviewing recent literature about measuring CSR, confirms that due to the new data and advanced techniques available at least a modest positive link is well-founded.

Scholtens (2008) specifically examined the causation between FP and CSP, and while he found an interaction, in which FP preponderantly triggers CSR, he strictly points out that results may vary in respect to the observed variables and assumed market structure (Scholtens 2008). In contrast, Bruckner and von Pföstl (2006) observed that in the majority of the cases, CSP occurred independent of the financial situation. However, the view on causation shall not be limited to one direction only, much on the contrary, Orlitzky, Schmidt and Rynes (2003) contend that CSP and FP affect each other mutually. Financially sound companies spend money on CSR, which in turn increases their profits and enables them to intensify their socially responsible activities (Orlitzky, Schmidt and Rynes 2003).

3. Investment Theory

Investors seek to get high returns with the greatest probability possible, yet as theory shows, the price they have to pay is risking themselves to get more than just the return on (presumably) risk free assets such as government bonds or treasury bills. Besides investing in single stocks or bonds, investor's can choose to combine multiple assets in one portfolio and as such evidently optimize their expected risk adjusted performance. Plenty of theories have evolved in the last decades to understand and profit from financial markets and its agents' behavior. The grounded theories applied to portfolio management are the mean-variance portfolio theory, the capital asset pricing model (CAPM), the arbitrage pricing model (APT) and a number of factor models. The first two will be discussed in detail.

3.1 Portfolio Theory

The basic concept underlying Portfolio management is attributed to the Nobel laureate H. Markowitz (1952), the founder of the mean-variance portfolio theory. He defined the mean return and variance of return as the central measurement parameters of any investment portfolio. Variance serves as a measure of risk, and is the square root of the standard deviation, which in financial practice is more commonly referred to as volatility. It can be described as the dispersion of the observed outcomes around the expected values (mean) (Fabozzi 2009, 22).

The expected return of a portfolio is given by

$$E(R_p) = \sum_{j=1}^n w_j E(R_j) \quad (1)$$

and the variance of the return on the portfolio is

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n w_i w_j \text{Cov}(R_i, R_j) \quad (2)$$

Where w is the portfolio weight of each asset and Cov is the covariance between the assets.

Markowitz (1952) developed the theorem of an efficient portfolio, which yields the highest expected return for a given level of risk (variance) or the least level of risk for a given expected return and this way delivers the best possible diversifications strategy for a portfolio of risky assets. The theory is based on the following assumptions:

- Investors are risk-averse and seek to optimize the expected return

- Expected returns, variances and covariances of all assets are known and no other factors are required to determine the optimal portfolio
- No taxes and no transaction costs
- There is one single time horizon
- Probability distribution of asset returns follow a normal distribution (Markowitz 1952)

An investor can, as a consequence, apply his or her preferred risk-return preferences and determine the preferred portfolio. The feasible set of portfolios can be outlined as containing all possible combinations of risk and return, but only those lying on the efficient frontier achieve the highest return for a given variance, or equivalently, minimal variance for given return, and represent the tradeoff between the two factors (Markowitz 1952).

The creation of an optimal portfolio appears thus to be a dilemma of conflicting objectives, which can be tackled by identifying the investor's utility function in respect to risk attitude and preferences (Fabozzi 2009, 23). Although securities exhibit individual variances, combined in one portfolio, dispersion from the expected mean is extended to the concept of covariance to measure how much the assets' returns move together. This co-movement can also be expressed as the correlation between the assets, where a value of 1 suggests identical movements in the same and -1 in the opposite direction. The aim of diversification is thus to fundamentally reduce the risk exposure. Unless returns correlate with a coefficient of 1, a portfolio of assets will always be less risky than the individual asset alone. The effect of diversification can very well be illustrated by assuming an equally weighted portfolio of n stocks, where the average variance of all returns is equal. The variance of the portfolio is then given by

$$\sigma_p^2 = \frac{1}{n^2} \sum_{i=1}^n \sum_{j=1}^n Cov(R_i R_j) \quad (3)$$

Simplifications allow to see that the portfolio variance turns out to be determined by the correlations between the assets (Bodie, Kane and Marcus 2001, 249-250).

$$\sigma_p^2 = \sigma^2 \left(\frac{1-\rho}{n} + \rho \right) \quad (4)$$

Intuitively, it can be said that the higher the number of n stocks, the lower the variance and thus the risk exposure. Risk is thus said to be diversified away by using the information about the co-movements of returns (DeFusco et al. 2007, 445-448). Therefore, from the

perspective of pure risk minimization the interaction between securities has to be taken into account to achieve the optimal diversification.

The choice of the optimal portfolio can be extended by the assumption that investments can also be made in risk free assets. Combining risky and risk free assets in one portfolio is optimal along the capital allocation line (CAL), the line of the return of the risk free rate, which intersects with the efficient frontier. Risk free rate of returns imply a variance of 0, from which it also follows that also the covariance to other assets in the portfolio is 0. Based on the assumptions that all investors share identical expectations about the mean returns, variance of returns, and correlations of risky assets, it turns out that the tangency portfolio containing the all the risky assets in proportion to their market value weights is the market portfolio (DeFusco et al. 2007, 445-449). The capital market line (CML) consists only of efficient portfolios of risk free and risky assets. Its expected return is determined by

$$E(R_p) = R_F + \left(\frac{E(R_M) - R_F}{\sigma_M} \right) \sigma_p \quad (5)$$

The slope of the CML, $\frac{E(R_M) - R_F}{\sigma_M}$, represents the premium for every unit of additional market portfolio risk taken (Markowitz 1952).

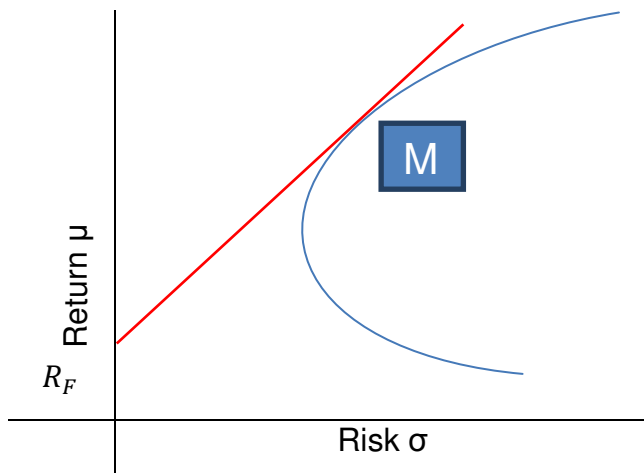


Figure 1. Portfolio theory. The capital allocation line

Figure 1 illustrates that the tangent from the risk free rate of return to the efficient frontier gives the solution to the optimization problem of maximizing the slope of the CML/CAL.

Despite its fundamental role as the core concept for portfolio investment, portfolio theory has also been prone to criticism. Not only in the case of portfolio theory, but also for many other models in finance, the assumption of normal distribution is a crucial one and was

contested to hold to real market data (Fama 1963). Returns have been shown to be better characterized by a log normal distribution, ie. in which the logarithms of returns are normally distributed. Moreover, other measures of risk have been identified, better suiting the desired objectives of investors, shifting attention away from (co)variance. Eventually, it should be noted that the assumption of rational agents in the constructed investment framework is, as in many models, limited in its application to real financial markets, where the behavior of individuals is also driven by psychological factors (Fabozzi 2009, 64). Although, plenty of conflicting or alternative theories have been put forth so far, due to its intuitive appeal and practical relevance Markowitz's mean-return analysis was able to maintain its significance (Elton and Gruber 1997).

3.2 Capital Asset Pricing Theory

The Capital Asset Pricing Model (CAPM) builds upon the portfolio theory and represents the fundamental asset pricing theory in finance. Its assumptions are extending those of the portfolio theory by the following:

- Investors have identical views about risky assets' mean return, variances of returns, and correlations
- Investors can buy and sell assets in any quantity without affecting price, all assets are marketable
- Investors can borrow and lend at the risk-free rate without limit, and they can sell short any asset in any quantity

Sharpe (1964), Lintner (1965) and Mossin (1966) independently developed a model where an asset's expected return is described as a linear function of the factor beta β . The equation is derived from the CML, which represents the efficient frontier under the assumptions of the CAPM. The ratio of the variance of the portfolio i.e. the covariance of its assets, to the variance of the market portfolio results in CAPM's beta, which is perceived as the measure of the portfolio's sensitivity to movements in the market. Hence the equation looks as follows

$$E(R_p) = R_F + \beta_i[E(R_M) - R_F] \quad (6)$$

Reiterating the equation, it can easily be seen that the risk premium of the portfolio equals the risk premium of the market portfolio multiplied by beta.

$$E(R_p) - R_F = \beta_i[E(R_M) - R_F] \quad (7)$$

Thus, when the portfolio exhibits the same variance as the market, beta is 1 and the portfolios yield identical expected returns. The difference between the expected return and the risk free rate is defined as the excess return. Any beta higher than 1 indicates a higher than average market risk and, as implied by the model, earns higher expected excess return. In turn, the opposite is true for any beta below 1 (Sharpe 1964).

Theoretically, the market portfolio contains all market assets, and is therefore completely diversified and efficient. For the equilibrium of supply and demand, the market portfolio must equal the set of mean-variance efficient portfolios held by investors. This property implies mean-variance efficiency on both sides. However, in practice no such portfolio is observable but is usually approached by means of indexes covering the respective investment universe. In active portfolio management the market index is used as a benchmark to evaluate the portfolio manager's investment skills. Under the premise of the CAPM, passively managed portfolios on the other hand rely on the market forces to achieve the optimal expected return (Connor, Goldberg and Korajczyk 2010, 23-25).

The linearity condition of the market model allows its parameters to be best measured by time series regression. In chapter 7 of this paper several regressions have been conducted on historical data to shed light on the relationship between socially responsible investment portfolios and their benchmarks. The intercept estimated by the regression in this context is referred to as Jensen's Alpha, a measure to see whether the portfolio over- or underperformed its benchmark. Alpha represents the average return on the asset unrelated to the market, thus if the return on the market portfolio were 0, the asset would still earn alpha. Depending on the chosen index, alpha indicates whether the fund manager was able to beat the market by achieving abnormal returns (Elton and Gruber 1997).

In general, the same limitations found in portfolio theory are equally applicable to CAPM. Over time the index model has undergone several modifications to overcome some problems of the presented asset pricing approach. The role of beta was extended with the introduction of multi-index models, which use more than one index to capture the influences from market movements. For example the effects of firms' capitalization on returns can be taken into account by including small and large cap indexes alike (Elton and Gruber 1997; Schröder 2004). Additionally, as discussed before, choosing the right benchmark index can also be crucial to determine both the fund's and its manager's effective success (Elton and Gruber 1997). However, the choice of the right index is only one side of the coin. Some studies have shown that the beta coefficient of the CAPM was not in line with the expected

returns. Portfolios with low betas have yielded higher returns than predicted, while high betas have been found to fall below the predicted returns (Fabozzi 2009). Still, proponents claim that since the perfect market portfolio cannot be observed the model is also not contestable (Roll 1977). In any case, it must be noted that the assumptions of the model can never completely hold for real markets, therefore, the model itself must be understood as an approximation of reality only.

4. Socially Responsible Investing

The definition and application of selection criteria on financial products is crucial for the evolvement of socially responsible investments (SRIs; in further consequence the umbrella term for any green, ethical or socially and environmentally responsible investment). The consideration of social and environmental concerns supplements a distinctive element to the classical magical triangle of investing and transforms it to a magical square. Thus, investors' fundamental decisions are no longer solely centered on return, security and liquidity but also incorporate social responsibility or ESG (environmental, social, governance) criteria (Friesenbichler and Reithofer 2001, 66-69; Franck, Pätzold Henning-Thurau 2002, 33-35; Pinner 2003, 28). They aim at directing the flow of money towards companies which develop and implement processes that entail positive or at least prevent negative effects on society and environment. As a consequence, the resulting issue is the identification of responsible corporations on the market. This task is performed by rating institutions that screen the investment universe by SRI criteria, hence providing investors with the relevant information to invest in line with their principles (Gabriel 2008, 29-32).

A frequent growing problem in the context of SRI is the overly generous application of the term. Definitions of SRI have been found to be neither definite nor very limited, so that investors might be misled or statistics biased (O'Rourke 2003). As O'Rourke (2003) points out, discrepancies among definitions are most likely due to the commercial need of investment companies and rating agencies to promote and differentiate their products.

From a historical point of view, the origins of SRIs are related to religious restrictions found in Christianity, Islam and Judaism alike, where sinful investment objects or interest receivables have been despised and prohibited. The progress of environmental destruction, climate change and the increasing scarcity of natural resources further increased the recent boost of SRI with particular focus on environmental protection, energy conservation and renewable energies (Renneboog, Horst and Zhang 2008).

4.1 Selection Criteria and CSR Ratings

At the bottom of SRIs three methods are first and foremost in the position to shape business processes. Gabriel (2008, 33-35) refers thereby to avoidance, promotion and shareholder activism. Avoidance is the result of a negative screening, while companies and their reputations are promoted through positive screening. More recently, value is also placed on shareholder activism to enter into dialogue with the company's management to influence

the corporate behavior in respect to ESG aspects. In fact, the composition of most of the SRIs results from a combination of different methods and screens (ETHIBEL 2003; Eurosif 2006, 3; Gabriel 2008, 33-35; Renneboog, Horst and Zhang 2008).

4.1.1 Rating Methodologies and Objectives

Financial ratings are widespread and generally accepted methods for the assessment of a company's economic performance. Quantitative and qualitative evaluation is aggregated and results in respective corporate rankings. In the case of CSR ratings (in further consequence used as an umbrella term for SRI ratings, eco-ratings or sustainability ratings) filters are added to the screening process and by implication the eligible universe of investments is reduced. As a consequence, its assets' investment policy is in compliance with certain ecological, ethical and social standards and norms and thus attracts private and institutional investors with increased awareness of CSR related issues. Nevertheless, it is important to note that the financial analysis is not neglected but only extended by sustainability and ethical criteria (O'Rourke 2003; Pinner 2003, 137-152; Renneboog, Horst and Zhang 2008). Pinner (2003, 138-139) illustrates that although both conventional and sustainability research processes are based on the top-down analysis, SRIs distinctively feature the integration of ethical principles throughout the whole process.

Rating methodologies are not standardized and thus may vary according to rating providers and objectives pursued by investors. In response to the lack of uniform CSR rating standards, the *Frankfurt-Hohenheim Guidelines* present a multidimensional approach to tackle this issue (Balz et al. 2002).

In general, there are three main institutions that conduct ratings: independent rating agencies, in-house research teams of credit institutions, and operators of security indexes (Schäfer 2005).

4.1.2 Screening Approaches

The determination of companies, whose corporate philosophy and practices correspond to the desirable investment criteria within the scope of a CSR rating, requires the application of certain screening methods. Among the most important strategies, according to Eurosif (2006), the following criteria are ranked:

- Negative screening / simple exclusions
- Ethical exclusions

- Positive screening
- Best-in-class
- Pioneer screening / Thematic investment propositions
- Norms-based screening
- Simple screens / Simple exclusions
- Engagement
- Integration

These strategies are often interrelated and therefore usually applied in conjunction with each other (Eurosif 2006).

The following section describes ethical exclusions, positive screening and the best-in-class approach as well as norms-based screening in more detail.

4.1.2.1 Negative Screening / Ethical Exclusions

The earliest screening procedures have been conducted in response to religious reservations towards sinful investments, in further consequence leading to the establishment the term sin-stocks. Particularly during the course of the last century drastic events such as the Vietnam War and the apartheid policy in South Africa caused a deliberate rethinking. The emergence of public opposition in the form of anti-racist and anti-war movements paved the way for socially responsible investing (Pinner 2003, 80-81; Renneboog, Horst and Zhang 2008). The explosion of the nuclear power plant in Chernobyl (former USSR) in 1986 increased the criticism leveled at the generation of nuclear power. Soon after, the Exxon Valdez tanker ran aground in the sea of Alaska in 1989 and caused serious maritime pollution (Renneboog, Horst and Zhang 2008). More recently, the ongoing chemical pollution of the Gulf of Mexico was exacerbated by the BP oil spill in 2010 (BP 2010; Science Education Resource Center Carlton College 2011). The occurrence of these and a number of other man-made environmental disasters underlines the risks arising out of the reckless way of dealing with the environment and its resources (Renneboog, Horst and Zhang 2008).

Considering the potential impacts, it is no surprise that more and more investors raise moral concerns about the direction of their capital flows. Negative screening leads to the exclusion of companies operating in controversial industries.

Criteria of exclusionary character mostly relate to

- alcohol
- armament and military involvement
- breaches in the human rights of employees or local residents

- child labor
- discrimination of women, ethnic groups and minorities
- abortifacients
- gambling
- nuclear power
- polluting and hazardous substances
- animal testing and maltreatment
- supporters of oppressive regimes
- pornography
- tobacco
- use of pesticides and genetic engineering (GMO) in farming (Oekom Research AG 2001; Friesenbichler and Reithofer 2001, 73; Forum ETHIBEL 2003; Pinner 2003, 156-157; Eurosif 2006, 3; Renneboog, Horst and Zhang 2008; MSCI 2010).

4.1.2.2 Positive Screening

The next step of the rating process usually entails the application of positive criteria on the already reduced pool of eligible companies. Selection pursuant to positive criteria stemmed from the promotion of ecological technologies in the 1980s. In conjunction with this the awareness of the advancing environmental destruction raised the demand for sustainable corporate philosophies (Pinner 2003, 81-82). Positive screening is considered to be a proactive approach as it incentivizes the adoption of social and environmentally friendly practices and standards. The criteria are concerned with the a company's CSR performance, encompassing the particularly exemplary involvement in for instance

- environmentally friendly production processes, products and technologies
- implementation of environmental management systems
- renewable energies
- recycling
- corporate governance standards
- cultural diversity
- human and labor rights
- labor practices and relations (Oekom Research AG 2001; Friesenbichler and Reithofer 2001, 73-74; Forum ETHIBEL 2003; Pinner 2003, 156; Eurosif 2006, 3; Renneboog, Horst and Zhang 2008; MSCI 2010).

4.1.2.3 Best-in-class Approach

After having identified those companies that seem to have a record of compliance regarding social and environmental issues, the rating procedure is usually extended by the best-in-class approach. The best companies in the context of CSR within an industry sector or group are determined by a qualitative ranking (Pinner 2003, 158-159). This way, a continual improvement process through competition ought to be triggered. However, the evaluation of each company's individual CSR score usually lacks uniformity and thus hampers fair judgments (Michelson et al. 2004; Van den Bossche et al. 2010). Michelson et. al. (2004) suggest tackling this problem by adopting uniform accounting and auditing principles.

The best-in-class approach applied without pre-screening for minimum CSR standards fell into disrepute after the oil disaster at the Gulf of Mexico, when it came to light that the safety measures taken by BP, Halliburton and Transocean had been inadequate. A number of sustainability indexes and funds had included BP due to exemplary reductions of greenhouse gas emissions relative to its peer group, but had not considered its reported misconduct in environmental issues and plant safety (Oekom Research 2011, 22-23). From 2005 to 2010 BP and BP Amoco have also repeatedly been included in several funds listed in the OeSFX (elaborated from OeSFX asset allocation database).

4.1.2.4 International Conventions and Declarations

Most rating schemes require the compliance with internationally recognized conventions and guidelines. By operating in conformity with norms and standards related to CSR, companies adhere to the basic principles of responsible business conduct. Examples of such norms have been issued by the UN, OECD, ILO and a number of other globally and regionally acting organizations. The *ILO Labor Standards*, the *OECD Guidelines for Multinational Enterprises* and the *UN Global Compact* are directed at the CSR record at the company level, whereas the *UNPRI* and the *Eurosif Transparency Code* refer to ESG attributes of investments (Oekom Research AG 2001; Schäfer 2005).

4.1.3 Rating Institutions

“Rating institutions are the link between stakeholders and companies.” This proposition of Schäfer (2005) gets to the heart of the discussion about the role of CSR rating organizations. The need for ratings with regard to ESG is large, given the growth in the field of SRI in general, and of sustainability funds in particular. The same holds for the number of rating agencies which in response to this movement increases at the same pace (Scalet and

Kelly 2010). Rating organizations are in charge of the rating process and methodology, most of them pursuing their own approach of collecting and evaluating the data, together with addressing issues of environmental and social concern. In order to cope with the flood of CSR information available, they are also in the vital position to establish transparency and credibility in the market (Koellner et al. 2005; Van den Bossche et al. 2010).

The comparability of ratings across rating organizations is however rather low, given the deficiency of uniform applications of ESG norms and screening methods (Scalet and Kelly 2010). While the market for credit ratings is dominated by a few large key players, have the leading providers of CSR ratings not yet emerged. Eventually, the focus is expected to shift to a few rating institutions only (Schäfer 2005).

From the geographical point of view, differences have been perceived between Continental Europe and the Anglo-American world. The latter had originally put more emphasis on corporate governance issues, while the primary assessment criteria in Europe has been environmental performance (Schäfer et al. 2006). The markets for SRI are still under development, yet the degree of progress varies between countries. Whilst the UK and the US are regarded as advanced, Austria has not yet got beyond the early stage of ethical investment (Hofmann, Penz and Kirchler 2009).

4.1.4 Critique of CSR Ratings

Proper rating systems are elementary in making socially responsible investing work. Naturally, the CSR rating concepts are well-intentioned, yet also vulnerable to a range of distorting influences if the enormous volumes of capital employed are taken into consideration.

At the very basis of the ongoing discussion about socially responsible investments and how to determine them, appears the fundamental point of criticism about their proper and distinctive definition. The grounds for the discrepancies regarding terms and interpretations can according to O'Rourke (2003) partially be traced back to investment companies' and rating agencies' intentions to create a unique selling proposition. New competitors are entering the market and as the range of products is extending, so grows the need for differentiation (O'Rourke 2003). Another source of discord is the perception of social responsibility. As there is no universally accepted concept of CSR, screening criteria are very prone to pure subjectivity and may vary heavily across cultural spheres (Michelson et al. 2004). Likewise, Eurosif (2010, 21) underpins these beliefs by declaring the proper definition

and categorization of SRI as the key challenge and central issue to achieving a common understanding of the subject.

Although CSR screenings of rating organizations may incentivize companies to improve their CSR performance, it has been shown that the rising number of direct information requests in the form of questionnaires, interviews, site visits, etc. can also generate an adverse effect. Rating results can be severely distorted simply due to the lack of response. In fact, smaller companies in particular are unable to cope with a flood of inquiries and varying methodologies each day (O'Rourke 2003; Schäfer et al. 2006). Large companies are in the position to afford proper information systems in order to respond to the external information demand, while smaller firms are simply screened out and removed from the investment universe (O'Rourke 2003).

Another frequently addressed issue is the lack of transparency in both the screening process and the fund's investment strategy. Firstly, fair judgments require reliable, uniform social reporting schemes together with best practices in auditing (Michelson et al. 2004). Due to missing uniformity and the excessive spread of rating agencies, companies may benefit from the free choice of rating methods they want to be assessed by in order to communicate the best corporate image possible (Scalet and Kelly 2010).

Further, Michelson et al. (2004) critically review the negative screening method when it comes to secondary involvement. Companies that convey the impression of being eligible may in fact be involved in industries considered sinful simply because they are part of the supply chain and deliver electronics or raw materials that are to be further processed. Fund managers tend to address this issue by setting a ceiling rate for secondary contribution in negatively rated firms. Accessing such crucial information, however, might be a difficult task to undertake (Michelson et al. 2004).

Along with the findings of his qualitative survey about rating agencies, Figge (2000) expresses harsh criticism not only about the imprecise target definition but also about the presence of agency risk. If incentives are sufficient enough, rating agencies are induced to relinquish objectivity in favor of the assessed companies. A reasonable explanation may, for one thing, be the prevalent dependency of the rating organizations on their clients, as long as the market for CSR ratings is not in equilibrium. Since there is still too little demand, buyers might be tempted to exercise their power in order to induce suppliers to deliver better rating results (Figge 2000, 76-81).

Eventually, the purpose of CSR ratings is not only the disclosure of commitments and practices, but in the wider sense also to impact on companies to improve their CSR standing.

Despite fulfilling the function of assessing CSR efforts, ratings have not proved to provide the necessary incentive to bring about a change in corporate behavior (Kelly and Scalet 2010). Even though the CSR movement is at present undeniable, Kelly and Scalet (2010), for example, conclude their investigation concerning 60% of the Fortune Global 250 by contesting that ratings hardly induce companies to address negative CSR events in public.

4.2 Socially Responsible Investment Products

Many standard investment products can also be structured in a way that allows for the integration of ESG aspect, thus asserting the claim of qualifying as ethical or sustainability investments. In general, SRI can be classified in direct and indirect forms. Shares, bonds, closed-end funds, shareholder participations and sustainable real estate qualify as direct investments due to the autonomous asset allocation process, in which the investor takes the decision for an investment project individually. Indirect investments, on the other hand, are characterized by the externally managed pooling of financial resources with the aim of a greater investment. The typical indirect investments are bank deposits, investment funds and certificates. In any case, ESG criteria are to be met by the individual investment objects, such as a company or government in order to be regarded as socially or environmentally responsible (Faust and Scholz 2008, 143-148; Werner 2009, 31-33).

More recently, sustainable investment trends have also been recorded in the microfinance segment due to increased CSR reporting efforts and the consideration of exclusionary criteria. In 2009 the overall microfinance investments in Europe with regard to ESG amounted to 1 billion euros (Eurosif 2010, 17). The emergence of sustainability orientation can also be observed for other financial products such as pension and life insurances (Werner 2009, 31-33).

On the European level, among all socially responsible investment vehicles, discretionary mandates are at the forefront with a share of 84%. In sharp contrast to the segment of funds which cover only 14%. Other structured products seem to be rather unpopular, in total reaching only a share of 2%. The preferred class of assets under management with 53% are bonds, followed by equity with 33%, while the remaining 14% mainly comprise alternative/hedge funds, property assets, private/equity venture capital and monetary assets (Eurosif 2010, 17).

Renneboog, Horst and Zhang (2008) point out that particularly pension funds had a large impact on the evolvement of the SRI industry. First regulatory implementations have been initiated in the last decade by a number of European countries, Australia and the U.S.,

necessitating the reporting and disclosure of ESG information in the investment policy (Renneboog, Horst and Zhang 2008).

4.3 Performance of SRI

The dominating performance hypotheses underlying investment decisions under ethical and environmental aspects embrace three different positions.

The main argumentation against SRI refers to modern portfolio theory, in which broadly speaking, any limitation of the investment universe brings with it lower expected risk-adjusted returns (Markowitz 1952). Thus, investors fear that compared to traditional funds, returns will not compensate them for the relatively higher risks of the constrained portfolio. Additionally, the requirement of information beyond purely financial data increases the transaction costs and management fees disproportionately to the funds size (Michelson et al. 2004).

Proponents of SRI claim that companies with strong CSR motivations and sustainable practices will be more successful and outperform those neglecting any non-financial responsibility towards their stakeholders. The costs of externalities are presumed to exceed any possible losses attributable to the constrained investment universe (Haigh and Hazelton 2004). At the same time, the awareness of ESG issues signals a higher quality of management (Cortez, Silva and Areal 2009). It is in fact plausible that irresponsible corporate behavior poses a threat to any long term profitability. The selection process thus excludes companies, which deliberately ignore ESG aspects and rewards their more responsible counterparts (Michelson et al. 2004; Phillips, Hager & North Investment Management 2005). Much in contrast to the first argument of higher risk due to limited portfolio diversification, the long term orientation of responsible corporations and avoidance of social and environmental risks is presumed to manifest itself in the form of lower volatility of equities and this way positively affects the risk-adjusted performance (Pinner 2003, 36-39).

According to the third hypothesis, SRI are expected to eventually pay out in the long term, as the alignment of financial objectives with social responsibility occurs over a longer time period (Michelson et al. 2004). Or from a more pragmatic perspective, there is at least no significant difference in the performance compared to conventional investments. This holds, provided a best-of-sector approach is applied and securities are only eliminated to a limited degree (Phillips, Hager & North Investment Management 2005).

5. Sustainability Indexes

A wide range of indexes have been developed to serve the specific needs of institutional and private investors alike. Besides regional, capitalization and sectorial selection criteria, large index providers usually publish, among others, style, volatility and alternatively weighted indexes as well as a number of thematic benchmarks, including ESG indexes (see for example FTSE 2011; Standard&Poor's 2011; Dow Jones Indexes 2011a; MSCI 2011b). Since the 90's the number of sustainability indexes is steadily increasing and reflects the demand for sustainable investment alternatives. Still, this overly small timeframe poses a problem to many quantitative performance studies as they encounter a lack of long-term time series data (Fowler and Hope 2007).

Meeting the qualifying criteria for the inclusion into a sustainability index can incentivize the management to further advance the implementation of sustainable business processes (Barkawi 2008, 547-548). Conventional benchmarks alone can no longer satisfy the needs of investors, which seek to integrate the aspects of corporate social responsibility in the investment process. According to Barkawi (2008, 547) the three distinctive key functions of sustainability indexes are: Performance benchmarking, efficient implementation and indirect engagement.

The first point refers to the requirement of measuring financial performance explicitly within the segment of sustainability investments. An index covering the entire market appears too general for a comparison that considers more factors than only risk and return. However, thematic indexes also benefit from having a total market benchmark set as investors will inevitably question the relative performance in contrast to conventional indexes. At the same time sustainability indexes are used to evaluate fund manager's performance (Schoenefeld 2004, 236; Barkawi 2008, 547). Although the extent to which funds actively set sustainability indexes as benchmarks is still very limited, fund managers have been reported to primarily license the large sustainability indexes (Fowler and Hope 2007).

In addition, indexes provide investment managers pursuing an active approach with a pre-selected set of securities, thus facilitating the investment process. The index provider's selection allows for the identification of the leading companies with regard to sustainability and CSR, bringing about higher transparency and efficiency gains for the investor. The same applies to passive portfolio management and the replication of sustainability indexes (Barkawi 2008, 547).

5.1 Creation of Sustainability Indexes

The design of sustainability indexes closely relates to the criteria used to define SRI. Most indexes assign in-house analysts with the task of creating and implementing screening methodologies to determine what the index constitutes. Besides ethical criteria, weightings and capitalization play an important role for the inclusion and strongly influence the constitution even when the screenings are almost identical. Gabriel (2005) qualitatively evaluated 11 sustainability indexes and found a strong tendency towards the inclusion of companies with increased market capitalization. Sustainable small or medium sized companies are underrepresented in most of the indexes as a large-cap bias prevails (Gabriel 2005, 63-68).

Indexes usually consist of advisory boards and decision committees that are responsible for supervising the selection process. Their sphere of influence is far-reaching, not only with respect to the methods applied but also when it comes to the final say on whether a company is admitted to the index or not. Here, Gabriel (2005) critically notes that on the one side sustainability indexes benefit from the quality of the overall assessment through supervisory bodies but at the same time might also encounter a loss of objectivity. The value of the original evaluation process is at risk of being undermined by the assessment on a case-by-case basis (Gabriel 2005, 75-76).

5.2 Selected Sustainability Indexes

By now the majority of all large index providers worldwide publishes at least one or more sustainability indexes. This way they successfully respond to the demand that has developed over the years and create a diversified ESG benchmark series. Below, the Dow Jones Sustainability index and the FTSE4Good Index, both relevant for the empirical analysis in chapter 7, are briefly outlined.

5.2.1 Dow Jones Sustainability Index

The first, and still one of the main, (Fowler and Hope 2007) global sustainability benchmarks was launched in 1999 by Dow Jones Indexes in cooperation with SAM, a Swiss fund-management firm. The main focuses of its methodology is laid on the application of the best-in-class approach across all industries and no exclusionary criteria are applied (Dow Jones Indexes and SAM Indexes 2011a). In the course of its existence, the Dow Jones

Sustainability Indexes run through annual revision processes, whereby the ongoing adaptations of environmental and social standards are dynamically incorporated (Barkawi 2008, 553).

5.2.2 FTSE4Good Index

The FTSE Group, as a joint undertaking between the Financial Times and the London Stock Exchange, offers sustainability indexes with global perspective or focus on Europe and the U.S. Both benchmark and tradable indexes are composed of selected constituents underlying the FTSE Developed Index or All-Share Universe. The index inclusion criteria applied require good standards in corporate responsibility concerning environmental management, client change mitigation and adaptation, countering bribery, upholding human and labor rights and supply chain standards. At the same time, tobacco producers and armament industries are strictly excluded (FTSE International Limited 2008).

5.3 OeKB Sustainability Fund Index - OeSFX

Within the scope of its corporate sustainability policy, the Österreichische Kontrollbank Aktiengesellschaft, Austria's main provider of financial and information services to the export industry and capital markets, launched the OeSFX in May 2005 to offer a benchmark for socially and environmental responsible equity funds in Austria. The index was a result of the common efforts of its advisory committee, consisting of independent experts from ÖKO-INVEST Verlagsgesellschaft, the Austrian Consumer Protection Association, the Austrian Business Council for Sustainable Development and OeKB Financial Data Services, to establish a benchmark of performance to investors that are concerned about the impact of their investments on society and the environment. The link between financial investments and ethics, although neglected too long, experienced a tremendous upswing for the last two decades, making the OeSFX an appropriate response to increased investor awareness (Österreichisches Kontrollbank AG 2011).

To guarantee the compliance with environmental and social standards that are required for the admission to the OeSFX, the funds undergo a strict verification process on a regular basis according to the Environmental Management and Audit Scheme, EMAS (Österreichische Kontrollbank 2011). The objectives of EMAS are defined as the application of environmental management systems and their regular evaluation, providing the public with information about relevant business activities and fostering the active involvement and

extended vocational training of employees (Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management 2011).

5.3.1 Inclusion Criteria

The eligibility requirements of the index oblige the equity funds to invest in companies that pursue ethical, socially responsible and/or environmental standards in conformity with the exclusion criteria. The admission of purely ethically or socially oriented funds is possible if environmental criteria are at least partially incorporated within the fund's investment policy. Of exclusionary character are shares held in

- companies involved in the production and trade of arms. Participating interests in such companies must not exceed five percent of the total assets.
- nuclear power plants, companies generating nuclear energy or components clearly designated for its generation. Should participating interests in such companies be held, they must not amount to more than five percent of the total assets.
- companies, which do not comply and respect international guidelines, particularly with respect to labor and human rights standards as defined by the International Labor Organization of the United Nations. At least one of the relevant standards has to be met in the fund's investment policy. Pure environmental technology funds, however, if their manufacturing facilities are located in countries that show severe deficiencies with regard to social standards, are required to include social criteria in their policy.

While many environmentally and socially responsible funds actively screen for the exclusion of prostitution, gambling or animal testing, these criteria are not taken into account in the composition of the OeSFX. Otherwise, funds investing in environmentally sustainable and innovative enterprises might be excluded due to not explicitly stating their social commitments (Österreichische Kontrollbank 2011).

The minimum fund size for inclusion amounts to € 3 million (or the equivalent in a foreign currency, at the reference exchange rate of the ECB) of assets under management. During the period of inclusion a fund must not drop below the threshold of € 2.5 million, otherwise it is removed from the index (Österreichische Kontrollbank 2011).

5.3.2 Calculation Method

The eligible funds are sized in three classes and weighted accordingly to prevent biases due to the domination in absolute terms of larger funds. If a fund's assets under management are below 30 million euros, the weighting factor is one, between 30 and 100 million euros it increases to two and any fund exceeding 100 million euros is weighted with three. Necessary adjustments of the relative weightings take place at the beginning of each quarter.

The calculation methods applied by the OeSFX and the MSCI World index differ in respect to the underlying weighting concept. In contrast to the MSCI equity indexes, which base their calculation methodology on *Laspeyres formula*, the weightings of the OeSFX constituents are dependent on the funds size and thus predefined and only rebalanced if changes in the size require adjustments (Österreichische Kontrollbank 2011, 5; MSCI 2011a).

The formula for calculating the index value of the OeSFX is given by:

$$I_t = I_{t-1} \times \frac{\sum_{i=1}^n G \times \frac{P_{i_t} + A_{i_t}}{P_{i_{t-1}}}}{\sum_{i=1}^n G_i} \quad (9)$$

$$\text{and } P_t = \frac{NAV_t}{FX_t}, A_t = \frac{Div_t}{FX_t}$$

where I	Index value
t	Effective calculation date, i.e. the date on which the index calculation applies
G	Weighting factor in the index (G = 0 or 1 or 2 or 3)
i	i = 1 ... n
NAV	Net asset value (price) of a given fund
Div	Distribution
FX	Euro reference exchange rate of the European Central Bank
P	Net asset value (price) of a given fund in euros
A	Distribution (gross) in euros (Österreichische Kontrollbank 2011)

6. Recent Economic Crises and Their Impact

The following chapter deals with the series of events and phases most crucial for the understanding of the analysis of equity indexes. Therefore, as a first step, the sample period is split in reasonable sub-periods and the events leading to this subdivision are in further consequence portrayed in a structured and plausible manner.

6.1 Breakdown into Phases

The definition of proper and reasonable time spans within the overall sample period is a fundamental issue most of the empirical studies about the global financial crisis have been concerned with. Based on the chronology of events, the subdivisions in the previous analyses are rather arbitrary, but nevertheless quite in conformity with each other (Bartram and Bodnar 2009; Silipo 2010; Baur 2011; Iley and Lewis 2011; Shahrokhi 2011; Mun and Brooks 2012). Consequently, in this study a similar approach is also pursued and the period from December 30, 2004 to August 31, 2011 is broken down into:

1. Pre-Financial-Crisis period: 30/12/2004 – 15/09/2008
2. Lehman Brothers bankruptcy to March 2009: 16/09/2008 – 09/03/2009
3. March 2009 to the beginning of the sovereign debt crisis: 10/03/2009 – 05/11/2009¹
4. Sovereign debt crisis to end of sample period: 06/11/2009 – 31/08/2011

The end of the credit crisis cannot be determined as straightforward as the beginning, therefore, for the purpose of this study, the end of the second period is defined as the day when the OeSFX and the MSCI World index hit bottom.

It further entails three subsamples dealing with a period of 90 trading days before and 15 respectively 90 trading days after the nuclear incident in Fukushima, Japan. The nature of the OeSFX, to strictly exclude stocks related to the nuclear energy industry, leads to the assumption that the environmental disaster had less of a severe impact on the sustainability fund index than on its global benchmark. Therefore the indexes' mean-variance relationship in time spans around the accident is examined.

1. Subsample: 90 trading days before Fukushima: 02/11/2010 – 11/03/2011
2. Subsample: 15 trading days after Fukushima: 14/03/2011 – 01/04/2011

¹On November 5, 2009 Greece announced its revised public deficit figure. Taken from the timeline provided by Europa – EU Nachrichten http://europa.eu/news/economy/2010/12/20101123_de.htm

6.2 The Global Financial Crisis 2007 to 2010

Economists have put a lot of effort in shedding light on the complex dynamics of the most recent global financial crisis since the 1930s. The ongoing economic depression is the result of a chain of events that unfolded its magnitude at an unforeseen pace, encompassing all industries and economic zones (Bartram and Bodnar 2009; Baur 2011). Due to the global nature of the crisis, risk diversification strategies have clearly failed to yield secured returns (Bartram and Bodnar 2009) and today's prevailing economic theories have not been able to provide a remedy to forestall the volume of impairment caused on financial and real markets (Silipo 2010).

6.2.1 The Causes

The vulnerability of the financial systems was heavily underestimated and its advent far too long ignored. Shahrokhi (2011) identifies the misaligned incentives of participants in the U.S. financial system and the military engagement in Iraq and Afghanistan as central drivers of the economic slump. Arising out of this, forerunners of instability are the commodity sector, sub-prime housing, equities and credit markets, which have been affected most severely in the long haul. Yet the grounds of the crisis are ramified and embedded in non-transparent structures. Indisputable in the center of attention was the fragility of the financial sector. Financial market interlocking and the fast emergence of sophisticated financial innovations led to hardly comprehensible transactions that paired with an ever increasing appetite for risk among investors, paved the way for high rates of indebtedness and, in further consequence, a worldwide meltdown across industries (Shahrokhi 2011; Silipo 2010).

Furthermore, as Silipo (2010) notes, the generally optimistic perception of the economic situation in Europe and the U.S. after the dot-com crisis led to a strong growth at the beginning of the 2000's in demand for credit lending and mortgages, for both private and corporate sectors. At the time credits fell due, neither private households nor financial institutions had been able to meet their obligations any longer. As banks were extending their business to non-traditional financial products, they increased their liquidity by wrapping loans and trading them on secondary markets. Even more crucially, securitization of loans facilitated banks to expand lending to sub-prime borrowers, which entailed higher

probabilities of default. Eventually, in February 2007 first mortgage defaults indicated the upcoming wave of downgrades by banks and rating agencies (Silipo 2010).

6.2.2 Crisis Timeline

The early indications of the global crisis can be dated back to February 2007, when Freddie Mac officially ceased to buy the most risky subprime mortgages and mortgage-related securities (Federal Reserve Bank of St. Louis 2011). In the summer months of the same year the U.S. housing bubble burst and the subprime loan crisis took its course (Silipo 2010; Shahrokhi 2011). The crisis period of the credit crunch is defined as the timeframe between Friday September 12, 2008 to Monday October 27, 2008, when equity indexes sharply declined with daily losses around 6 percent for the major global indexes (Bartram and Bodnar 2009). The issue of counterparty risk in the context of credit contagion quickly started to play a fundamental role. Through the clustering in default correlations probability of losses increased and intensified the spread of counterparty default (Jorion and Zhang 2009). Amidst all market turbulences it became apparent that the collapse of Lehman Brothers on September 15, 2008 was most incisive and set an unmistakable example to all market participants (Bartram and Bodnar 2009; Grammatikkos and Vermeulen 2011; Mun and Brooks 2012).

The worldwide turmoil in equity markets was accompanied by high levels of volatility with rates up to four times that of the pre-crisis period. Only by November 2008, a slight relief as far as volatility levels were concerned, was perceptible. However, the credit crisis spilled over onto real economic demand while it continued to control the movement of equity markets and caused a series of breakdowns (Bartram and Bodnar 2009; Mun and Brooks 2012). Although markets started to slow the downward slide at the beginning of 2009, a global recession impeded the return to pre-crisis levels. In March 2009 stock markets finally reported relieving upturns while the surge of negative news slumped (Baur 2011). Iley and Lewis (2011) refer to the National Bureau of Economic Research of the U.S. to officially date the end of the recession as June 2009.

The policy response in the U.S. during the sub-prime crisis was mainly concerned with restoring the liquidity of credit markets and addressing financial institutions. After the bankruptcy of Lehman Brothers the awareness of the systemic risk arose as did policy interventions aim at restoring confidence in the markets and preventing the meltdown of further banks (Ait-Sahalia et al. 2011). In the following months, recovery set in, however, the collapse of the financial system paved the way for the sovereign debt crises taking place in 2009 (Shahrokhi 2011).

6.2.3 Effects Across Sectors and Economic Zones

What became obvious from the very beginning was the underperformance of the financial sectors across all developed markets. Financial institutions found themselves in the epicenter of turmoil and market values dropped down at enormous rates. From 2006 to February 2009 the oil and gas industry, in contrast, clearly stuck out with much less destructive losses compared to all other sectors, even though they recorded significant drops from July 2008 onwards. However, during the credit crunch, only the healthcare sector was able to limit losses in emerging and developed countries (Bartram and Bodnar 2009).

Baur (2011) only recently produced empirical evidence for the strong contagion stemming from the financial sector. He provides cross-country and within-country contagion estimations for financial and real economy markets by measuring changes in the return co-movements of 25 countries. His findings indicate increased co-movement of local stock markets and the world portfolio for the majority of countries, but interestingly not for Germany and the U.S., whose markets have performed better. Co-movements of the world financial sector and domestic real economy sectors are valid for only 28% of all cases. This form of contagion took place mainly in developed countries, especially France, the U.K. and the U.S. The real-economy sectors affected the most are Basic Materials and Utilities, while Telecommunications, Consumer Services and Healthcare have in general been less vulnerable to movements of the financial sector. In contrast, he finds strong support for the spreading of the crisis from the domestic financial to the domestic non-financial sectors in most of the emerging countries, but hardly in the developed markets (Baur 2011).

Furthermore, Bartram and Bondar (2009) observed that during the crisis the equity index performances of the financial sector in emerging markets showed very similar patterns to the non-financial sectors in developed countries. The different structure of the banking market in emerging countries, which constrained the exposures to mortgage securitization much more, offers a good explanation for the mitigated effect on financial firms (Bartram and Bodnar 2009).

6.3 The Sovereign Debt Crisis 2009 to date

In the wake of the global financial crisis, governments worldwide face enormous budget deficits caused by large amounts of capital injections in financial institutions to prevent a further destabilization on the markets. Amplified by countercyclical policy measures the deficit spending reached unprecedented highs (Grammatikkos and Vermeulen

2011). As a consequence, the resulting sovereign debt crisis dominated the global financial markets throughout the last two years (Alsakka and Gwilym 2011).

6.3.1 Crisis Timeline

Although the years following Greece's entry into the euro area entailed high rates of economic growth, the extending fiscal imbalances and the lack of competitiveness posed a problem with serious consequences for the country. The tranquil phase following the global recession in 2009 was disrupted in November of the same year, when the announcement of the revised Greek public sector deficit of 12.7% of GDP and the resulting downgrading of Greek bonds by rating agencies in December triggered market turbulences in the Eurozone (Gibson, Hall and Tavlás 2011; Nelson, Belkin and Mix 2011). Soon after, in April 2010, another revision of Greece's deficit led to a new round of grave downgrading of government bonds by Moody's and Standard and Poor's and reinforced the pressure on European and U.S. markets (Reuters 2010). On May 2 the Eurozone and the International Monetary Fund pledged financial assistance to the amount of 110 billion euros to prevent Greece from defaulting on its debt obligations. The granting of financial assistance sent a message to investors: the pressure on the common European currency was piled and stock markets reacted with a harsh downturn. One week later, on May 9 an additional package of 500 billion euros for other vulnerable European members and the European Central Bank's announcement to start buying European bonds relaxed the international markets and strengthened the euro (Nelson, Belkin and Mix 2011). At the same time the EFSF (European Financial Stability Facility) was created as a common lending facility for vulnerable members of the monetary union (European Financial Stability Facility 2011). In the following months Portugal, Ireland, Spain and later Italy also came under persistent pressure to downgrade. Potential spillovers presented high risks for European banks holding large exposures in these countries and could unleash a surge of defaults all over the European Economic Area. In July 2011 further financial assistance to the amount of another 109 billion euros from the European Community was inevitable, as the new fiscal policy and consolidation measures of the past months had not yet borne fruit to overcome the crisis. Standard & Poor's continued to downgrade Greece in June and July of the same year and attested a negative outlook (Nelson, Belkin and Mix. 2011). The impact of rating agencies during the sovereign crisis was in fact large, although more with regard to outlook forecasts and watch announcements than to the actual rating. Negative news from rating agencies were shown to imply currency depreciation and to be contagious for other countries (Alsakka and Gwilym 2011).

6.3.2 Implications for the European Economic Union

The stability of the Eurozone was quickly disrupted after rating agencies started to penalize Greece's excessive budget gap and illiquidity. The crisis had revealed the critical imbalances between highly competitive exporting countries in the North and less fiscally disciplined countries in the South of Europe. In response to the prevailing disequilibrium the monetary and fiscal integration of the union was called into question. With the membership of the European Monetary Union, Greece waived sovereignty over its currency regime and in this sense also to use monetary policy to lever exports (Nelson, Belkin and Mix 2011).

Although the announcement of a broader stabilization mechanism in May 2011 was a first step in making markets rebound, at the core, Greece's insolvency remained unsolved and continued to adversely affect the economic stability of the European Union (Nelson, Belkin and Mix 2011). Moreover, the troubles looming in Spain and Italy have been reflected in the risk premium for 10-year bond yields, with interest rates rising above the 6% mark in August 2011. EMU equity indexes plunged heavily and the fear of a spreading to the rest of the European Union as well as the U.S. was imminent (Wearden and Fletcher 2011).

The deteriorating economic situation of some Eurozone countries also poses a serious threat to the credibility of the common currency. The advanced integration at the fiscal and monetary level interconnects the single member states such that economic turmoil in one country is likely to entail currency depreciation and rising volatility (Hui and Chung 2011).

6.3.3 Implications for the U.S.

For the U.S. the consequences arising from of the last crisis are severe in many dimensions. However, the incline of the public debt burden is and will remain the dominating issue for the next years. In fact, projections of the International Monetary Fund (2009) suggest a doubling of the publicly-held debt before the end of the decade (International Monetary Fund 2009).

After all, the fiscal stimulus and private companies' regained growth in profitability were pegging the sluggish recovery of the U.S. economy in the years following the last recession. Concerns about spillovers from the European sovereign debt crisis are rather muted due to the modest direct credit exposures to the members of the European monetary union (Nelson, Belkin and Mix 2011). Interestingly however, other potential exposures to Italy are much higher than that to Greece, implying that crisis contagion of Italian markets would result

in a potentially more adverse impact on the U.S. financial sector (Bank of International Settlements 2011).

On the one hand, U.S. exports are vulnerable to euro depreciation and a general growth slowdown in the affected European countries. On the other hand, the main source of concern is the financial link between the two leading economic spheres through financial institutions and money market funds, which could adversely affect U.S. banks (International Monetary Fund 2011).

6.4 The Nuclear Reactor Accident in Fukushima

The debate about nuclear energy experienced an unforeseen and dramatic resurgence, when on March 11, 2011 the great earthquake off the East-Japanese coast unleashed a gigantic tsunami, which caused explosions in several reactors of the Fukushima Dai-ichi Nuclear Power Plant. On the following days high levels of radioactive emissions were released on the Honshu-Island and its surroundings (Hirose 2011). In fact, the severity of the incident was classified as Level 7 by the International Nuclear and Radiological Event Scale, releasing radioactivity corresponding to around 10% of the Chernobyl disaster in 1986. During the days after the accident, a cloud containing radioactivity spread towards the U.S., crossing the Atlantic Ocean and approaching Europe (Bolsunovky and Dementyev 2011).

Before Fukushima, nuclear energy was perceived as a viable alternative to mitigate climate change and to reduce dependency on fossil fuels. Yet the potential dangers it is bearing have been drawn back into memory by this latest incident. The most drastic response to the events came from Germany, when Chancellor Angela Merkel announced the temporary shutdown of seven nuclear power plants, paving the way for other sources of energy. The phasing out of nuclear technology requires the country to sustainably adjust its energy portfolio and to adopt a nuclear-free energy policy (Glaser 2011). However, the largest number of active power plants worldwide, 104 by the end of 2010, operates in the U.S., where some are already nearing the end of their 40-year life time. China on the other hand ran only 13 power plants in 2010, but is more than doubling its fleet in the next years. The construction of numerous new plants in other emerging countries like Russia, India or South Korea indicates the expectations placed on nuclear energy to contribute to a secured energy supply (International Atomic Energy Agency 2011). Although technologies have improved and the core damage frequencies from internal events fell significantly, particularly in regard to older reactors' safety, external events such as the tsunami in Fukushima still pose a threat to virtually all nuclear facilities (Glaser 2011).

7. Performance Analysis

The total return performance of the OeSFX sustainability fund index, taking into account price changes and dividend payments of the underlying funds, reflects the economical performance of a wide range of exchange traded companies qualified under the exclusionary criteria of the index. The historic data accumulated so far dates back to December 30, 2004 thereby contributing a valuable benchmark time series in the context of socially responsible investments. In comparison to the MSCI World equity index, the global benchmark unrestricted by any ethical or environmental criteria, several patterns are observable with respect to the global and regional economic developments. Risk-adjusted performance measures are computed to go beyond pure return focus. The market model and a 2-factor-model estimation in the sense of the CAPM take into account the risk component and a possible small cap bias.

7.1 Preliminary Technical Analysis

In the first step, it is intuitive to take a look at the graphical presentation of the overall time series. Figure 2 as well as most of the following charts, is depicted by means of separating lines divided into the four sub-sample periods, determined and explained in chapter 6. The data covers the cumulated daily total return values in euros, unless otherwise stated.

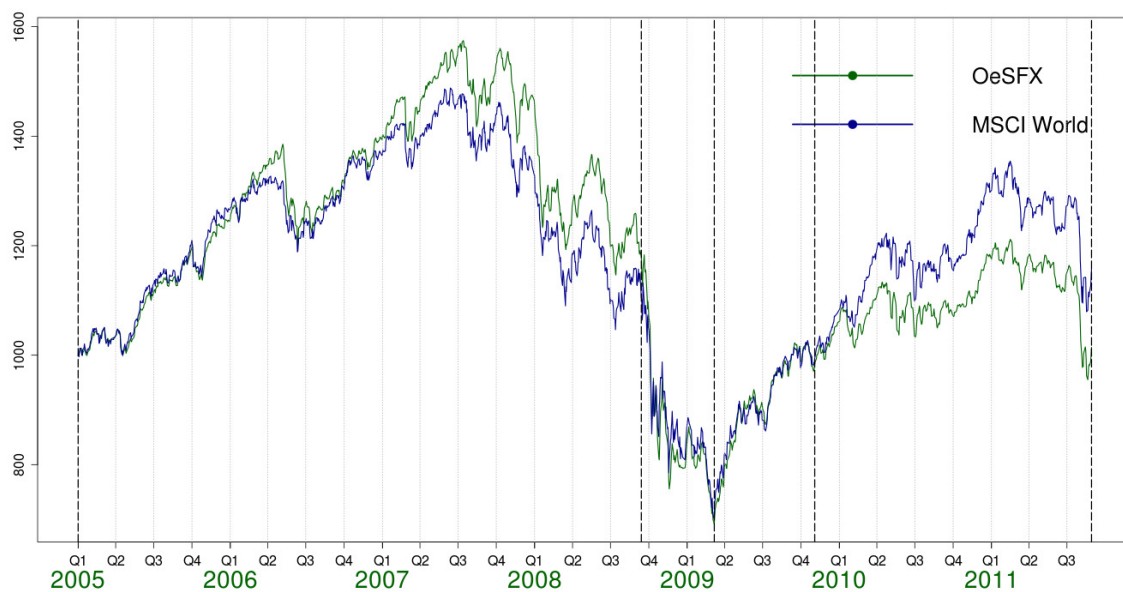


Figure 2. OeSFX plotted against MSCI World

Daily gross returns in EUR, Source: MSCI and Österreichische Kontrollbank

Despite the drastic slump during the financial crisis, the differences in the performance particularly in the period before Lehman Brother's announcing their insolvency are in favor of the sustainability index. After the trough in March 2009, an overall upward trend for all markets set in. The regained strength was disrupted when the European Monetary Union came under pressure due to the debt level of its member states. In this period, the OeSFX was no longer able to keep up with the world index in terms of total performance and there was an ever-increasing widening gap in the subsequent months.

In figure 3, by splitting the overall time series sample into the four predefined periods and by assuming base values of 1000 it is possible to graphically highlight the magnitude of the indexes' deviating return development during these timeframes. Although having originated in the U.S.A, the crisis spilled over to Europe and the rest of the world. In the phase of the crisis peak, the OeSFX moved downward at an even higher rate than the global portfolio. In contrast, recovery after the crisis occurred at a greater pace, yet only initially. At the end of 2010 the OeSFX already started to tail behind.

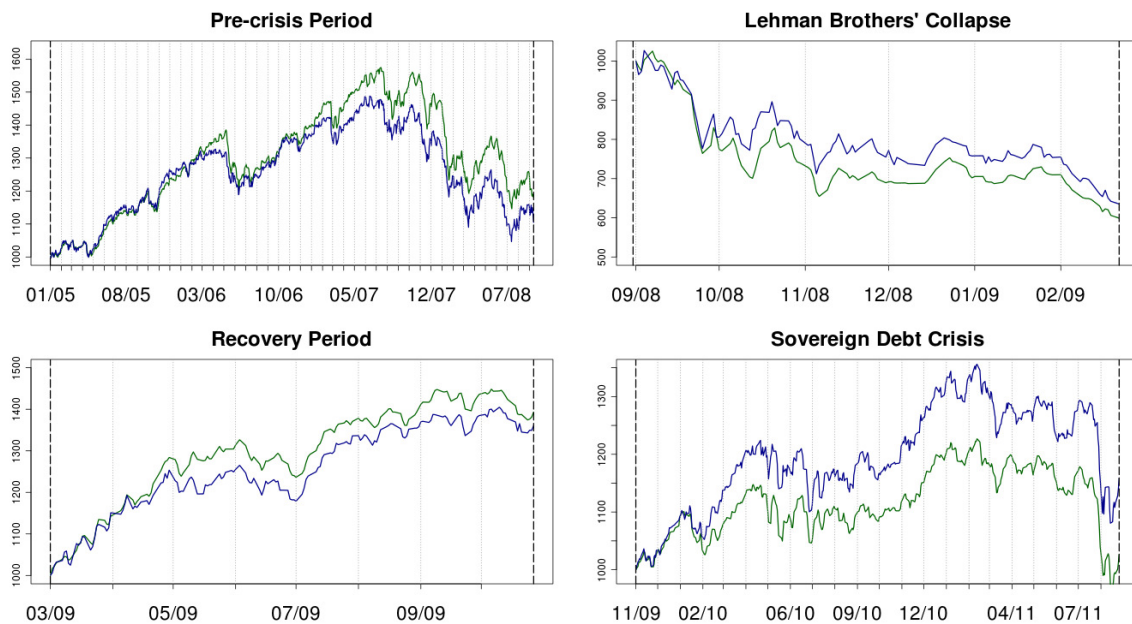


Figure 3. OeSFX plotted against MSCI World in sub periods

Daily gross returns in EUR, Source: MSCI and Österreichische Kontrollbank

7.2 Descriptive Statistics

The descriptive analysis of the data in table 1 confirms the prediction presented in the graphical illustrations. To emphasize the geographically occurring differences, four more country specific benchmarks are added to the statistics. Namely, the MSCI Europe, Eurozone,

U.S. and Pacific index, which, by covering the largest exchange listed companies, reflect the overall economic climate in the respective region very well. Moreover, large and small cap indexes as well as two global sustainability indexes, the DJSI World and the FTSE4Good World, help to provide an initial overview. The returns are calculated by applying the concept of continuously compounded returns, where, associated with a certain holding period, the daily return between t and $t+1$ is given by $r_{t,t+1} = \ln \frac{S_{t+1}}{S_t}$, which is equal to $r_{t,t+1} = \ln S_{t+1} - \ln S_t$ and in this way it is possible to differentiate the time series.

The daily mean returns taken for the entire observation period are rather low. Much of the profits accumulated before the crisis were annihilated and at the end of the sample period no space for outstanding profits was left. The highest daily returns were reached around mid-October 2008, amounting to approximately 10% in Europe, the Pacific region and the U.S. The World index yielded 8.5% and the OeSFX substantially less with only 5.65%. The enormous losses during the crisis make up around 40 to 50% of the pre-crisis levels. Three weeks up to one month after Lehman Brothers, returns had completely plummeted. The highest daily loss recorded for the OeSFX amounted to 6.18 % on October 7 and for the MSCI World to 6.95% on October 15. On the same day the MSCI U.S. lost 9.13%.

	OeSFX	MSCI				
		World	Euro	Europe	US	US**
Mean:						
03/01/2005 – 31/08/2011	0.00001	0.00009	0.00004	0.00010	0.00006	0.00010
annualized*	0.00281	0.02311	0.01038	0.02414	0.01557	0.02434
03/01/2005 – 15/09/2008	0.00019	0.00016	0.00027	0.00022	0.00009	0.00007
16/09/2008 – 09/03/2009	-0.00454	-0.00386	-0.00471	-0.00445	-0.00366	-0.00465
10/03/2009 – 05/11/2009	0.00213	0.00211	0.00285	0.00270	0.00182	0.00281
06/11/2009 – 31/08/2011	0.00007	0.00034	-0.00017	0.00011	0.00046	0.00039
Entire Sample Period:						
Median	0.00088	0.00080	0.00058	0.00088	0.00059	0.00059
Min. Return	-0.06179	-0.06948	-0.08117	-0.07915	-0.09135	-0.09502
Date of Min. Return	07.10.2008	15.10.2008	06.10.2008	06.10.2008	15.10.2008	15.10.2008
Date of Index Trough	09.03.2009	09.03.2009	09.03.2009	09.03.2009	09.03.2009	09.03.2009
Max. Return	0.05652	0.08503	0.10086	0.09573	0.10448	0.11049
Date of Max. Return	14.10.2008	13.10.2008	13.10.2008	13.10.2008	13.10.2008	13.10.2008
Date of Index Peak	16.07.2007	15.06.2007	16.07.2007	16.07.2007	15.06.2007	09.10.2007

	MSCI			DJSI	FTSE
	Pacific	LC	SC	World	4Good
Mean:					
03/01/2005 – 31/08/2011	0.00011	0.00008	0.00017	0.00007	0.00008
annualized*	0.02669	0.02006	0.04310	0.01786	0.02071
03/01/2005 – 15/09/2008	0.00013	0.00011	0.00010	0.00013	0.00012
16/09/2008 – 09/03/2009	-0.00318	-0.00381	-0.00434	-0.00415	-0.00517
10/03/2009 – 05/11/2009	0.00171	0.00207	0.00269	0.00245	0.00341
06/11/2009 – 31/08/2011	0.00033	0.00030	0.00058	0.00018	0.00015
Entire Sample Period:					
Median	0.00036	0.00076	0.00098	0.00065	0.00065

Min. Return	-0.07873	-0.06923	-0.07323	-0.06735	-0.06882
Date of Min. Return	16.10.2008	15.10.2008	01.12.2008	15.10.2008	29.09.2008
Date of Index Trough	10.03.2009	09.03.2009	09.03.2009	09.03.2009	09.03.2009
Max. Return	0.09501	0.08633	0.06733	0.08243	0.09339
Date of Max. Return	14.10.2008	13.10.2008	13.10.2008	13.10.2008	13.10.2008
Date of Index Peak	26.02.2007	15.06.2007	14.02.2011	16.07.2007	31.10.2007

* 252 trading days, ** in USD

Table 1. Summary statistics of relevant equity indexes

Source: MSCI, DJSI, FTSE and Österreichische Kontrollbank

It should be emphasized, that although its peak return appears rather modest in relation to the benchmarks, the OeSFX has in fact made the smallest loss over the entire observation period. The date of the index's historical low, Monday March 9, is identical across all regions, except the Pacific region, which seems to respond with a time lag of 1 day, and indicates that from that point onwards an upswing took place. In any case, the cyclical trends appear to be consistent independently of the index focus.

In addition, table 2 depicts the total returns accruing in the different periods for regional and sustainability indexes.

▲	OESFX	MSCI				
		World	Euro	Europe	US	US*
30/12/2004 – 31/08/2011	1.86%	16.38%	7.05%	17.18%	10.76%	17.32%
30/12/2004 – 15/09/2008	18.56%	11.07%	25.27%	20.44%	2.34%	6.84%
16/09/2008 – 09/03/2009	-40.10%	-36.47%	-41.54%	-39.24%	-36.52%	-43.20%
10/03/2009 – 05/11/2009	39.33%	36.04%	52.02%	49.00%	28.43%	49.95%
06/11/2009 – 31/08/2011	2.70%	15.90%	-7.20%	4.84%	22.77%	18.85%

▲	MSCI			DJSI	FTSE
	Pacific	LC	SC	World	4Good
30/12/2004 – 31/08/2011	19.14%	14.08%	32.70%	12.44%	14.56%
30/12/2004 – 15/09/2008	12.75%	10.71%	9.16%	12.57%	11.84%
16/09/2008 – 09/03/2009	-28.88%	-36.04%	-40.40%	-37.80%	-44.60%
10/03/2009 – 05/11/2009	33.18%	35.08%	50.38%	43.68%	67.05%
06/11/2009 – 31/08/2011	14.17%	14.00%	29.46%	7.94%	6.74%

* in USD

Table 2. Total returns in percent by index and period

Source: MSCI, DJSI, FTSE and Österreichische Kontrollbank

In table 3 the correlation coefficients between the indexes have been computed as a simple but strong key figure to measure interactions. Generally speaking, the coefficient shows to what extent the market movements have been in line with each other. Inferring from the daily returns, it can be seen that the OeSFX's linear dependency with the World index results in a coefficient value ranging from 0.60 to 0.77 in the four periods. However, the coefficient is highest when measuring the relationship with the globally diversified Dow Jones Sustainability Index (DJSI). The close link between the two sustainability indexes

appears reasonable and plausible as both focus on ESG aspects. By contrast, the correlation to the U.S. is rather weak and evidently higher with Europe and the Eurozone, which provides an early indication of the strong inclination towards these economical areas.

Additionally, the DJSI and the FTSE4Good are by these measures also perceived to be more tilted towards Europe. On the other hand, DJSI and MSCI World show high rates of dependence as both are globally diversified. During the peak of the crisis, contagion was spreading at a tremendous pace and is responsible for the generally stronger correlated negative returns. In the last sub-period, a decline in correlation between the OeSFX and all other indexes (except the U.S.) can be observed, indicating that the return movements are less in line with the total market.

	MSCI					DJSI		FTSE		MSCI					DJSI	FTSE
	OeSFX	World	Euro	Europe	US	Pacific	World	4Good	OeSFX	World	Euro	Europe	US	Pacific	World	4Good
03/01/2005 – 15/09/2008									10/03/2009 – 05/11/2009							
OeSFX	1.00	0.67	0.63	0.66	0.39	0.61	0.71	0.66	1.00	0.77	0.70	0.70	0.55	0.49	0.80	0.72
World		1.00	0.76	0.78	0.88	0.42	0.94	0.77		1.00	0.78	0.78	0.91	0.22	0.94	0.85
Euro			1.00	0.98	0.45	0.28	0.89	0.84			1.00	0.98	0.55	0.02	0.92	0.89
Europe				1.00	0.46	0.30	0.91	0.85				1.00	0.53	0.05	0.94	0.88
US					1.00	0.13	0.72	0.52					1.00	0.01	0.74	0.67
Pacific						1.00	0.42	0.34						1.00	0.22	0.10
DJSI							1.00	0.83							1.00	0.90
4Good								1.00								1.00
16/09/2008 – 09/03/2009									06/11/2009 – 31/08/2011							
OeSFX	1.00	0.64	0.66	0.69	0.37	0.65	0.72	0.68	1.00	0.60	0.44	0.51	0.44	0.53	0.62	0.44
World		1.00	0.76	0.78	0.90	0.31	0.93	0.88		1.00	0.69	0.78	0.92	0.38	0.95	0.74
Euro			1.00	0.99	0.46	0.32	0.93	0.91			1.00	0.96	0.46	0.00	0.84	0.88
Europe				1.00	0.47	0.35	0.94	0.90				1.00	0.54	0.11	0.92	0.86
US					1.00	0.00	0.70	0.67					1.00	0.20	0.77	0.58
Pacific						1.00	0.40	0.33						1.00	0.33	0.07
DJSI							1.00	0.94							1.00	0.82
4Good								1.00								1.00

Table 3. Correlations between equity indexes

Daily log returns, Source: MSCI, DJSI, FTSE and Österreichische Kontrollbank

7.3 Analysis of the Index Composition

The sustainability fund index itself has changed in composition due to three factors, either through inclusion, exclusion or re-weighting of a fund. In total, from the start of the index to the reference date, 43 different funds have influenced the performance. Variations have occurred throughout the course of time when a new and eligible fund was launched or an existing one no longer met the admission criteria in regard to ESG or size (Österreichische Kontrollbank 2011). The highest number of funds listed in the OeSFX was reached in 2006, when 30 SR funds were included. The minimum were 20 funds in 2008.

7.3.1 Country-specific Composition

Based on the yearly values provided by MSCI from 2006-2011, the constitution of the World Index (developed countries) plotted in figure 4 reflects that the U.S. shares are more strongly weighted, accounting for about 50% throughout the last six years. The influence of the Eurozone is substantially lower and makes up around 15 % in 2011, which is even 1 – 2 % less than in the years from 2006 – 2009, while the U.K. and Japan are each contributing constantly to the performance by about 10 %. In 2011 Canada's share increased to 5.3% at the cost of some smaller European countries and Switzerland contributes 3.7%. Overall, the MSCI World appears to be characterized by the pursuit of a very consistent composition in regard to both, regions and sectors.

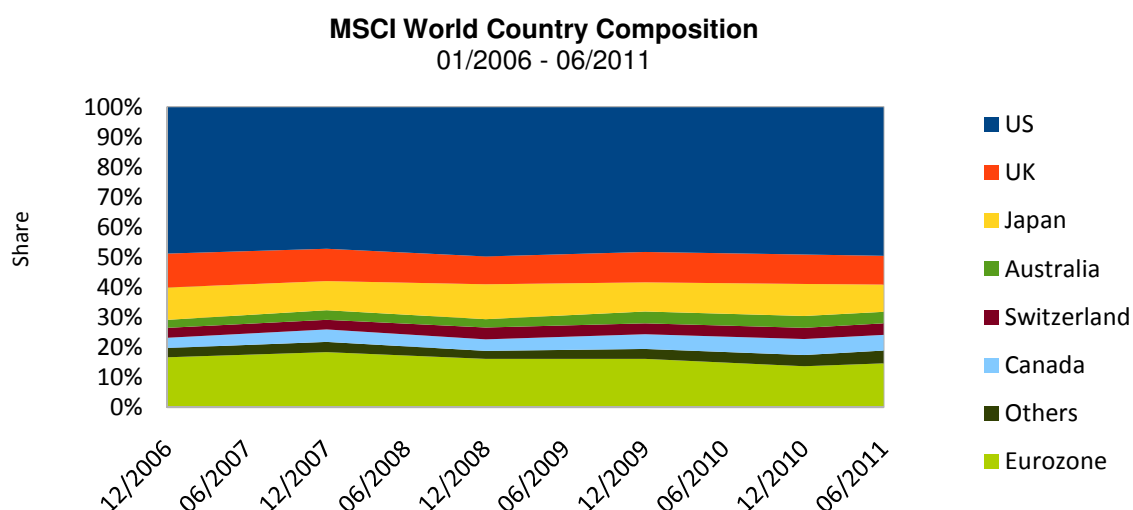


Figure 4. MSCI World composition by country

Elaborated from MSCI Factsheets 2006 – 2011, Source: MSCI

As figure 5 shows, for the OeSFX the picture is somewhat different. Although comprising funds whose assets are globally diversified and invested according to ESG criteria, it notably varies in the allocation across regions. The following numbers are based on the provided portfolio information for each individual fund, which was neither completely coherent nor consistent and can thus only serve as a rough approximation. The historic data before 2008 in particular cannot be regarded as sufficiently explanatory. The estimation of the relative shares between 2008 and 2011, on a monthly basis, reveals that by August 2011 the major part can be attributed to Europe (42%), of which the U.K. has a share of 8% and Switzerland around 6%. While the share of U.S. companies steadily increased from around

20% at the beginning of 2008 to 25% at the end of August 2011, the volumes of Eurozone member countries declined from an initial 33% to 22%.

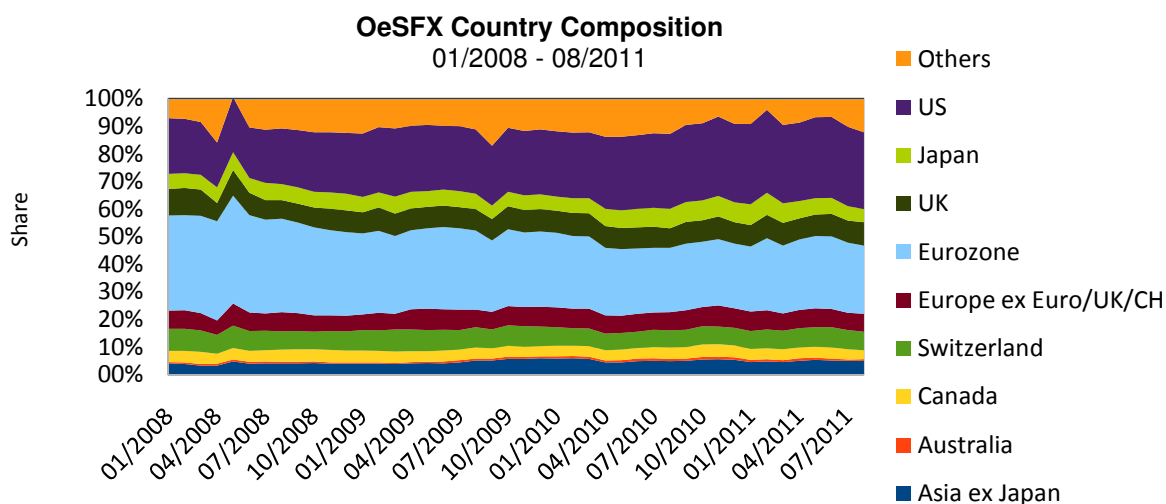


Figure 5. OeSFX composition by country

Elaborated from OeSFX asset allocation database, Source: Österreichische Kontrollbank

To highlight this pattern in composition, simply charting the total returns in euros of the regional indexes in figure 6 and 7 shows that the OeSFX approaches the European markets more than the U.S. American.

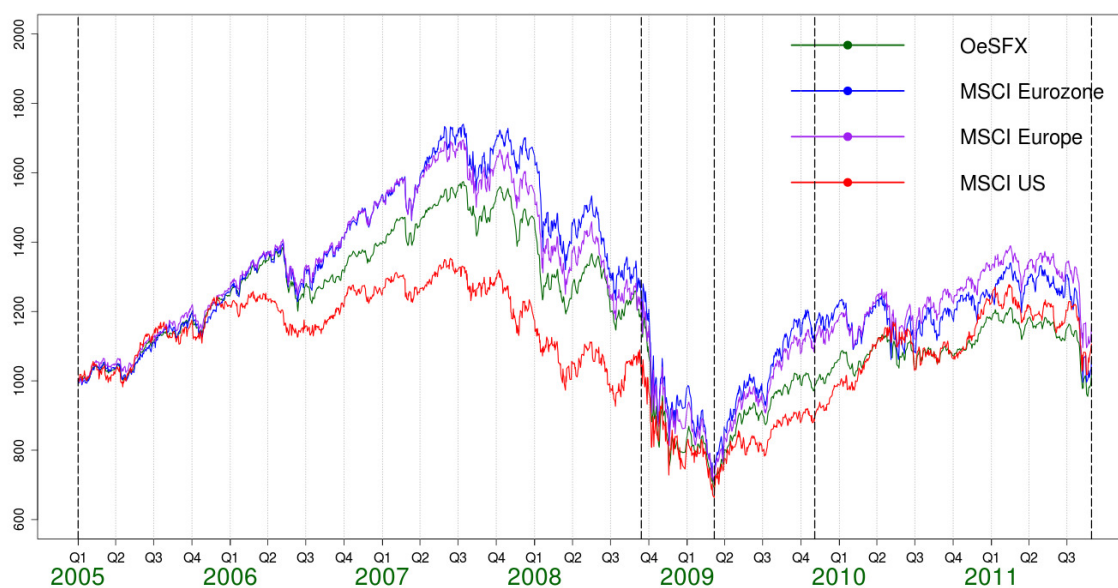


Figure 6. OeSFX plotted against MSCI regional equity indexes

Daily gross returns in EUR, Source: MSCI

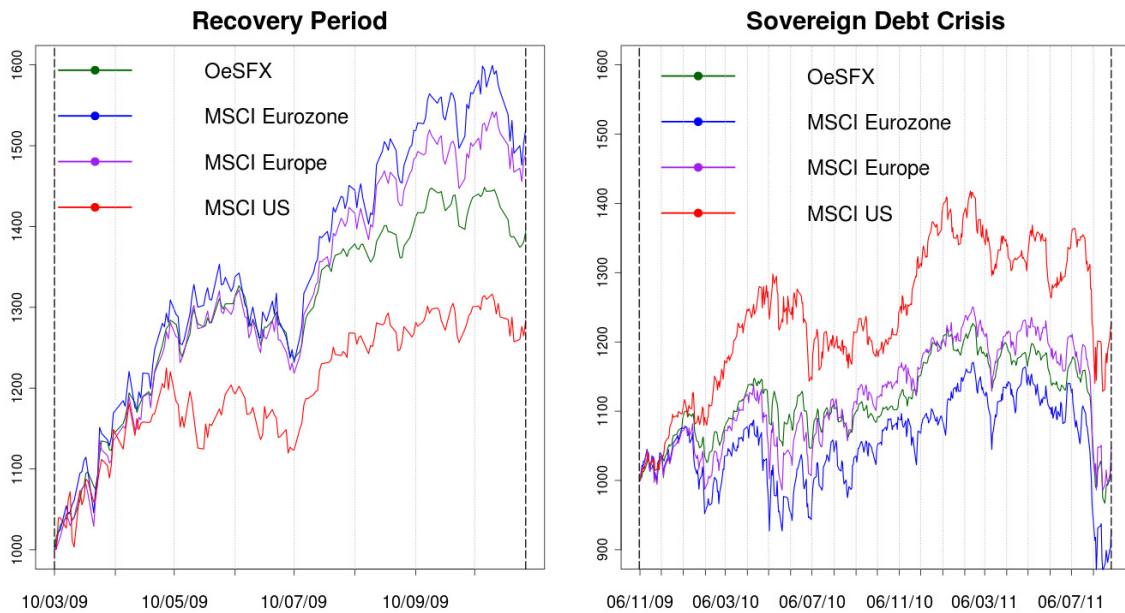


Figure 7. OeSFX plotted against MSCI regional equity indexes in sub-periods

Daily gross returns in EUR, Source: MSCI

As can be seen by help of the mean return statistics, the biggest losses in the phase of the sovereign debt crisis accrued in Europe and this development strongly affected the OeSFX. After the crisis the OeSFX continued to run very much in line with the European indexes, reversing the negative performance. Also it comes to light that as soon as the troubles around Greece, Portugal, Ireland, Spain and eventually Italy, became public, the U.S. economy started to take over the lead.

The graphical exploration is extended by plotting the OeSFX with the regional DJSI series in figure 8 and 9. It turns out to be the same pattern in respect to regional differences, and moreover, it becomes apparent that the two sustainability indexes exhibit a somewhat parallel course. The performance of sustainable companies, either defined by the OeSFX funds or the DJSI, appears very similar. The assumption that much of the difference between the OeSFX and the MSCI World can be attributed to the country focus is supported when looking at the portfolio allocation of the DJSI. About 30% of the sustainability leaders of the largest 2,500 companies in the Dow Jones Global Total Stock Market are allocated to the US, 22% to the Eurozone, 17% to the UK and 8% to Switzerland (elaborated from factsheets by Dow Jones and Sam Indexes 2011b). Much in contrast though, the Dow Jones Global Index attributes the major share of its performance to U.S. American companies (44.81%). 8.96% of the listed companies are located in the Eurozone, 9.08% in Japan and 8.23% in the U.K. (Dow Jones Indexes 2011b). This difference in allocation between the sustainability and the global Dow Jones index suggests that in relation to the global portfolio, sustainability leaders are

relatively higher in number in continental Europe and in the U.K. Although the numbers of the DJSI World are a snapshot of the reference date and not a time series, it is interesting to note that the OeSFX exhibits approximately the same proportion of Eurozone member countries, but differs with regard to other geographical areas, like the U.S. and the U.K.

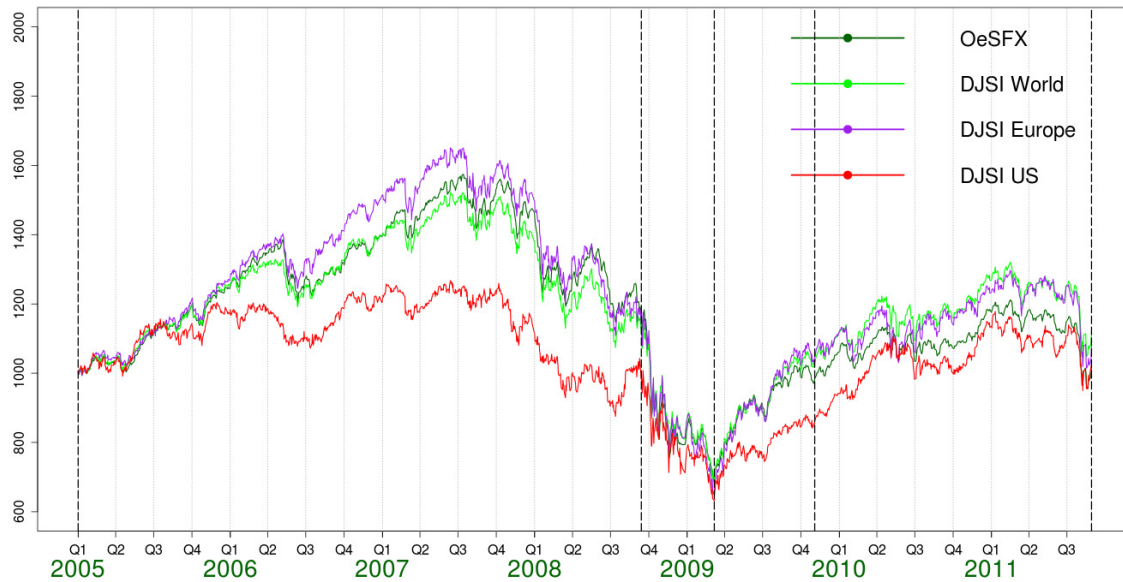


Figure 8. OeSFX plotted against DJSI regional equity indexes

Daily gross returns in EUR, Source: DJSI and Österreichische Kontrollbank

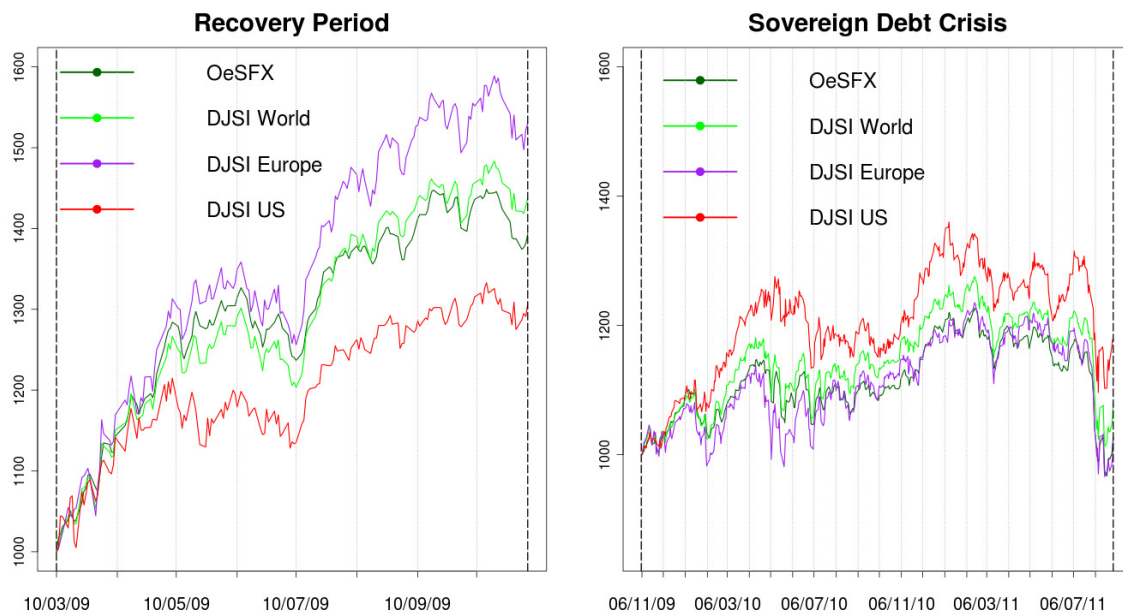


Figure 9. OeSFX plotted against DJSI regional equity indexes in sub-periods

Daily gross returns in EUR, Source: DJSI and Österreichische Kontrollbank

In figure 10 the performance of the three sustainability indexes is compared and it can be seen that the FTSE4Good deviates from the OeSFX and the DJSI. The geographical allocation focus of the FTSE4Good has not fully been disclosed by the index provider, however, at the end of 2011 21% of the underlying companies were located in the Eurozone, 20% in the US, 11% in the UK and a remarkably large share of 26% in Japan (elaborated from data provided by FTSE International Limited 2012).

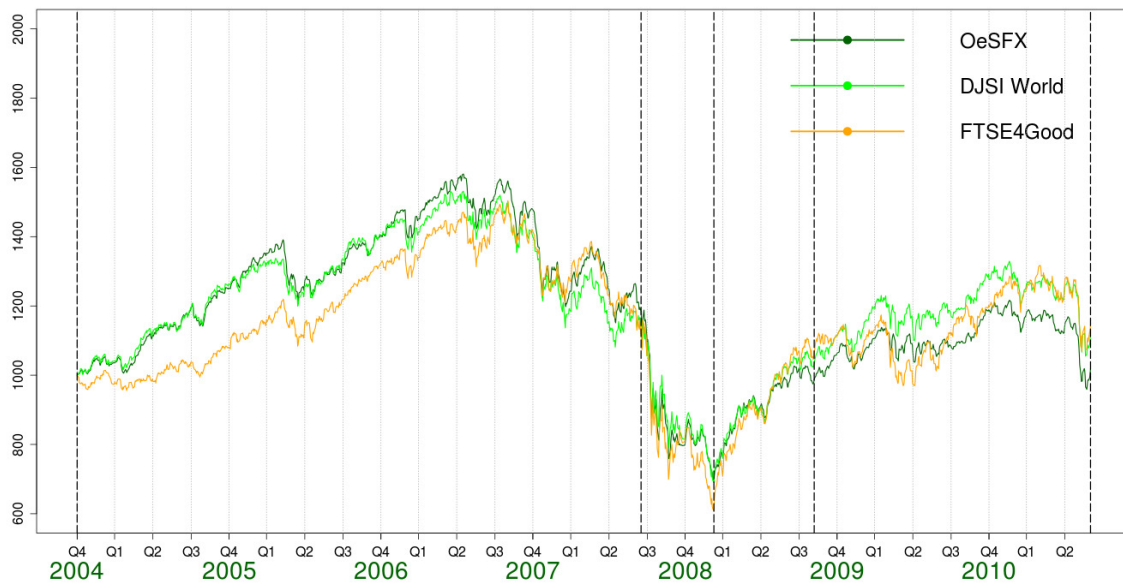


Figure 10. OeSFX plotted against DJSI World and FTSE4Good

Daily gross returns in EUR, Source: DJSI, FTSE and Österreichische Kontrollbank

7.3.2 Sector-specific Composition

The financial crisis did not affect all sectors alike and although the general trend is consistent, financials declined the most. Table 4 shows the monthly return correlation coefficients between the OeSFX and the sector specific indexes provided by MSCI from 2004 to August 2011. Here, the linear dependence is strongest for Industrials and Materials. Industrials are mainly concerned with transportation, commercial and professional services, machinery and construction etc., while Materials cover metal and mining, construction materials, chemicals, containers and packaging (MSCI 2011c). The relationship to the energy sector in particular is rather weak for both indexes and in contrast to the OeSFX the World index is more correlated to the financial sector.

03/01/2005 - 31/08/2011							
	OeSFX	MSCI World	Energy	Materials	Industrials	Cons. Discr.	Cons. Staples
OeSFX	1.00	0.96	0.80	0.92	0.94	0.87	0.85
MSCI World		1.00	0.80	0.91	0.97	0.93	0.88
Energy			1.00	0.84	0.73	0.64	0.61
Materials				1.00	0.89	0.82	0.75
Industrials					1.00	0.93	0.83
Cons. Discr.						1.00	0.80
Cons. Staples							1.00

	OeSFX	MSCI World	Healthcare	Fin.	IT	Telecom.	Utilities
OeSFX	1.00	0.96	0.76	0.87	0.88	0.81	0.84
MSCI World		1.00	0.80	0.94	0.92	0.84	0.84
Healthcare			1.00	0.75	0.68	0.67	0.75
Fin.				1.00	0.82	0.74	0.76
IT					1.00	0.74	0.70
Telecom.						1.00	0.82
Utilities							1.00

Table 4. Correlation between OeSFX, MSCI World and MSCI sector indexes

Monthly log returns in USD, Source: MSCI and Österreichische Kontrollbank

Figure 11 illustrates the monthly returns of the OeSFX, represented by the green line, and the respective sectors in USD terms. The Energy sector, comprising oil, gas and consumable fuels as well as energy equipment and services, appears to yield much higher returns than Utilities, Industrials or Financials (MSCI 2011c).

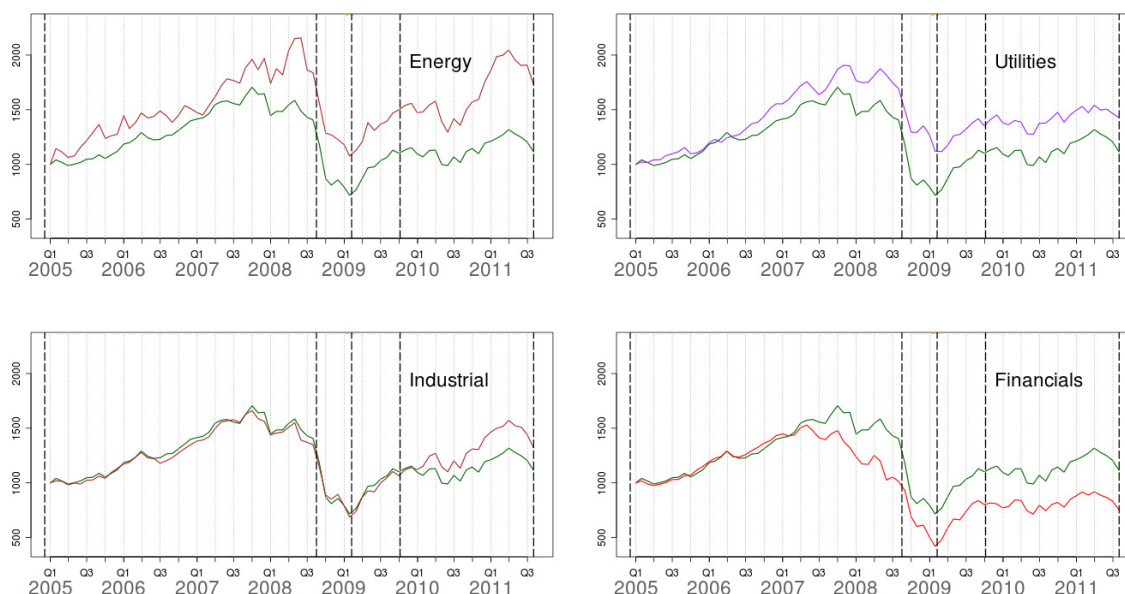


Figure 11. OeSFX plotted against MSCI sector indexes.

Monthly gross returns in USD, Source: MSCI and Österreichische Kontrollbank

As far as the sector allocation of the MSCI World is concerned, figure 12 shows that Financials are dominating the weighting from 2006 to the first half of 2011 with around 20%. Yet it is obvious that in response to the great turmoil on the capital market banks, insurances, real estate and financial services went broke and capitalization dropped. The remaining sectors are all rather equally weighted with approximately 10%. Telecommunication alone contributes only about 4% to the total.

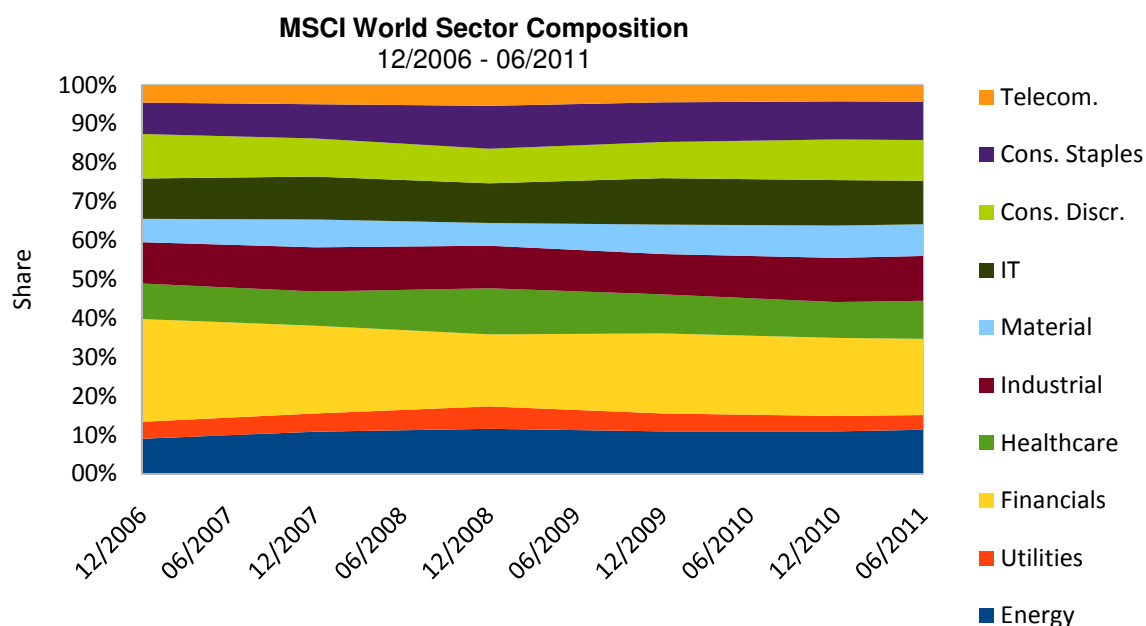


Figure 12. MSCI World composition by sector

Elaborated from MSCI Factsheets 2006 – 2011, Source: MSCI

The numbers of the OeSFX sector allocation must once more be considered with caution due to the partly inconsistent portfolio information and sector classification. Nonetheless, they provide some rough estimates and figure 13 suggests that the weightings are rather uniform. The industrial sector seems to slightly prevail and in contrast to the MSCI World, Financials do not hold a dominating share. Partly, the high drop in returns of the OeSFX during the hot phase of the financial crisis can be attributed to the industrial sector. While the financial sector was already suffering from 2007 to 2008, contraction in industrial production was proportionally stronger towards the end of 2008 until the beginning of 2009 (Nissanke 2010).

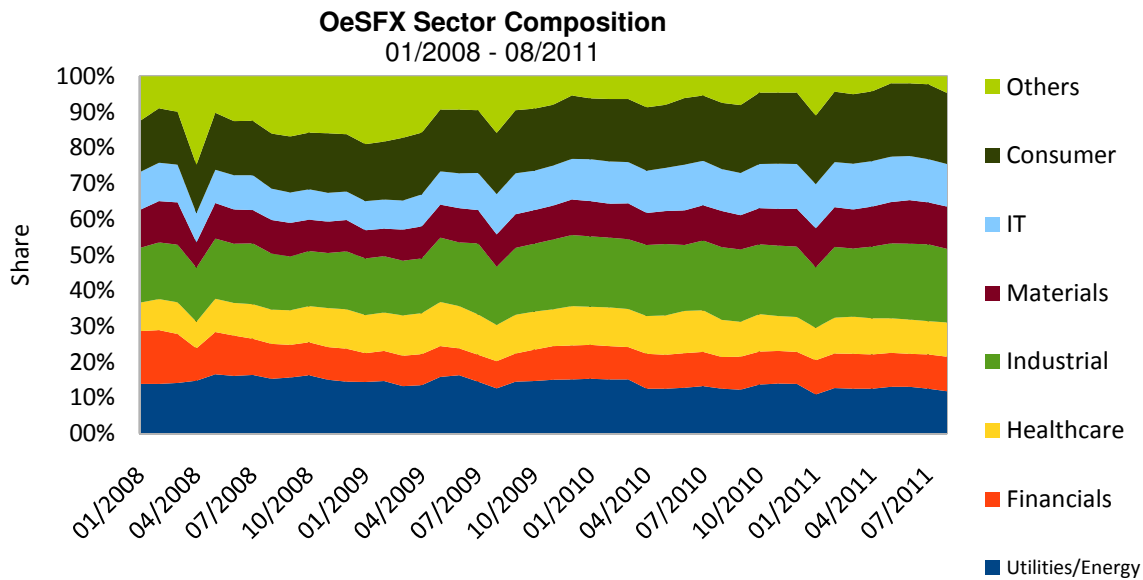


Figure 13. OeSFX composition by sector

Elaborated from OeSFX asset allocation database, Source: Österreichische Kontrollbank

7.4 Risk-adjusted Performance

Following modern portfolio theory, the performance of a portfolio shall be recorded by more than just mean returns. The introduction of variance, or equivalently standard deviation, as measures of portfolio risk, allows for the risk-adjusted evaluation. If investments are less profitable, investors in turn are expected to be compensated with lower risk. The market model and the 2-factor model of the capital asset pricing theory are applied to measure whether this holds in the case of the OeSFX.

7.4.1 Mean-variance Analysis

Again, in order to facilitate comparability, also the mean-variance analysis includes the values of the MSCI US and Europe as well as the DJSI World index. Tables 7 and 8 show the mean returns and the standard deviations, the measure of volatility, referred to as μ and σ respectively. First of all it is remarkable that the OeSFX, in all periods ranks foremost with regard to absolute volatility. The daily deviations from the mean of the historic data set imply that the portfolio of the sustainability index is less prone to short term variations and in general offers investor more stability than any of the benchmark indexes. Yet the price to pay for this consistency is clearly reflected in the height of the mean returns. In total, from 2005 to

August 2011, the OeSFX yielded on average only 0.001% return per day, whereas the MSCI World earned 0.009%. The corresponding annual returns amounted to 0.28% and 2.3% respectively, which serve to better illustrate the magnitude of this relationship. The European index seems to perform very well in total, but not unexpectedly, just like the OeSFX, suffers most severely in both crisis periods. The risk-return profile of the DJSI World takes a middle position, while the U.S. benchmark is comparatively volatile. Figure 14 visualizes the ratios between risk and return given from table 6.

03/01/2005 - 31/08/2011				
	μ	σ	μ annualized	σ annualized
OeSFX	0.00001	0.00866	0.281%	13.74%
MSCI	0.00009	0.01124	2.311%	17.84%
DJSI	0.00007	0.01135	1.764%	18.01%
MSCI Europe	0.00010	0.01358	2.414%	21.56%
MSCI US	0.00006	0.01497	1.557%	23.76%

Table 5. Risk and return of OeSFX and relevant equity indexes

Daily log returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank

03/01/2005 - 15/09/2008			16/09/2008 - 09/03/2009		10/03/2009 - 05/11/2009		06/11/2009 - 31/08/2011	
	μ	σ	μ	σ	μ	σ	μ	σ
OeSFX	0.00019	0.00631	-0.00454	0.02066	0.00213	0.00859	0.00007	0.00699
MSCI	0.00016	0.00820	-0.00386	0.02669	0.00211	0.01168	0.00034	0.00912
DJSI	0.00016	0.00831	-0.00415	0.02680	0.00245	0.01176	0.00018	0.00923
MSCI Europe	0.00022	0.00995	-0.00445	0.03129	0.00270	0.01426	0.00011	0.01164
MSCI US	0.00009	0.01081	-0.00366	0.03658	0.00182	0.01577	0.00046	0.01163

Table 6. Risk and return of OeSFX and relevant equity indexes in sub-periods

Daily log returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank

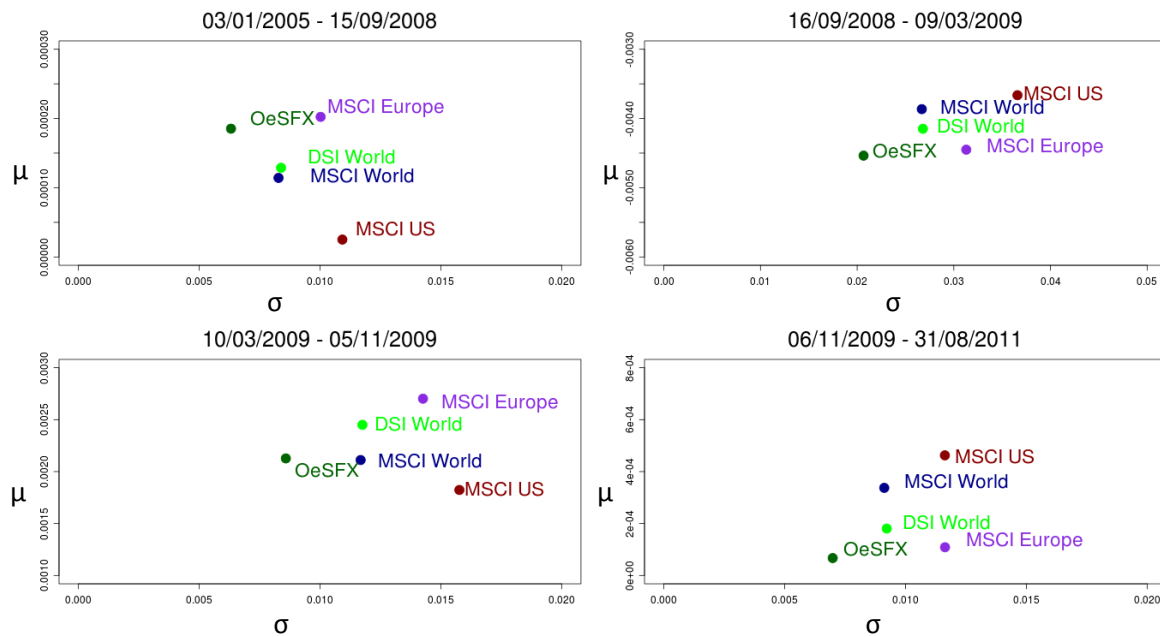


Figure 14. Risk-return-diagram. OeSFX and relevant equity indexes in sub-periods
Daily gross returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank

The results of the mean-variance analysis in table 7 reveal some interesting patterns in the context of the nuclear accident in Fukushima. These findings have however to be considered with caution because the impact is measured on two parameters only and other factors that could have influenced the movements in the underlying markets are left out. It nonetheless lends support to the hypothesis of the OeSFX's strategic advantage. The mean returns yielded within the first 15 days after the accident show that the two sustainability indexes took over the MSCI World. Therefore, both sustainability indexes and its underlying equities have been less vulnerable to this event. In the case of the OeSFX it might even be argued that the investment in nuclear-energy-free companies became an advantage in respect to both return and risk. Nevertheless, looking at the values for the 90-trading-days period after the event, it turns out to be only a short-lived effect. Not surprisingly, the MSCI Pacific loses the most among the considered indexes.

From April 2010 onwards the same funds remained listed in the index and were therefore suitable for direct comparison in light of the short term impact of the nuclear accident. It is worthwhile to mention that the fund yielding the highest return within a shorter period of 15 trading days after the event is the UBS (Lux)EF Global Innovators B (T) fund. Its portfolio is composed of innovative companies that address climate change, water and demographics and the top 10 positions are dominated by companies involved in energy efficiency, renewable energy and waste management (UBS 2011).

	90 days before		15 days after		Change	Return after 15 days	90 days after		Change
	μ_1	σ_1	μ_2	σ_2	$\Delta \mu_1, \mu_2$		μ_3	σ_3	$\Delta \mu_1, \mu_3$
OeSFX	0.00066	0.00505	0.00142	0.00653	116.77%	2.12%	-0.00010	0.00537	-115.94'
MSCI	0.00095	0.00733	-0.00001	0.01025	-100.84%	-0.83%	0.00000	0.00708	-100.00'
DJSI	0.00061	0.00688	0.00060	0.01047	-2.72%	-0.23%	0.00004	0.00710	-93.87'
MSCI Europe	0.00046	0.00814	0.00123	0.01197	166.84%	0.33%	0.00010	0.00914	-77.93'
MSCI US	0.00122	0.00943	0.00011	0.00940	-91.03%	-0.67%	0.00003	0.00823	-97.32'
MSCI Pacific	0.00088	0.00894	-0.00337	0.02763	-482.61%	-4.12%	-0.00020	0.01436	-122.32'

Table 7. Risk and return of equity indexes in Fukushima sub-periods

Daily log returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank

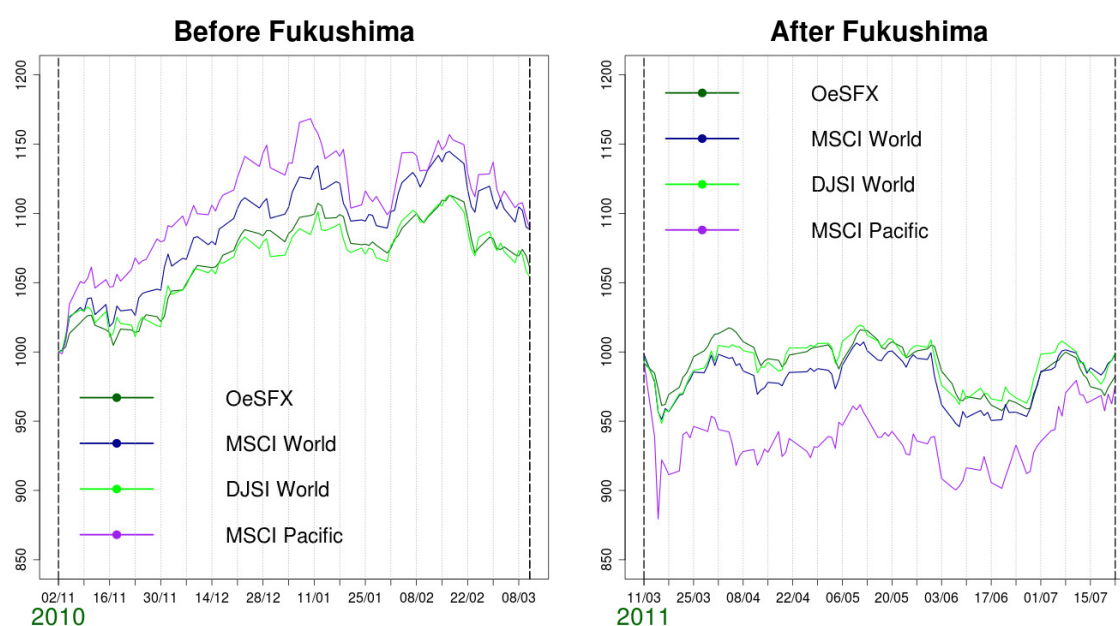


Figure 15. OeSFX plotted against MSCI World and Pacific indexes

Daily gross returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank

Figure 15 graphically highlights the change in performance 90 trading days before and 90 trading days after the accident. What is more, the historic data of the MSCI Pacific has been plotted as an additional line representing the Pacific area including Japan. During the financial and the sovereign debt crisis this geographic region was generally better off. Yet the terrible incident had obvious adverse effects on the financial markets of Japan and the surrounding states. It might be argued that since the World index is constituted of almost 10% Japanese shares, the decline in returns can to some degree also be accredited to this fact. The second plot illustrates that towards the end of the 90-day period, the MSCI Pacific seemed to already have recovered most of its deficit.

In all observed samples, the OeSFX distinguishes itself through lowest levels of absolute variability. Whether investors have to forego returns relative to the benchmark for this reduced uncertainty is measured in the next section by means of risk adjusted performance. The main argument for lower volatility stems from the idea that sustainable companies, those committing themselves to social corporate responsibility, are also sustainable in regard to their financial development. Their focus is the long term soundness of the corporation and not short-lived profits. Similar findings have been provided by Bauer, Koedjik and Otten (2002), who evaluated 103 ethical funds and found that they are less prone to market return variability, which supports the proposition that low volatility is a particular feature of ethical funds.

Nevertheless, it is vital to bear in mind that the sample time series in this study are still too short as they would allow drawing sound inference about the long term performance of socially responsible investments. Furthermore, it should be emphasized that the index is constituted of funds, which are composed of various shares of different companies. Fund management skills and timing activities influence the performance of funds. The composition of portfolios changes over time with regard to securities and weightings in order to achieve appealing returns and to diversify risk away.

7.4.2 Market Model Estimation

Given the assumptions of the CAPM, the expected return on an asset is a positive linear function of its reference index. The systematic risk is measured by beta, while alpha is the coefficient that states the extra return, which is not explained by the risk exposure of the security. In this sense the model is also applicable in measuring the performance of a thematic index compared to a corresponding benchmark. The analysis of a sustainability index instead of a single fund bears the advantage of contraposing the performance of an entire sustainability universe to the conventional equity market. The asset allocation of sustainability funds is restricted due to specified environmental or ethical criteria. Portfolio theory claims that these restrictions entail a lower risk-adjusted return. The aim of the following analysis is thus to find out whether this relationship holds or if the composite of SRI underlying the OeSFX can earn superior returns and negate this simple argument. In this way the choice of the appropriate benchmark as the efficient market portfolio crucially influences the results.

To take into consideration the specific characteristics of the sustainability index' investment universe, its sensitivity to the market risk is explored in four dimensions. Firstly, the parameters are estimated with regard to the World Index, representing the most

comprehensive of the benchmarks. The second version takes into account that sustainability indexes can significantly be tilted towards firms with low market capitalization and therefore includes in addition to the blue chip a small cap index (DiBartolomeo and Kurtz 1999; Bauer, Koedjik and Otten 2002; Schröder 2004). Thirdly, as the OeSFX is composed of firms with presumably increased CSR efforts and not conventional equity shares, it appears reasonable to compare it to the performance of an, in this respect, equivalent investment universe. The DJSI World qualifies best, as the underlying securities are globally diversified, a large universe of exceptionally sustainable companies is covered and, as shown in section 7.2, index return movements have been proved to be strongly correlated with the OeSFX.

The previous findings in this chapter suggest that the OeSFX and the MSCI also deviate from each other with regard to the regional allocation of the underlying securities. In response to the different weightings attributed to the European and U.S. American shares, the estimates are extended by the two regional blue chip indexes.

Version 1: Blue chip or *sustainability blue chip*

$$re_{i,t} = \alpha_i + \beta_{1i}re_{B,t} + \varepsilon_{i,t} \quad (6)$$

Where $re_{x,t} = r_{x,t} - r_{f,t-1}$, with $x = i, B$ or S . r is the index return at time t of either the OeSFX (i), the blue chip (B) or small cap (S) index and $r_{f,t-1}$ is the risk free rate at $t-1$.

Version 2: Blue chip or *sustainability blue chip* + small cap

$$re_{i,t} = \alpha_i + \beta_{1i}re_{B,t} + \beta_{2i}re_{S,t} + \varepsilon_{i,t} \quad (7)$$

The collected data are the monthly index gross levels, including price changes and distribution effects. The risk free interest rate is the 1 month Euribor (obtained from the website of the Bank of Finland). This time the time series are split in only two sub-periods to maintain sufficiently large and significant samples. All equations are solved by the ordinary least squares estimation in order to obtain Jensen's alpha and to measure the sensitivity to the specific benchmark indexes in the form of beta. The data series is corrected for both autocorrelation and heteroscedasticity applying the Newey-West approach (Newey and West 1987). This way lagged time series dependencies and the non constant variance of the disturbance factor is taken account of.

In addition, the characteristics of the monthly time series are depicted in table 8 and 9. The statistical key figures are extended by the annualized Sharpe Ratio, intended to measure

the performance in relation to the risk exposure (Sharpe 1966). It is obtained from dividing the annualized mean excess return of index i to the risk free rate of return by the standard deviation.

$$SR_i = \frac{\mu_i - \mu_f}{\sigma_i} \quad (8)$$

The mean excess return in this case is the difference to the 1-month Euribor. On average the excess returns are, except for the MSCI Europe, negative as the entire observation period is characterized by two fatal crises. In the case of negative values, higher risk leads to a better Sharpe ratio and no interpretation of the results is possible. On a monthly basis the OeSFX is prone to stronger fluctuations before and during the crisis. The Sharpe ratios in the second period highlight the better performance of the U.S. market.

	Mean Excess Return			Std. Dev.		
	01/2005 – 08/2011	01/2005 – 02/2009	03/2009 – 08/2011	01/2005 – 08/2011	01/2005 – 02/2009	03/2009 – 08/2011
OeSFX	-0.0205	-0.1019	0.1152	0.1707	0.1840	0.1420
MSCI World	-0.0005	-0.0975	0.1612	0.1462	0.1503	0.1310
DJSI World	-0.0056	-0.1019	0.1548	0.1507	0.1525	0.1404
MSCI Europe	0.0006	-0.0923	0.1553	0.1646	0.1635	0.1611
MSCI US	-0.0079	-0.1124	0.1663	0.1447	0.1485	0.1277
	Mean					
Euribor	0.0232	0.0326	0.0076			

Table 8. Mean excess return to 1 month Euribor and index standard deviations

Monthly log returns in EUR, Source: MSCI, DJSI, Österreichische Kontrollbank and Bank of Finland

	Sharpe Ratio		
	01/2005 – 08/2011	01/2005 – 02/2009	03/2009 – 08/2011
OeSFX	-0.1199	-0.5535	0.8115
MSCI World	-0.0032	-0.6486	1.2307
DJSI World	-0.0374	-0.6684	1.1024
MSCI Europe	0.0034	-0.5647	0.9644
MSCI US	-0.0546	-0.7569	1.3023

Table 9. Sharpe Ratios of mean excess returns

Monthly log returns in EUR, Source: MSCI, DJSI and Österreichische Kontrollbank and Bank of Finland

7.4.2.1 Risk-adjusted Performance Relative to Global Benchmarks

The results of the first version in table 10 exhibit a small and negative but insignificant alpha coefficient. The sensitivity to the market portfolio's return, measured as the beta coefficient, is significant and greater than one and as such indicates a slightly higher exposure to risk for the OeSFX. The estimates for the combined benchmark approach including the

conventional blue chip and the small cap index suggest that the OeSFX is more tilted towards firms with large capitalization. Evidence for a small cap bias is only weak, given the low significance level. Likewise, after extending the model by a small cap factor, Schröder (2004; 2007) concluded the same for the majority of the investigated sustainability indexes.

In the first sub-period alpha is positive and represents the extra-return of the OeSFX that is not explained by the risk exposure with respect to the benchmark, while the negative value in the second period indicates the underperformance of the index compared to the observed market portfolio. Although statistically not significantly different from zero, the estimates for alpha are still plausible. Overall, in both versions the coefficient of determination is very high and supports the validity of the linear relationship.

01/2005 – 08/2011				
	α	β BC	β SC	R ²
Version 1	-0.0017	1.0780***		0.856
Version 2	-0.0024	0.5801**	0.4177*	0.873

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 10. Market model estimates version 1 and 2. MSCI blue chip and small cap

Source: MSCI, Österreichische Kontrollbank and Bank of Finland

01/2005 – 02/2009			03/2009 – 08/2011			
	α	β	R ²	α	β	R ²
MSCI	0.00073	1.1345***	0.857	-0.0038	1.0010***	0.848

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 11. Market model estimates version 1. MSCI World benchmark in sub-periods

Source: MSCI, Österreichische Kontrollbank and Bank of Finland

01/2005 – 08/2011				
	α	β DJSI	β SC	R ²
Version 1	-0.0012	1.0660***		0.889
Version 2	-0.0018	0.7139***	0.3124**	0.901

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 12. Market model estimates version 1 and 2. DJSI blue chip and small cap

Source: MSC, DJSI, Österreichische Kontrollbank and Bank of Finland

01/2005 – 02/2009				03/2009 – 08/2011		
	α	β DJSI	R ²	α	β DJSI	R ²
DJSI	0.0012	1.1375***	0.888	-0.0028	0.9614***	0.901

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 13. Market model estimates version 1. DJSI World benchmark in sub-periods

Source: DJSI, Österreichische Kontrollbank and Bank of Finland

From table 12 it can be seen that the regression against the DJSI World has an even larger explanatory power of 89 to 90% in all three periods. Again, beta is significant and slightly above 1 for the overall sample, alpha is small but negative. R^2 suggests that the excess returns of the DJSI World better approximates the Austrian sustainability fund index than the conventional benchmark. The fit improves when the small cap parameter is added to the model. This time the significance level for the small cap beta is higher than in the 2-factor model in table 10, which leads to the conclusion that the best-in-class approach and a certain share of small cap companies can relatively well reflect the performance of the OeSFX.

As shown in table 11 and 13, beta, in comparison to the first sub-period, decreased after the crisis peak. This holds for both benchmarks, the MSCI World and the DJSI, and indicates a reduction in relative risk exposure.

It should be noted that the OeSFX is a “young” index with a relatively short time series and this can affect the quality of the parameter tests negatively. Nevertheless, the results gained from the application of the CAPM point out that on average an investor in SRI still earns a similar risk-adjusted return compared to the benchmark. Also in the case of other sustainability indexes, the impact of the financial crisis on the risk adjusted performance was equally worse and deviations from conventional indexes have not been found (Schröder 2011).

7.4.2.2 Risk-adjusted Performance Relative to Regional Benchmarks

The estimation results depicted in table 14 are based on version one of the equations and merely aim at underlining the differences resulting from the country specific asset allocation of the indexes. In the previous section, the relationship to the European and U.S. American markets has already been stressed as influential factors. Here, the linear relationship of the excess returns strongly highlights that the European index possess a much higher degree of explanatory power than the U.S. benchmark, before and after the crisis. The overall fit of the linear regression of the OeSFX against the MSCI Europe corresponds to an adjusted R^2 of 88%, while for the U.S. version it reaches only 67%.

According to the majority of the estimates from table 14, the regional market indexes are exposed to more risk than the OeSFX, except for first sub-period, as evident from the beta coefficients below 1. Portfolios constituted by U.S. and global financial stocks were found to have lost at the highest rates during the financial crisis (Bekaert et al.2011). Accordingly, in the months before and during the financial crisis, the OeSFX was able to yield extra returns relative to the U.S. equity index, but was at the same time also exposed to more risk. In the

period following the trough, the risk exposure relative to the European and U.S. American markets was significantly decreasing and both alphas take values below zero.

	01/2005 – 08/2011			01/2005 – 02/2009			03/2009 – 08/2011		
	α	β	R^2	α	β	R^2	α	β	R^2
Europe	-0.0018	0.9737***	0.883	-0.0002	1.0768***	0.917	-0.0008	0.8046***	0.834
U.S.	-0.0011	0.9675***	0.676	0.0011	1.0261***	0.686	-0.0026	0.8810***	0.629

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 14. Market model estimates. European and U.S. benchmark

Source: MSCI, Österreichische Kontrollbank and Bank of Finland

7.5 Interpretation of the Findings

Beyond satisfying the need to take responsibility for the consequences of economic activities, investors in sustainable corporations nevertheless have expectations about profits and the certainty of their occurrence. Different views prevail in this issue, which are often dependent upon the general attitude of the individual towards social and ecological business models. Many previous studies share the opinion that although over-performance relative to conventional investments is open to dispute, there is in general no need to worry about the financial performance of SRI (Plinke 2008).

In this study, the sample of SRI funds provided in the form of the sustainability index OeSFX supports two theories. On the one hand, the risk measured by the daily values of the OeSFX was in all evaluation periods significantly lower than for the benchmark indexes, which strongly supports the claim that sustainable companies more successfully manage business risks. Measuring the risk-adjusted performance of the OeSFX suggests that there is no significant difference compared to the conventional benchmark and confirms that lower volatility and lower returns go hand in hand.

The times in which the OeSFX yielded substantially higher or lower returns than the global benchmark index have been identified to show patterns with respect to the European and U.S. American markets. The results of the technical analysis, correlation coefficients and the market model estimates point to a strong inclination towards the European economic area and are supported by the analysis of the geographical allocation focus of the sustainability index. Much in contrast, the MSCI World is influenced by approximately 50% by U.S. companies. The European focus is also a feature of the globally diversified DJSI World. This index is constituted of the most sustainable companies within the sectors of the Dow Jones Global universe and exhibits a very similar geographical asset allocation as the OeSFX. The

best-in-class selection reduces the share of U.S. American companies from 45 to 30% and increases the share of European companies from around 20 to 47%. The analyses have shown that the DJSI World and the OeSFX perform very similarly.

The finding that global socially responsible investment universes tend to be dominated by companies located in European countries is in fact nothing new. The sustainability country ranking of Oekom Research (2011) clearly highlights which geographical areas have developed advanced social and ecological framework conditions. Scandinavian countries lead the ranking, followed by Austria and Germany. The assessment casts bad light on the U.S. (rank 44) where Oekom Research expresses foremost its criticism of the lack of climate protection, high energy and resource consumption as well as the growing income disparity (Oekom Research 2011). Not only are the significance and the degree of implementation of sustainability on the corporate level evidently higher in Europe, also the political incentives and regulatory requirements in the individual states increasingly promote the framework conditions for sustainable and socially responsible companies (Plinke 2008).

The country ranking is equally reflected on the company level. In 2010 Corporate Knights, an independent media and research company, evaluated 3,000 publicly traded companies on ESG criteria and found that the ranking of the global sustainability leaders is biased towards European countries. Companies located in the U.K. and the Nordic countries are performing exceptionally well and are considered to be particularly resource efficient (Coster 2010). Although the political incentives and regulations for sustainable development are considered as relatively poor in the U.S., driving forces like activist groups and companies that become proactive and set examples in social responsibility exist (Kho 2012). The Bank Sarasin sustainability evaluation supports the previous results and concludes that the share of sustainable rated companies in Europe (about 50%) is substantially higher than in the U.S. (about 35%). European exchange traded companies have seized the opportunities of sustainability long before their American counterparts started to recognize its relevance for stock prices (Plinke 2008).

8. Conclusion

It is important to bear in mind that SRI are not uniformly defined investment products but highly influenced by the individual perception of the underlying terms. What is classified as SRI eventually determines the performance of SRI. For instance, some investors might condemn involvement in nuclear energy generation while others see it as efficient solution to provide long term energy security and combat CO₂ emissions. In the case of General Electrics, a provider of technology for nuclear energy, its efforts in corporate sustainability put it in the first place on the 2010 Corporate Knights ranking (Coster 2010). With the nuclear catastrophe in Fukushima one year later, General Electrics fell into serious disrepute about not having reacted to known safety risks in advance (Zeller 2011). This example shows that comparisons to conventional investments have to be drawn with due care as categorization all too often depends on the rater's point of view.

Nevertheless, the general outlook for SRI is a rather prosperous one. Not least due to the strong impetus that has been established on a political level. Climate change and environmental degradation have become some of the most important topics of our time and have initiated widespread regulative and voluntarily motivated countermeasures in the sense of a sustainability oriented model of society. Although cross-border initiatives like, for instance, the Kyoto Protocol or the Copenhagen Accord have not met the expectations that have been placed on it beforehand, the committing parties are still pressing the national legislative environment to achieve progress in this matter (Stiglitz 2010). Europe plays a pioneering role by continuously putting forward ecological concerns on a regulative level. In response to the increasing energy demand and the strong dependency on a few suppliers only, the EU has defined binding targets until 2020 for the share of renewable energy on the overall energy mix (European Commission 2009). Considered in the negative light cast on the nuclear energy generation since the catastrophe in Japan and Germany's subsequent nuclear phasing-out strategy, renewable energies and energy efficient technologies are receiving unprecedented attention. Despite the role of natural gas as the major substitute for nuclear energy, governmental incentives facilitate the economically attractive implementation of renewable energy solutions and make them more interesting for investors (Knopf et al. 2011).

Although this is only one point of view that highlights how green investments can open up promising opportunities that benefit both its holder and the environment, the present study overall supports the opinion that there is a consistent trend towards socially responsible investing and a considerable potential for the future.

List of Abbreviations

CAL	Capital Allocation Line
CAPM	Capital Asset Pricing Model
CML	Capital Market Line
CSP	Corporate Social Performance
CSR	Corporate Social Responsibility
DJSI	Dow Jones Sustainability Index
EFAMA	European Fund and Asset Management Association
EMAS	Environmental Management and Audit Scheme
ESG	Environmental Social and Governance
FP	Financial Performance
GMO	Genetically Modified Organism
MSCI	Morgan Stanley Capital International
NAV	Net Asset Value
OeSFX	OeKB Sustainability Fund Index
SRI	Socially Responsible Investments

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Abstract in English:

Investment products that complement financial with social, ethical or environmental objectives, these days reach such volumes that they can no longer be categorized as merely niche products or a short-lived investment trend. Socially responsible or sustainability funds consist of companies, which are screened in line with ethical investor expectations. Since the appearance of this investment segment, their performance has been a controversial issue. On the one hand, portfolio theory claims that any limitation of the investment universe negatively affects the risk-adjusted performance of a fund. On the other hand, it is precisely this screening for corporate social responsibility criteria, which can avoid investment in volatile and short term oriented companies.

Provided by Österreichische Kontrollbank, since 2005 the OeSFX sustainability fund index allows the tracking of the performance of socially responsible equity funds licensed in Austria. These funds have to adhere to strict social and environmental criteria in order to be admitted into the index. The performance of the OeSFX during the global financial and the sovereign debt crisis has been shown to diverge from the global benchmark portfolio and gave rise to the assumption that the underlying funds have been subject to different market influences.

The analysis of the asset allocation revealed that the OeSFX is tilted towards the European market, while the MSCI World index is to a greater part constituted of U.S. American companies. Besides the different allocation focus, the OeSFX was identified as less volatile compared to conventional benchmark indexes, which is suggested to be a particular feature of socially responsible companies. However, the risk-adjusted performance measured by the market model for the sample period does not point to a significant under- or outperformance of the sustainability index.

Keywords:

Socially Responsible Investments – OeSFX – Sustainability Index – Performance

Abstract in German:

Investments, die finanzielle Ziele um soziale, ethische oder um ökologische Aspekte erweitern, erreichen mittlerweile Volumen die sie nicht mehr länger als bloße Nischenprodukte oder kurzfristige Investmenttrends gelten lassen. Nachhaltigkeits- oder sozial verantwortliche Fonds beinhalten Unternehmen, die mit der ethischen Erwartungshaltung der Investoren übereinstimmen. Seit dem Aufkommen dieses Investmentsegments ist jedoch ihre finanzielle Performance zu einem strittigen Thema geworden. Auf der einen Seite wird gemäß Portfolio Theorie jegliche Beschränkung des Investmentuniversums als negativ für die risikoadjustierte Performance wahrgenommen, während auf der anderen Seite eben diese Selektion nach Corporate Social Responsibility Kriterien unbeständige und nur auf kurzfristigen Erfolg ausgerichtete Unternehmen ausschließen kann.

Zur Verfügung gestellt von der Österreichischen Kontrollbank AG, ermöglicht der OeSFX Nachhaltigkeitsfondindex seit 2005 die Entwicklung in Österreich zugelassener sozial verantwortlicher Aktienfonds zu verfolgen. Die gelisteten Fonds müssen strengen sozialen und ökologischen Kriterien entsprechen um in den Index aufgenommen zu werden. Während der globalen Finanzkrise und der Staatsschuldenkrise hat sich der OeSFX abweichend zum MSCI World Benchmark Portfolio entwickelt, was vermuten ließ, dass die zugrundeliegenden Fonds von anderen Markteinflüssen gesteuert wurden.

Die Analyse der Portfolio Allokation machte deutlich, dass der OeSFX sich dem Europäischen Markt zuneigt, während der MSCI World Index zu einem größeren Teil von U.S. amerikanischen Unternehmen beeinflusst wird. Neben dem unterschiedlichen Allokationsschwerpunkt, zeigte sich, dass der OeSFX im Vergleich zu herkömmlichen Marktindizes weniger Volatilität aufweist, was als Charakteristika sozial verantwortlich agierender Unternehmen gewertet werden kann. Die risikoadjustierte Performance im Beobachtungszeitraum gemessen anhand des Marktmodells lässt jedoch auf keine signifikante Unter- oder Überperformance schließen.

Keywords:

Sozial verantwortliche Investments – OeSFX – Nachhaltigkeitsindex – Performance

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Education

Oct. 2009 – to date	University of Vienna	Master's degree program in International Business, specialization in Energy and Environmental Management, Finance
Oct. 2007 – Feb. 2008	University of Milan, Bicocca	Erasmus semester abroad, Italy
July 2007	Academy of Labour and Social Relations Moscow	Russian language course, Russia
Sept. 2005 – Sept. 2008	University of Applied Sciences FHS Burgenland, Eisenstadt	FH Bachelor degree program International Business Relations
Sept. 2000 – June 2005	Commercial High School BHAK Kirchdorf/Krems	A-Levels

Language Skills

	European Competence Level:
German	Mother tongue
English	C1 (CAE, proficient user)
Italian	B2 (independent user, fluent in speech and writing)
Bosnian/Croatian/Serbian	B2 (independent user, fluent in speech and writing)
Russian	B1 (independent user, fluent in speech and writing)

Computer Skills

Microsoft Office (incl. MS Visio), Web design (Html, PHP, SQL), SPSS, R, Confluence

Vocational Experience

Starting April 2012	Accenture Consulting 80807 Munich, Germany	Analyst Risk Management
Feb. 2011 – Oct. 2011	Österreichische Volksbanken-Aktiengesellschaft 1090 Vienna	Assistant to the Head of Program Management of the Basel II IRB Rollout CEE project
July 2010 – Sept. 2010	Austrian Trade Commission Sarajevo 71000 Sarajevo, BiH	Business correspondence , writing reports, translating, project work
August 2009	Greiner Packaging International 4550 Kremsmünster	Support of the controlling department
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