

Schröder, Michael

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Socially Responsible Investments in Germany, Switzerland and the United States: An Analysis of Investment Funds and Indices

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Discussion Paper No. 03-10

**Socially Responsible Investments
in Germany, Switzerland
and the United States**

– An Analysis of Investment Funds and Indices –

Michael Schröder

ZEW

Zentrum für Europäische
Wirtschaftsforschung GmbH

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Non-Technical Summary

Socially responsible investment (SRI) funds are a special market segment of the asset management industry. Although this market segment is still relatively small it is fast growing in many countries. There is also an increasing number of banks, asset management companies, investment advisors and rating agencies that are specialised in this field of business. Therefore the economic performance of these specialised investment funds is of interest to investors and investment companies. In our study we investigate the performance of 16 German and Swiss funds and 30 U.S. funds that concentrate on socially responsible investing.

From the point of view of financial market theory it is interesting to examine if socially screened assets have on average the same performance than conventional assets. As SRI investment funds use only a subset of the total investment universe they should have the same or a worse performance than conventional funds. The performance analysis of SRI investment funds tests the combined hypothesis of the qualities of the fund management and the performance of the underlying assets. We thus enlarge the performance analysis by the investigation of 10 specialised SRI indices which represent the performance of socially screened assets only.

Thus, the aim of the study is twofold. First, the performance of SRI equity investment funds in the United States, Germany and Switzerland and well-known SRI equity indices such as the Domini 400-index is analysed. Second, the risk-return characteristics are investigated in detail. As performance measure Jensen's alpha is used. In addition to most of the earlier studies a broader set of benchmark assets is considered (blue chip stocks and small cap stocks). In the analysis of the investment funds possible distortions due to market timing strategies of the fund management are taken into account and, in addition, the approach of Ferson and Schadt (1996) to measure conditional performance is used.

The review of the literature shows that SRI funds have on average a similar performance than conventional funds. Many studies report a significant overweight of SRI funds in companies with a low market capitalisation (small cap stocks). But the results particularly of the early studies on SRI funds should be interpreted with some caution as these studies have some shortcomings regarding the performance measure.

Those studies using a so called matching approach try to compare SRI funds and conventional funds grouped by important fund characteristics such as size, age and investment universe. Regarding the problems in the application of this approach it seems to be more appropriate to analyse the underlying assets directly. This can be done by using SRI indices which are now available for different countries and regions.

The results of our performance analysis show that most of the German, Swiss and U.S. SRI investment funds do not significantly under-perform their benchmarks. We even found that 7 (= ca. 44%) of the German and Swiss funds exhibit a positive but insignificant Jensen's alpha. It is also interesting to note that the German and Swiss funds are significantly stronger tilted towards smaller companies than the U.S. funds. The results of the performance analysis for the SRI indices show that only two of them clearly under-perform the conventional benchmark indices. But there are also 3 SRI indices with a positive but insignificant alpha. Thus, the hypothesis that the performance of SRI assets is not worse than those of conventional assets can be rejected only for a few SRI indices. The analysis also reveals that most of the SRI indices have special index structures that deviate from their conventional benchmarks.

In addition we investigated the sensitivity of the returns of SRI funds and indices on important macroeconomic factors. Many German and Swiss funds show a significant reaction to unexpected changes in the OECD industrial production, the long-term U.S. interest rate and the U.S. dollar. In contrast, the factor sensitivities of the U.S. funds and the SRI indices are much less pronounced. Overall, the most influential single factor is the external value of the U.S. dollar.

In the next step the specific portfolio weights regarding industrial sectors and international regions are estimated by so called investment style-regressions. We find two major results. First, the investment style analysis confirmed that SRI funds and indices have a relatively high weight in small cap stocks and that German and Swiss funds are on average stronger tilted towards small cap stocks than U.S. funds. A second important result is that SRI funds and indices have a special structure. Most of them concentrate their investments in blue chip stocks in the two sectors "non-cyclical consumer goods" and "non-cyclical services". There are only few differences between German and Swiss funds and their U.S. counterparts: the German and Swiss funds invest more in utilities whereas the U.S. funds also prefer the sector "information technologies". Another result is that most of the global funds and indices concentrate their blue chip investments in European companies.

Overall, socially screened assets have no clear disadvantage concerning their performance compared to conventional assets. In addition, the analysis reveals specific risk-return characteristics (or investment styles) so that SRI funds and indices as a group might be characterised as special investment vehicles that are different from conventional assets.

Socially Responsible Investments in Germany, Switzerland and the United States

- An Analysis of Investment Funds and Indices -

Michael Schröder

Centre for European Economic Research (ZEW), Mannheim

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Abstract

The aim of this study is the analysis of so called socially responsible investments (SRI). First, the performance of SRI equity investment funds and equity indices is investigated using Jensen's alpha as performance measure. The analysis considers market timing strategies of the fund management and takes publicly available information into account (conditional performance). In the second part sensitivities regarding macroeconomic factors are estimated and the third part investigates the investment style of the SRI funds and indices. It is found that most of the SRI assets have a similar performance than their benchmarks. Only a few funds and indices exhibit a relatively poor performance. As SRI funds and indices seem to have some specific risk-return characteristics (investment styles) that might be characterised as special investment vehicles different from conventional assets.

JEL-Classification: G11, G23, Q01, Q20

Keywords: Socially responsible investing, performance measurement, investment style, investment funds

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Corresponding address:

Dr. Michael Schröder, Centre for European Economic Research (ZEW), P.O. Box 10 34 43,
D-68034 Mannheim, Germany
Phone: + 621 1235 140, Fax: + 621 1235 223, E-mail: schroeder@zew.de

1 Introduction

Investments based on social, ethical and environmental criteria have risen significantly in the last decades. This is particularly true for the United States but also for Sweden, United Kingdom, the Netherlands and Switzerland. According to Bauer, Koedijk and Otten (2002) about 2.3% of total mutual fund assets in the United States, i.e. 153 bn US dollar, have been invested in 230 so called socially responsible investment funds at the end of the year 2000. In other countries, e.g. Germany (0.04%) and France (0.01%) this market segment is still relatively small but the market share is growing.

The development of socially responsible investing (SRI) in the United States has also attracted the interest of academic finance. The empirical analysis of SRI funds¹ dates back as early as 1972 to a study of Moskowitz. Since then numerous studies investigated if SRI funds can reach the same performance as not restricted investment funds. The results of many of these studies show that SRI funds do not under-perform on average traditionally managed funds. This is an interesting result as SRI funds only use a subset of the full investment universe.

The aim of our study is twofold. First, the performance of SRI equity investment funds in the United States, Germany and Switzerland and well-known SRI equity indices such as the Domini 400-index is analysed. As performance measure we use Jensen's alpha. In addition to earlier studies a broader set of benchmark assets is considered (blue chip stocks and small cap stocks). Regarding the analysis of the investment funds possible distortions due to market timing are taken into account. To measure conditional performance the approach of Ferson and Schadt (1996) is used.

The performance analysis of the SRI indices shows if the screening based on social, ethical and environmental criteria results in a better or worse outcome than traditional investments that use the whole investment universe. The performance analysis of the SRI investment funds tests jointly the performance of the underlying assets and the quality of the fund management.

The second aim is to investigate the risk-return characteristics of SRI investment funds and indices. This is done by measuring the sensitivities against macroeconomic variables such as oil price, inflation, interest rates and industrial growth. In addition an investments style analysis quantifies the strategy of the fund management concerning sectoral and regional diversification.

¹ In the literature this market segment is named differently. In the United States the usual term is "socially responsible investing" which is also used throughout this study. In the UK the term used most often used is "ethical investing" and in Germany the market segment is divided into several segments such as "environmental funds", "environment-technology funds", "sustainability funds" and "socially responsible funds".

The paper is organised as follows. In section 2 we give a comprehensive review of the major studies in this field of research and compare the different methods and results. Section 3 describes the data i.e. the investment funds and indices under consideration and gives a first look at the performance using Sharpe ratios. In section 4 the performance of investment funds and indices is analysed. In section 5 the sensitivities of SRI fund and index returns regarding macroeconomic factors are investigated. This sheds light on specific risk characteristics of SRI investments compared to the benchmark indices. Section 6 analyses the investment styles of the SRI investment funds and indices. The aim is to conduct an external assessment of the specific structures of the funds and indices concerning the weightings of industrial sectors and international regions. Section 7 concludes. The appendix contains all tables that are discussed in the text.

2 Review of the Literature

The aim of this literature survey is to describe the methods and major results of earlier studies on performance measurement of investments in socially screened equities.² The review concentrates on studies on SRI investment funds and SRI indices. This serves as a starting point of our own analyses in the following sections.

The major question of the studies on the performance of SRI investment funds is whether these funds perform better or worse than traditional investment funds that have no restricted investment universe. SRI investment funds use a set of social, ethical and environmental criteria to select equities. These criteria are either used to pick specific stocks out of the investment universe (positive criteria) or to delete specific stocks (negative criteria). Positive criteria are for example low pollution emissions, equal employment opportunities and good workplace conditions. Usual negative criteria are the production of alcohol, tobacco, nuclear power and weapons.

From the point of view of portfolio theory a restricted investment universe should result in a lower risk-adjusted return. Even a very smart SRI investment strategy can only be as good as a traditional investment strategy because SRI investment opportunities are a subset of the total investment universe. Therefore, a traditional investment fund should always be able to use the same investment strategy as a SRI fund, but not vice versa.

² Schäfer and Stederth (2002) give a comprehensive overview on almost all international studies that investigate the effects of SRI screening strategies on the performance of the investment. Concerning the studies included the survey of Schäfer and Stederth has a much wider approach compared to our review. But they concentrate primarily on the results of these studies and only describe shortly the different methods used without looking deeper into the mechanisms and shortcomings of the different methods. In contrast our literature review concentrates on the methodological approaches and their strengths and weaknesses.

Luther, Matatko and Corner (1992) is the first study on the performance of SRI investment funds. The authors analyse 15 British ethical funds. They regress the returns of the funds on a constant and a benchmark index. As benchmark indices they use either the Financial Times All Share index or the MSCI World index.³ The constant of this regression is known in the literature on performance measurement as Jensen's alpha. The authors also use the so called Sharpe ratio as a performance measure.⁴ They do not find clear evidence of out- or under-performance of the funds relative to the benchmark indices. Another result is that many SRI investment funds have a relatively high portfolio weight in the segment of small companies. In addition, the authors find that the SRI funds in the UK are relatively dissimilar. The differences of the funds concern the SRI investment criteria, the stock selection strategy and the international diversification. In a follow-up study Luther and Matatko (1994) confirm that the excess returns⁵ of SRI investment funds depend significantly on companies with a low market capitalisation (so called "small cap stocks"). They conclude that a regression based on two benchmarks – a blue chip and a small cap index - is more appropriate for performance measurement. The empirical results show again no clear sign of out- or under-performance of the SRI funds.

Hamilton, Jo and Statman (1993) conduct a similar analysis for U.S. funds. They investigate 17 SRI funds using the simple regression of the excess returns on a constant and the excess returns of a portfolio that consists of all stocks listed at the New York Stock Exchange. Only one of the 17 funds has a significantly positive estimate for Jensen's alpha, whereas all other estimates are insignificant. In a second step the authors combine all SRI funds to one portfolio and form a second portfolio from the existing conventional investment funds. A comparison of the mean excess returns of both portfolios shows no significant differences. This means that in the United States SRI funds performed on average as well as the conventional funds.

White (1995) investigates the performance of 6 U.S. and 5 German SRI investment funds for the period 1991-1993. He used the Sharpe ratio, Jensen's alpha and the Treynor ratio⁶ as performance measures. The results show that the U.S. investment funds under-performed both the conventional benchmark (S&P 500-index) and the SRI benchmark index (Domini 400 Social-index). The results for the German funds are also negative compared to the chosen benchmark index (DAX). A clear disadvantage of this study is the very short time period.

³ MSCI is the abbreviation of Morgan Stanley Capital International Ltd.

⁴ The Sharpe ratio is defined as the mean return of the investment minus a risk-free interest rate, divided by the standard deviation of the returns.

⁵ The excess return is equal to the return minus a risk-free interest rate.

⁶ The Treynor ratio is equal to the mean return of the fund minus a risk-free interest rate, divided by the systematic risk of the fund i.e. the sensitivity of the returns of the fund to the returns of a benchmark index.

A different approach is chosen by Sauer (1997). He analyses not SRI investment funds but a well-known SRI stock index, the Domini 400 Social-index (DSI). Sauer tests if the performance of the DSI is different from the performance of the S&P 500-index and the CRSP Value Weighted Market-index.⁷ The time period used is January 1986 to December 1994. Analysing an SRI index has the advantage (compared to investment funds) that the result is not distorted by transaction costs and the specific quality of the fund management. Both the SRI index and the benchmark index exhibit only the performance of the underlying stocks. The results using Sharpe ratio and Jensen's alpha show no significant differences between the SRI index and the conventional benchmarks. The author concludes that a well diversified socially screened portfolio (represented by the DSI) has no worse performance than conventional indices that comprise a broader investment universe.

DiBartolomeo and Kurtz (1999) compare the Domini 400 Social-index and the S&P 500-index for the period May 1990 to January 1999. They use a complex multi-factor regression model that includes not only a benchmark index but also 66 additional factors that decompose Jensen's alpha.⁸ The authors measure a total outperformance of the DSI relative to the S&P 500-index of 0.18% per month. They attribute 0.06% of this outperformance to a higher beta of the DSI i.e. a higher risk exposure to the benchmark index. The remaining significant extra-return of 0.12% per month can be fully explained by specific differences in the risk exposure between the DSI and the S&P 500-index. The authors attribute 0.10% to differences in the industry composition of the indices and 0.02% to differences in the fundamental portfolio characteristics e.g. the average company size and the level of financial leverage. The authors conclude that the out-performance of the DSI is not due to the effect of social screening but can be explained by the relative risk exposures of the DSI. In an earlier study DiBartolomeo and Kurtz (1996) they find for the period May 1990 - September 1993 that the DSI also exhibits a relatively lower risk exposure to the oil price and the U.S. industrial production.

A recent study Garz, Volk and Gilles (2002) investigates the Dow Jones Sustainability Index (DJSI) for Europe. The index is constructed applying a social screening on the investment universe of the Dow Jones STOXX 600-index (DJStoxx). The authors find significant differences in the sector allocation and the country allocation between the two indices. But more important are the differences due to the selection of single stocks and so called "style factors" that characterise the investment style, for example company size, market beta, growth and value stocks, financial leverage, etc. Therefore, the study reveals that the analysed SRI index exhibits significant differences in the relative risk exposure to the conventional benchmark index. Garz, Volk and Gilles in addition estimate Jensen's alpha from a three-factor model that uses the same factors as Fama and French (1996). The first

⁷ CRSP is the abbreviation of Center for Research in Securities Prices.

⁸ For a detailed description of the model the authors refer to Rosenberg (1974).

factor is the excess return of the DJStoxx-index whereas the other two factors measure the risk exposures concerning the valuation (i.e. book value relative to market value) and the company size (i.e. low versus high market capitalisation), respectively. The authors show that the DJSI has a positive alpha at the 10% significance level and is tilted towards companies with high market capitalisation and high book-to-market value (= so called "value stocks"). They conclude that the DJSI has no worse performance than the DJ STOXX 600-index and find even signs of an out-performance.

Statman (2000) investigates both the Domini 400 Social-index (DSI) and the performance of 31 U.S. investment funds that apply a social screening. For the period May 1990 - September 1998 the DSI has a higher risk-adjusted return than the S&P 500-index and the CRSP 1-10-index, a value-weighted index of all U.S. stocks. This result is similar to the findings of DiBartolomeo and Kurtz (1999) and Sauer (1997). Most of the 31 SRI funds have a similar performance as the S&P 500-index and the DSI. There are only few funds with a significant under-performance (3 funds under-perform relative to the S&P 500 and 5 funds relative to the DSI). But as the fund returns include transaction costs whereas the indices do not this results in an underestimate of the true performance of the funds. To cope with this problem Statman compares the SRI funds also with conventional funds using a so called matching approach. He chooses two conventional investment funds for each SRI fund with the objective to match the size of the SRI fund. As a large part of the transaction costs of an investment fund is related to the size of the fund, the difference return between the SRI fund and the average of the two conventional funds should be a better measure of the performance of the underlying assets. Statman finds that the SRI funds exhibit a positive but not significant Jensen's alpha relative to the conventional funds. Nevertheless, other fund characteristics such as a possible market timing strategy of the fund management or the size of the companies in which the fund is invested are not controlled for. The approach of Statman could therefore still result in biased estimates of the out- or under-performance.

A matching approach is also applied by three other studies. Mallin, Saadouni and Briston (1995) compare 29 SRI funds with conventional funds from UK. They assign one conventional fund to each SRI fund by using the size and the age of the fund as matching criteria and then compare Jensen's alpha, Sharpe ratio and Treynor ratio for each pair. The result shows that the performance of both types of British investment funds are very similar. But as the authors do not apply statistical tests for the differences in performance measures these are only approximate results.

Gregory, Matatko and Luther (1997) investigate 18 funds out of the 29 analysed by Mallin et al. They use not only the two criteria of Mallin et al. for the matching procedure but consider also the area of investment and the type of the fund. Thus the assignment of the conventional fund to each SRI fund should be more precise. Gregory et al. estimate Jensen's alpha using two benchmarks: a blue chip index

(Financial Times All Share index) and a small cap index. This gives a better estimate of Jensen's alpha as most of the SRI funds are tilted towards companies with low market capitalisation. The authors apply a statistical test to the differences in Jensen's alpha between the matched pairs of funds. Although the SRI funds have a slightly worse performance the difference is not significant. But a cross-sectional analysis reveals further signs of an under-performance of the SRI funds.

Kreander, Gray, Power and Sinclair (2000). analyse 40 SRI funds from seven countries using a matching approach. The countries included are Belgium (1), Germany (4), the Netherlands (2), Norway (2), Sweden (11), Switzerland (2) and the UK (18).⁹ The authors apply four criteria for the matching procedure: age, size, country and investment universe of the fund. Like most of the earlier studies they use Jensen's alpha, Sharpe ratio and Treynor ratio as performance measures. In the regression equation for Jensen's alpha a measure for market timing is included.¹⁰ As market timing of the fund management can significantly bias the estimation of Jensen's alpha this is an important improvement compared to earlier studies. The statistical tests concerning the differences in the performance measures show that the Sharpe and Treynor ratios of the conventional funds are slightly higher but not significant whereas the Jensen's alpha of the SRI funds is higher but only at the 10% significance level. The authors conclude that SRI and conventional funds exhibit a very similar performance.

There are some shortcomings in the study of Kreander et al. The authors use the MSCI World index as benchmark. This choice may not be appropriate for all funds because of different strategies concerning the regional diversification.¹¹ The authors, in addition, do not use a small cap market index to cope with the small cap bias of most SRI funds. As the investment universe of the SRI funds is matched more accurately than in Gregory et al. this neglect might be of only minor importance. But the authors show in the appendix that the size difference between the SRI funds and the assigned conventional fund is significant at the 10% level. Therefore the interpretation of the results of Kreander et al. should be done with some caution.

The most recent study is Bauer, Koedijk and Otten (2002). They consider 32 British, 16 German and 55 U.S. investment funds that apply a social screening. The authors compare a portfolio of all SRI funds with a portfolio of all conventional funds of each country.¹² They mainly use the 4-factor model of Carhart (1997) in their

⁹ The number of SRI investment funds analysed for each country is given in brackets.

¹⁰ The authors apply the approach of Henriksson and Merton (1981) which differentiates between upward and downward movements of the market index.

¹¹ There are even funds in the sample which concentrate their investment only in their home-country. For such funds the MSCI World index is probably only a poor benchmark.

¹² The funds are further divided into domestically and internationally investing funds.

investigation. The first three factors are those of the Fama-French model¹³ and the fourth factor captures the effect of momentum.¹⁴ Bauer et al. also use a conditional version of this model. Here they consider time-varying factor sensitivities where the time variation depends on the influence of four pre-determined instruments.¹⁵ The aim of this last approach is to include publicly available information which can be used by the fund management for dynamic investment strategies. A neglect of these influences could result in biased estimates.

The main findings of Bauer et al. are: (1) German and U.S. SRI funds under-perform both their relevant indices and the conventional funds, whereas UK funds slightly outperform. But all these differences are not significant. (2) The SRI funds seem to have investment styles that are different from the conventional funds. For example, the funds are tilted towards companies with a low book-to-market value (= growth stocks) and towards companies with a low market capitalisation. The latter result is a confirmation of the findings of earlier studies.

The review of the literature on the performance of SRI investment funds has revealed some interesting results. First of all, most of the studies agree that SRI funds have a similar performance than conventional funds. This result is well founded and reliable as the studies use different methods (from very simple one-factor models to three- and four-factor models with time-varying coefficients), investigate different time periods and different countries. The hypothesis that SRI funds must have a worse performance than conventional funds due to the restricted investment universe is therefore rejected. But the SRI funds also exhibit no out-performance.

Another important result is that SRI funds differ significantly in their investment strategy relative to conventional funds. The studies particularly find that SRI funds have an overweight in companies with a low market capitalisation (small cap stocks).

The results particularly of the early studies on SRI funds should be interpreted with some caution as these studies have shortcomings regarding the performance measure. For example only Kreander, Gray, Power and Sinclair (2000) consider market timing in their regression model and only Bauer, Koedijk and Otten (2002) apply a conditional model. The neglect of these two model characteristics can result in biased estimates of the model parameters and thus also in misleading measures of out- or under-performance.

¹³ See e.g. Fama and French (1996).

¹⁴ The fourth factor is the return difference of a portfolio of past 1 month winners and a portfolio of past 12 months losers.

¹⁵ The instruments are the 1-month T-bill interest rate, the dividend yield on the market index, the slope of the term structure of interest rates and the spread between the yields on corporate and government bonds.

The studies using matching procedures suffer from an only insufficient approximation of the fund characteristics. Particularly Statman (2000) and Mallin, Saadouni and Briston (1995) use a too small set of matching criteria. These two studies can probably approximate the transaction costs of the funds quite well but the matched pairs of funds may still differ e. g. in their investment universe. To a smaller degree this criticism also applies to Gregory, Matatko and Luther (1997) although this study uses a more appropriate set of matching criteria. Only Kreander, Gray, Power and Sinclair (2000) also consider the investment universe in detail.

Regarding the problems in the application of the matching approach it seems to be more appropriate to analyse the underlying assets directly. This can be done by using SRI indices which are now available for different countries and regions for sufficiently long time periods. These indices measure the performance of assets that are selected by SRI screening procedures and can therefore be used to test the performance of SRI assets. The suppliers of the SRI indices as for example Dow Jones, Financial Times, Calvert and KLD¹⁶ use similar sets of social, ethical and environmental criteria which are comparable to the criteria applied by the SRI investment funds. The analysis of SRI indices instead of investment funds has the additional advantage that common methodological problems like market timing and the use of publicly available information as instruments for conditional estimations are not necessary. Up to now only two indices – the Domini 400 Social index¹⁷ and the Dow Jones Sustainability index for Europe¹⁸ – have been investigated in detail. It is interesting to analyse again these two indices using the same method and to expand this examination by the analysis of eight additional SRI indices that are available by now.

3 Characteristics of the Data

In the following sections 4, 5 and 6 the performance and risk-return characteristics of SRI investment funds and SRI indices are analysed. The study includes the major SRI investment funds from the United States, Germany and Switzerland. These are 30 U.S. funds and 16 funds from Germany and Switzerland. In addition, 10 SRI indices are investigated. The time series selected represent the most important and best-known SRI funds and indices which are part of earlier studies and publications of SRI organisations.

The indices and funds comprise stocks that are selected applying social, ethical and environmental criteria. The SRI funds have a weighting of equities of at least 60%. Most of the analysed investment funds have an average equity weighting of more than 80%-90% and invest only in equities or cash. The data are primarily collected

¹⁶ KLD is the abbreviation of KLD Research & Analytics, Inc.

¹⁷ See particularly Sauer (1997), DiBartolomeo and Kurtz (1996) and Statman (2000).

¹⁸ See Garz, Volk and Gilles (2002).

using the Thomson Financial Datastream database. Some of the indices (Domini 400 Social, Calvin, Naturaktienindex) have been collected from the suppliers of these indices.

The price data of the investment funds include all cash payments to the investor and all these distributions are reinvested in the fund. The prices are net of all management fees and transaction costs. Load factors are not considered. The fund prices measure therefore the net asset value of the funds. The SRI indices and all benchmark indices are performance indices and include all cash payments (e.g. dividends) to the investor. The Naturaktienindex is a price index which only takes the stock prices into account. The U.S. fund prices are calculated in U.S. dollar, whereas the prices of the German and Swiss funds are measured in German mark and euro (from 1/1/1999 on).

An important selection criterion for the SRI investment funds is the length of the time series. Only funds for which data are available before May 2000 have been chosen. The end date of the series is September 2002. The minimum length of the price series is therefore 30 months. For all calculations the full available price series have been used, so that for most investment funds and indices the sample period is much longer. For the United States this selection criterion excludes only a few of the existing SRI funds but for Germany and Switzerland more than 20 new established funds could not be included in the study. Many of these new funds have been launched during 2001 so that their price series is too short to allow statistically sound inference. Nevertheless, some of the fund and index series used are also quite short and in these cases the results may suffer from relatively imprecise estimates.

A major concern of many performance studies is the so called survivorship bias. This causes an overestimation of the true performance regarding the universe of investment funds if funds that have been closed in the past are not included in the investigation. Our sample of SRI investment funds seems to be free of a survivorship bias as this field of business is still strongly growing in many countries with the result that older funds have not yet been closed to our knowledge.

But there could exist a survivorship bias regarding the indices as all indices are regularly restructured after some time. In this restructuring process the stocks which have delisted or exhibited a strong decrease in market capitalisation below a certain threshold level are usually dropped. Therefore the SRI indices as well as the benchmark indices may be affected by a survivorship bias.

The tables 1, 2 and 3 list all investment funds and indices included in the study, give information regarding the region in which the fund invests and the first date for which prices are available by Thomson Financial Datastream. In column 6 of these tables the specific social, ethical or environmental selection criteria of the funds are listed. These SRI criteria are usually combined with financial criteria (such as the expected profitability of the companies) in the stock selection process.

Table 1 shows the German and Swiss investment funds. All of these 16 funds apply a world-wide diversification of their portfolio. This is in contrast to the U.S. funds (table 2) which in most cases concentrate on U.S. stocks. Only 4 of the U.S. funds invest internationally. Looking at the SRI investment criteria of the funds it seems that the U.S. investment funds are more homogeneous than their German and Swiss counterparts. The U.S. funds apply a broad set of positive and negative criteria. Almost all of these funds exclude companies which are engaged in businesses like production of alcohol, gambling, nuclear energy, tobacco and military weapons. Many funds also consider criteria concerning the environment, workplace conditions and discrimination of minorities. Amongst the German and Swiss SRI funds are also funds that concentrate only on environmental friendly products and technologies. Overall the U.S. funds have a much stronger emphasis on social and ethical criteria.

The tables 4a - c give a first overview of the mean returns and the performance of the SRI funds and indices. All returns in this study are logarithmic returns based on monthly data. The performance is calculated using the Sharpe ratio (SR). The Sharpe ratio measures the return above the risk-free interest rate (= excess return) divided by the total risk of the investment:

$$(1) \quad SR = \frac{\mu - r_f}{\sigma}$$

where μ = mean logarithmic return, r_f = logarithm of the risk-free interest rate (mean), σ = standard deviation of the logarithmic returns. The risk-free interest rates are the 1-month Fibor for German and Swiss funds and the 1-month U.S. interbank offered rate for U.S. funds and the SRI indices. The Sharpe ratios of the funds and indices are compared to the Sharpe ratio for the MSCI World index for the same period. The calculations use the full available data history of the SRI funds and indices.

Table 4a reveals that the majority of the German and Swiss funds have both a lower mean return compared to the MSCI index and also a lower Sharpe ratio. Only 4 funds i.e. 25% have a Sharpe ratio above or equal to the MSCI index. For the U.S. funds the situation is similar: only 9 out of 30 funds (= 30%) have at least a Sharpe ratio as the MSCI index. In contrast, 8 SRI indices (= 80%) performed better than the MSCI World index. This indicates that the underlying assets represented by the indices seem to perform similar (or even better) than conventional assets, whereas the investment funds are in most cases not able to earn an extra-return which compensates the costs of the fund management. But these are only first results that will be analysed in depth in the next section.

4 Performance Analysis

The performance of the SRI investment funds and indices is investigated using different regression approaches. The aim is to measure Jensen's alpha i.e. the extra-return that is not explained by the risk exposures of the fund. The Jensen's alpha of the SRI investment funds is estimated by three approaches.

The first approach uses two benchmark indices, a blue chip index and a small cap index. The second approach considers in addition market timing activities of the fund management and the third approach expands the second approach by including instrumental variables for a conditional performance estimation.

A result of the earlier studies is that SRI funds are significantly tilted towards companies with a low market capitalisation.¹⁹ Therefore the investment universe should not only include a market index for companies with high market capitalisation but also a small cap equity index.²⁰

Thus, the first model version for estimating the out- or underperformance is:

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

re denotes the excess return of either fund i or the benchmark indices (B = blue chip index, S = small cap index), which is defined as:

$$(3) \quad re_{x,t} = r_{x,t} - r_{f,t-1} \text{ with } x = i, B \text{ or } S \text{ and}$$

$$(4) \quad r_{x,t} = \ln(I_{x,t}) - \ln(I_{x,t-1}), \quad r_{f,t-1} = \ln(1 + \text{risk-free interest rate}_{t-1}/100)/12 \text{ and} \\ I = \text{index level of either fund } i \text{ or one of the benchmark indices.}$$

The benchmark indices are selected in order to approximate the investment universe of the SRI funds and indices. For all globally investing funds the blue-chip benchmark index is the MSCI World index and the small cap index is the world index of Salomon Smith Barney which covers international companies with a market capitalisation below 500 mn U.S. dollar. The U.S. benchmarks are the Standard & Poor's 500-index for the blue chip stocks and the Wilshire Small Cap 250 index of the small cap stocks. The α_i measure if the SRI fund or index has an outperformance

¹⁹ See e.g. Luther and Matatko (1994), DiBartolomeo and Kurtz (1999) and Bauer, Koedijk and Otten (2002).

²⁰ We do not use the so called Fama-French-factors as e.g. Bauer, Koedijk and Otten (2002) and Garz, Volk and Gilles (2002) did. This is because the Fama-French-factors do not represent the primitive assets that constitute the SRI funds and indices but they represent instead a specific strategy of the portfolio management.

compared to a passive portfolio that consists of the two benchmark indices with the weights β_{1i} and β_{2i} .

If the fund management has market timing abilities model version 1 results in a biased estimation of Jensen's alpha.²¹ To consider market timing in the regression we apply the usually used Treynor-Mazuy approach.²²

(5) (Version 2 - Funds)

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

A positive γ means that the fund manager is able to time the market, whereas a negative γ shows that the manager invests less in upward markets and more in downward markets. This can be seen from the derivative of the SRI fund or index returns relative to the returns of the benchmark indices, e.g., $\partial re_{i,t} / \partial re_{B,t} = \beta_{1i} + \gamma_{1i}re_{B,t}$. Equation (5) measures market timing abilities for both benchmark indices.

Model versions 1 and 2 give unconditional estimations of Jensen's alpha. If the fund management can forecast market movements by publicly available information then the sensitivities of the funds on the market returns should be time-varying. Thus, equations (2) and (5) can result in biased estimates of the performance due to a neglect of this time variation. In model version 3 we apply the approach of Ferson and Schadt (1996) and use instrumental variables that approximate changing market conditions.

(6) (Version 3 - Funds)

$$re_{i,t} = \alpha_i + \beta_{1i}re_{B,t} + \beta_{2i}re_{S,t} + \gamma_{1i}(re_{B,t})^2 + \gamma_{2i}(re_{S,t})^2 + \sum_{j=1}^J (\lambda_{jB}z_{j,t-1}re_{B,t} + \lambda_{jS}z_{j,t-1}re_{S,t}) + \varepsilon_{i,t}$$

The J instrumental variables $z_{j,t-1}$ are predetermined from month $(t-1)$. We use $J=2$ instruments: the U.S. long-term interest rate and the U.S. term spread i.e. the difference between the long-term and the short-term interest rate. The U.S. long-term interest rate is a proxy for the global conditions on the bond markets and the term spread is a leading indicator for the business cycle. As usual the instrumental variables are the deviations of the original variables from their unconditional mean. If, for example, only λ_{1B} is significant then the new reaction of $re_{i,t}$ to changes in e.g. $re_{B,t}$ is: $\partial re_{i,t} / \partial re_{B,t} = (\beta_{1i} + \lambda_{1B}z_{1,t-1}) + \gamma_{1i}re_{B,t}$ and therefore systematically depends on the value of the instrument $z_{1,t-1}$ in period $(t-1)$.

²¹ See e.g. Admati and Ross (1985).

²² See Treynor and Mazuy (1966).

As market timing and time-varying betas due to publicly available information are irrelevant for the performance measurement of the SRI indices two simpler approaches are used for analysing these indices:

$$(7) \quad (\text{Version 1 - Indices}) \quad re_{i,t} = \alpha_i + \beta_{1i} re_{B,t} + \varepsilon_{i,t}$$

$$(8) \quad (\text{Version 2 - Indices}) \quad re_{i,t} = \alpha_i + \beta_{1i} re_{B,t} + \beta_{2i} re_{S,t} + \varepsilon_{i,t}$$

In equation (7) only a blue-chip benchmark index is used whereas version 2 also includes a small cap index. As benchmark indices those indices are chosen that match the investment universe of the SRI indices.

For the Calvin index, the S&P 500 “Environmental Services” and the Domini 400 Social index the Standard & Poor’s 500 is the blue-chip benchmark index. For the Naturaktienindex (NAX) and the Datastream world index “Environmental control” the MSCI World index is most appropriate. As the NAX is a price index here the MSCI World index is chosen as price index. The blue-chip benchmarks for the FTSE4Good-indexes are the FTSE All-World Developed, All-World Europe and Local US index, respectively. The benchmarks for the Dow Jones Sustainability indices are the DJ STOXX 600-index for Europe and the DJ World-index. The small cap indices used in equation (8) are the Salomon Smith Barney indices for Europe and World which cover companies with a market capitalisation below 500 mn U.S. dollar. For the United States the Wilshire Small Cap 250 index is taken.

All five equations ((2) and (5) to (8)) are estimated with ordinary least squares (OLS). The variance-covariance matrix of the residuals is corrected for autocorrelation and heteroskedasticity using the Newey-West approach.²³ Some of the time series of the SRI fund or index returns are relatively short and thus statistical inference on parameters is relatively imprecise for these funds or indices.

The tables 5a - c show the estimates of Jensen’s alpha for the funds and the indices. Although for many funds the alphas are negative there are only a few significant estimates. Concerning the German and Swiss funds the Fürst Fugger Sustainability fund, the SAM Sustainability Index fund and the Oppenheim DJ Sustainability World Index fund clearly under-perform (model version 3). All three funds have the Dow Jones Sustainability World index as benchmark. The Sun Life Ecological Portfolio also exhibits a negative performance but only at the 10% significance level. The results also show that the analysis is often hampered by a short time period. For example, the SAM Sustainability Pioneer Fund exhibits a relatively poor performance compared to the benchmarks ($\alpha = -2.373$), but the estimate is nevertheless insignificant.

²³ See Newey and West (1987).

As investment fund returns bear the costs of the fund management it is most often the case in empirical studies that the performance of investment funds is worse than the corresponding benchmark. It is therefore a surprise that at least 3 out of 16 German and Swiss funds (model version 3) exhibit a positive though not significant alpha. The performance of the U.S. funds seems to be similar to their German and Swiss counterparts. Only one of the 30 funds has a positive but not significant alpha using model version 3. But there are 7 funds that significantly under-perform their benchmarks.

The comparison between the performance of an investment fund and benchmark indices tests a joint hypothesis: the first part of the hypothesis is the out- or under-performance of the underlying assets and the second part is the ability of the fund management to create extra-returns higher than the costs of the fund. Therefore the results of the tables 5a and 5b cannot reveal which of the two parts of the hypothesis is rejected.

A separate test of the performance of the underlying assets can be conducted by measuring Jensen's alpha of the SRI indices. As table 5c shows that three of the 10 indices clearly under-perform their benchmarks (model version 2). These are the Calvin index and the Europe-wide FTSE4Good-index. The Dow Jones Sustainability World index (DJSI) also under-performs but only at the 10%-significance level.

In case of the DJSI World-index and the three FTSE4Good-indices the Jensen's alpha have been calculated for two periods each: the full data sample and a shorter period from the official start of the index on. The DJSI World-index, for example, is available from 1994 on but the DJSI index family has been launched not before January 1999. This means that the DJSI World-index has been calculated back to 1994. Therefore the test should also consider the shorter period as the index might be biased upwards in the period from 1994 to 1998. In case of the FTSE4Good-indices the situation is similar: the official start of the indices is January 2001 but the indices are available for much longer periods.

The results for Jensen's alpha shows that in all these cases the estimate is smaller for the period which begins at the date of the official start. But only in case of the FTSE4Good-index for Europe and the DJSI World-index this difference is significant. Nevertheless, the results for the backward calculated index data has to be interpreted cautiously. As a result we conclude that three SRI indices perform worse than their benchmarks whereas the other seven indices exhibit no significant deviation from the benchmark indices.

Our results for the Domini 400 Social-index are comparable to those of Sauer (1997) and DiBartolomeo and Kurtz (1999). They also find positive but not significant alphas which are of similar size than our estimates. But our estimations for the DJSI-index for Europe is partly at odds with those of Garz, Volk and Gilles (2002).

Whereas they found a positive and slightly significant alpha our results show insignificant alphas. This difference is astonishing as they use the same time period. But although the benchmarks used by Garz, Volk and Gilles are comparable to ours they are not identical. As the time period for the estimation is rather short and the estimated alpha of Garz, Volk and Gilles is only significant at the 10%-level the different results need not be a contradiction.

The tables 6a – b show the influence of both the blue chip and the small cap benchmark indices, the market timing-abilities of the fund managers and the overall fit of the model (R^2). The γ -coefficients in the equations (5) and (6) quantify the market timing concerning the blue chip and the small cap indices. If these coefficients are positive then the manager increases the market exposure when the market index rises and becomes more prudent when the market index decreases. The outcomes of the regressions show instead that the managers of the German and Swiss SRI funds have relatively bad timing abilities as many of them increase the market exposure in a downturn and decrease it in an upswing: 9 from the 16 funds have at least one significantly negative γ -coefficient. Only two funds have the ability to time the market: the Pictet Global Sector Water fund and the Fürst Fugger Sustainability fund. For the U.S. funds most of the γ -coefficients are not significant, only 5 fund managers have negative and 3 positive timing capabilities. Overall the timing abilities of the U.S. fund managers can therefore be characterised as neutral.

Another result from the tables 6a and 6b is the significant and strong influence of the small cap indices on the returns of the German and Swiss SRI funds. For 11 of the 16 funds the influence of the small cap index is even larger than the impact of the blue chip stocks. This is in sharp contrast to the U.S. funds as for most of these funds the influence of the blue chip index strongly dominates. Therefore, the U.S. funds are much less exposed to small company risk than the German and Swiss funds. This is also a finding of Bauer, Koedijk and Otten (2002). The overall fit of the fund return regressions is relatively good: the corrected R^2 is in most cases higher than 50% for the German and Swiss funds and at least for half of the U.S. funds.

The sensitivities of the SRI indices relative to the blue chip and small cap indices are more different amongst each other. There are five indices for which the small cap stocks play a major role but the others these sensitivities are either not significant or even negative. In case of the FTSE4Good Europe-index the negative sign for the blue chip index is probably due to multi-collinearity. As the investment style-regressions (see section 6) show this index is in fact dominated by blue chip stocks. The overall fit of the regressions (R^2) is relatively high in most cases. Only the two specialised sectoral indices from Standard & Poor's and Datastream exhibit a very low R^2 . All other indices are relatively well explained by the two benchmark indices.

5 Factor Sensitivities

For the assessment of the risk of SRI investment funds and indices it is interesting to analyse the impact of important macroeconomic variables. For example DiBartolomeo and Kurtz (1996) have found that the Domini 400 Social-index reacted weaker than the S&P 500 index on changes in the oil price and the U.S. industrial production in the period 1990 to 1993.

For the investigation of the factor sensitivities the following approach is used:

$$(9) \quad re_{i,t} = \alpha_i + \beta_{1i}re_{B,t} + \beta_{2i}re_{S,t} + \lambda_i UF_t + \varepsilon_{i,t}$$

The excess returns (re) of the SRI fund or index are regressed on the excess returns of a blue chip and a small cap benchmark index and in addition on a macroeconomic factor. As financial market theory tells us that particularly the unexpected change of a factor should have an influence on market prices the original logarithmic difference of the factor i.e. $F_t = \ln(Factor_t) - \ln(Factor_{t-1})$ is filtered by an ARMA (2,1)-model. The ARMA-model is used to approximate the expected change of the factor. The regressor UF_t is equal to the residual of the ARMA equation (= unexpected change of the factor).

The λ -coefficient in equation (9) indicates whether the unexpected change in the factor has a significant effect on the return of the SRI funds or indices beyond the effect of the factor on the benchmark indices. If λ is positive the effect is stronger than the effect on the benchmark indices whereas a negative value indicates a smaller effect. The tables 7a and 7b show all significant factor influences on the SRI funds. Only those λ -coefficients with significance levels of 5% or below are displayed.

The factors chosen are the usual macroeconomic variables used in empirical tests of the Arbitrage Pricing Theory (see e.g. Chen, Roll and Ross (1986)).

1. U.S. short term interest rate (1-month interbank offered rate)
2. U.S. long term interest rate (average)
3. Slope of the term structure = factor 2 – factor 1
4. External value of the U.S. dollar (nominal, trade-weighted)
5. Oil price
6. Industrial production OECD
7. Industrial production USA
8. Producer prices OECD
9. Producer prices USA
10. Consumer prices OECD
11. Consumer prices USA

A first look at the tables 7a and b reveals that the U.S. funds behave similar to their benchmark indices: for about half of these funds no factor coefficient is significant, whereas this is true for only 3 of the German and Swiss funds.

The German and Swiss funds react particularly to the following three macroeconomic factors: the OECD industrial production, the long-term U.S. interest rate and the external value of the U.S. dollar. All of the significant λ -coefficients are positive. The returns of most of the funds increase relative to their benchmarks with an (unexpected) rise in the OECD industrial production, an increase in the long-term U.S. interest rate and an appreciation of the U.S. dollar. The funds are therefore tilted towards pro-cyclical industrial sectors, stocks with a low interest rate sensitivity and companies which profit by a higher value of the U.S. dollar. The other factors play only a negligible role, the producer and consumer prices even have no significant influence.

The U.S. fund returns show no distinct influence of macroeconomic factors. There are only three factors which are of some importance: the external value of the U.S. dollar, the U.S. industrial production and the U.S. consumer prices. The U.S. fund returns are therefore much more in line with the behaviour of their benchmark indices than the German and Swiss funds.

Table 7c shows the results for the SRI indices. Most of the indices react at least to one of the macroeconomic factors, but it is difficult to find a clear pattern. The more important influences stem from the external value of the U.S. dollar and the short-term U.S. interest rate. Less important are the oil price, the slope of the U.S. term structure and the U.S. industrial production. In many cases the signs of the significant λ -coefficients for the same factor differ among the SRI indices.

The returns of two SRI indices - the DJSI World-index and the Domini-index - decrease relative to their benchmarks when the oil price increases. This was also found by DiBartolomeo and Kurtz (1996) for the Domini 400 Social-index for the period 1990 to 1993. And this is still a characteristic of the structure of the Domini index.²⁴

In sum, the examination of the reactions of SRI fund and index returns on macroeconomic factors shows a clear difference between German and Swiss funds on the one hand and U.S. funds on the other hand. Most of the German and Swiss funds show a significant impact of unexpected changes in the OECD industrial production, the long-term U.S. interest rate and the U.S. dollar. In contrast, the factor sensitivities of the U.S. funds but also the SRI indices are less pronounced. Overall, the most

²⁴ DiBartolomeo and Kurtz explain this reaction by the relatively high weight of the Domini-index in those sectors that are related to private consumption: A higher oil price reduces the disposable income of the households and thus leads to a decrease in the demand for consumption goods.

influential single factor is the external value of the U.S. dollar. In most cases an appreciation of the dollar induces a relative increase of the fund returns. But besides this factor it is difficult to find any clear pattern for macroeconomic sensitivities amongst the two groups of funds and the SRI indices. The differences in the macroeconomic factor sensitivities are thus an indication of structural differences.

6 Investment Style Analysis

From an external point of view it is difficult to assess the concrete strategy of the fund management. SRI funds apply a set of positive and/or negative selection criteria in addition to conventional criteria such as the profitability of the companies. Some of the criteria like “sustainability” or “positive contribution to the society” are difficult to interpret and overall the laid-down fund strategies leave a wide range for independent asset allocation decisions of the fund managers. Therefore it is worthwhile to investigate the specific investment styles of the SRI funds. The investment styles are analysed by estimating the fund weights concerning industrial sectors and international regions. This is in contrast to the studies of Garz, Volk and Gilles (2002) and Bauer, Koedijk and Otten (2002) which define investment styles as sensitivities to the Fama/French-factors.²⁵

The basic equation for the investment style analysis is:²⁶

$$(10) \quad r_{i,t} = \alpha_i + \sum_{k=1}^K \beta_{ik} r_{k,t} + \varepsilon_{i,t}$$

Here $r_{i,t}$ denotes the return of the SRI fund or the SRI index and $r_{k,t}$ is the return of the k -th factor-index. Equation (10) uses K different factor-indexes. These are either sectoral or regional stock indices. The equation is estimated under the restrictions that the β -coefficients are non-negative and sum to one. Therefore, the β -coefficients can be interpreted as portfolio weights. This does not necessarily mean that the β -coefficients give the correct portfolio weights of the SRI funds and indices. In general, it may only be the case that the passive portfolios that consist of the factor-indices describe relatively well the risk-return characteristics of the returns on the left-hand side.

The non-negativity constraint means that short-sales are not allowed. The α -coefficient measures the so called tracking error between the SRI fund or index and the passive portfolio that consists of the factor-indices.

²⁵ These are the excess market return, a factor measuring the valuation of the companies by the book-to-market ratio and a factor measuring the size of the companies. Bauer et al. (2002) include a fourth factor which represents the influence of momentum strategies.

²⁶ See e.g. Ter Horst, Nijman and de Roon (1998) and Gerard, Hillion and de Roon (2002).

In addition, so called spanning tests are conducted for the SRI indices. The aim is to investigate if adding the socially screened assets to the investment universe represented by the factor-indices improves the efficient frontier. This is done by estimating equation (10) without constraints in the first step and then testing in a second step if the two constraints - α equal to zero and the β -coefficients sum to one – are rejected.²⁷ If the constraints are rejected then the SRI index should be included to the investment universe, otherwise the factor-index portfolio mimics the SRI index and the index is spanned by the K factors.

The factor-indices used in equation (10) are the stock indices for the following 10 industrial sectors:

1. Basic industries (chemicals, construction, forestry and paper, steel, ...)
2. Cyclical consumer goods (automobiles, household goods and textiles, ...)
3. Cyclical services (retailers, leisure/entertainment/hotels, media/photography, transport, ...)
4. Financials (banks, insurance, investment companies, real estate, ...)
5. Information technology (information technology hardware, software and computer services)
6. Non-cyclical consumer goods (beverages, food, health, personal care products, pharmaceuticals, ...)
7. Non-cyclical services (food and drug retailers, telecom services)
8. Resources (mining, oil and gas)
9. Utilities (electricity, gas distribution, water)
10. General industries (aerospace, electronic and electrical equipment, engineering and machinery, ...)

The indices are constructed by Thomson Financial Datastream and are available for global, European and U.S. stocks. Therefore we can use those sectoral indices that fit best to the regional investment universe of the SRI funds and indices. As the sectoral indices cover mainly the blue chip stocks it is necessary to use also a small cap index as factor no. 11.

Table 8a shows the weights of the sectoral portfolio for German and Swiss funds. For most of the funds the small caps have the highest weight. The average weight for the small caps is 42%. The small cap weight is clearly higher than those for U.S. stocks which is approximately 32%. (table 8b). This is a confirmation of the results of the performance regressions in section 4.

The weights for the industrial sectors no. 7 but also for no. 6 and 9 are particularly high. Most of the German and Swiss funds are thus tilted towards non-cyclical services and consumer goods and have also a relatively high weight in utilities. It

²⁷ See Huberman and Kandel (1986).

seems also that the funds have relatively similar strategies concerning their sectoral diversification. All of them have a strong concentration in consumer goods and consumer services and reduce their dependency from the business cycle by investing primarily in non-cyclical stocks. This seems to be a contradiction to the relative strong pro-cyclical influence of industrial production found in section 5. But the sectoral investment style regressions only measure the diversification of the share of blue chip stocks whereas the small cap stocks might be invested primarily in other sectors. Another explanation is that small companies usually have a higher business cycle risk and the high sensitivity to industrial production could be mainly caused by the high share in small cap stocks.

The U.S. funds (table 8b) have similar strategies concerning the sectoral diversification amongst each other and compared to the German and Swiss funds. They also concentrate their investments in the non-cyclical consumer goods and services sectors. But they invest in addition significantly in information technology (sector no. 5) and 6 funds have a high portfolio weight in the sector “financials”. In contrast to the German and Swiss funds the investment in utilities is lower. But overall the similarities between U.S., German and Swiss funds are remarkable.

The SRI indices are relatively dissimilar amongst each other. Many of them have a relatively high portfolio weight in sector no. 6 which is also one of the preferred sectors of the U.S., German and Swiss funds. The three FTSE4Good-indices reveal relatively high weights in the sectors “financials” and “information technology”, which are almost fully neglected by the other SRI indices. The share of blue chip stocks in the SRI indices is in most cases concentrated in only 2, 3 or 4 industrial sectors. This is a much stronger concentration than those of the investment funds.

The three FTSE4Good-indices are fully invested in blue chip stocks. This is in line with the analysis of Hamid and Sandford (2002) who find a clear concentration in stocks with a high market capitalisation. This should also be the case for the two DJSI-indices. But our estimates in table 8c exhibit a very high weight of small cap stocks. How can this contradiction be resolved? First of all, Garz, Volk and Gilles (2002) show that the DJSI Europe-index exhibits significant deviations in the country allocation from the DJ Stoxx600-index and – still more important – is characterised by a specific stock selection strategy. Thus it might be the case, that the global sectoral indices of Datastream do not fit well to the specific structures of the DJSI-indices. Another reason might be a high correlation between the small cap index and the 10 sectoral blue chip indices.²⁸

The last column of table 8c gives the results of the spanning tests. For 6 of the 10 indices the spanning hypothesis is rejected i.e. the efficient frontier constructed using

²⁸ An experiment where the blue chip index (= DJ Stoxx600) was used instead of the small cap index has given the expected corrected result: the blue chip index exhibited a weight of 100% and all sectoral indices together 0%.

the 10 factor-indices can be shifted upwards by including these SRI indices in the investment universe. But the result does not tell us if the SRI indices should have a positive or a negative weight in the optimal portfolio. The result simply means that the return-risk characteristics of the SRI indices are a valuable addition to the benchmark indices. This is probably a consequence of the special structure of the SRI indices which is only partly captured by the factor-indices. For two of the FTSE4Good-indices, the DJSI World-index and the Datastream “Environmental Control”-index spanning is not rejected and a passive portfolio formed by the 10 benchmark indices can sufficiently well mimic the return characteristics of these SRI indices.

In addition to the investment style analysis using industrial sector stock indices the tables 9a-c show the results for the regional analysis. All SRI funds and indices which diversify world-wide are investigated using 3 regional stock indices from MSCI. The regional indices are:

1. Europe (all European countries)
2. North America (Canada, United States)
3. Pacific region (Australia, Hong Kong, Japan, New Zealand, Singapur)

All three indices are value-weighted. As the regional indices concentrate on blue chip stocks in addition the world-wide small cap index (market capitalisation below 500 mn U.S. dollar) from Salomon Smith Barney is used as factor no. 4. Table 9a shows that the German and Swiss funds invest the blue chip share of their portfolio mainly in European stocks. The Fürst Fugger fund and the Ecological Portfolio of Sun both have a high investment share in the pacific region and the SAM Sustainability Pioneer fund is highly invested in the United States. The four U.S. funds with a global diversification (table 9b) invest also primarily in Europe but have also a relatively high portfolio weight in the pacific region. Only the Global Equity fund of Citizen concentrates the blue chip investments in the United States.

The picture for the four world-wide SRI indices (table 9c) is mixed. The global FTSE4Good-index and the Environmental control-index of Datastream are concentrated in U.S. blue chip stocks, whereas the other two indices have a large share of European stocks. The spanning tests (see column 7) shows that all four indices are a valuable addition to the four benchmark indices. With the exception of the NAX the spanning hypothesis was not rejected for these indices using the sectoral factor-indices (table 8c). Thus, these three indices are better explained by the industrial sector-indices than by the regional indices.

There are two major results of this section. First, the regressions confirm that most of the SRI funds and also many of the indices have a relatively high weight in small cap stocks. This is particularly true for the German and Swiss funds whereas the U.S. funds and the indices are not so strongly concentrated in small caps. Second, the SRI

funds and indices have a special structure. Most of the funds concentrate their blue chip investments in the sectors non-cyclical consumer goods and non-cyclical services. The German, Swiss and U.S. funds have a similar sectoral structure with only few exceptions: the German and Swiss funds invest more in utilities whereas the U.S. funds also prefer the sector information technologies. The fund returns can be well approximated by the sectoral benchmark indices which can be seen from the high values for the corrected R^2 . Another result is that most of the global funds invest a relatively high share of their blue chip investments in Europe.

7 Conclusions

Socially responsible investment (SRI) funds are a special market segment of the asset management industry. Although this market segment is still relatively small it is fast growing in many countries. There is also an increasing number of banks, asset management companies, investment advisors and rating agencies that are specialised in this field of business. Therefore the economic performance of these specialised investment funds is of interest to the investors and the investment companies. In our study we investigate the performance of 16 German and Swiss funds and 30 U.S. funds that concentrate on socially responsible investing.

From the point of view of financial market theory it is interesting to examine if socially screened assets have the same performance than conventional assets. As SRI investment funds use only a subset of the total investment universe they should have the same or a worse performance than conventional funds. The performance analysis of SRI investment funds tests the combined hypothesis of the quality of the fund management and the performance of the underlying assets. We thus enlarge the performance analysis by the investigation of 10 specialised SRI indices which represent the performance of socially screened assets only.

The review of the literature shows that SRI funds have, on average, a similar performance than conventional funds. The studies use different methods – from simple one-factor models to three- and four-factor models with time-varying coefficients -, investigate funds of different countries and analyse different time periods. Therefore it is relatively reliable that the performance of SRI funds is comparable to those of conventional funds. Many studies find a significant overweight of SRI funds in companies with a low market capitalisation (small cap stocks). But the results particularly of the early studies on SRI funds should be interpreted with some caution as these studies have some shortcomings regarding the performance measure. Regarding the results of earlier studies we use two benchmark indices – a blue chip stock index and a small company stock index. The performance of the funds is measured by regression approaches that consider both market timing abilities of the fund management and publicly available information (= conditional performance measure).

Those studies using a so called matching approach try to compare SRI funds and conventional funds grouped by important fund characteristics such as size, age and investment universe. Regarding the problems in the application of this approach it seems to be more appropriate to analyse the underlying assets directly. This can be done by using SRI indices which are now available for different countries and regions. Most of these indices have a sufficiently long history and are therefore applicable to test the performance of assets that are selected by SRI screening procedures. Up to now only two indices – the Domini 400 Social index (e.g. Sauer (1997), DiBartolomeo and Kurtz (1996), Statman (2000)) and the Dow Jones Sustainability index for Europe (Garz, Volk and Gilles (2002)) – have been investigated in detail. In our study we expand this examination by the analysis of eight additional SRI indices that are now available.

The results of the performance analysis show that most of the German, Swiss and U.S. SRI investment funds do not significantly under-perform their benchmarks. A difference between the funds is that U.S. are more invested in blue chip stocks whereas the German and Swiss funds are strongly tilted towards smaller companies. The results of the performance analysis for the SRI indices shows that two indices clearly under-perform their benchmarks - the Calvin-index and the Europe-wide FTSE4Good-index. The performance of the DJSI World-index is also negative (at the 10% significance level) when the data sample starts at the official start date of the index (Jan. 1999). But there are also 3 SRI indices with a positive (but insignificant) alpha. Overall, the hypothesis that the performance of SRI assets is not worse than those of conventional assets can only be rejected for a few SRI indices. The analysis also reveals that most of the SRI indices have special index structures that deviate from the conventional benchmarks.

In addition we investigated the sensitivity of the returns of SRI funds and indices on important macroeconomic factors. Many German and Swiss funds show a significant effect on unexpected changes in the OECD industrial production, the long-term U.S. interest rate and the U.S. dollar. In contrast, the factor sensitivities of the U.S. funds and the SRI indices are much less pronounced. Overall, the most influential single factor is the external value of the U.S. dollar.

The estimation of specific portfolio weights concerning industrial sectors and international regions is conducted by so called investment style-regressions. We find two major results. First, the investment style analysis confirmed that SRI funds and some of the indices have a relatively high weight in small cap stocks and that German and Swiss funds are on average stronger tilted towards small cap stocks than U.S. funds. A second important result is that SRI funds and indices have a special structure. They concentrate in most cases their blue chip investments in the two sectors “non-cyclical consumer goods” and “non-cyclical services”. There are only few differences between German and Swiss funds and their U.S. counterparts: the German and Swiss funds invest more in utilities whereas the U.S. funds also prefer

the sector “information technologies”. Another result is that most of the global funds and indices concentrate their blue chip investments in European companies.

To summarize, socially screened assets have no clear disadvantage concerning their performance compared to conventional assets. In addition the analysis reveals specific risk-return characteristics (or investment styles) so that SRI funds and indices as a group might be characterised as special investment vehicles different from conventional assets.

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Appendix

Table 1 – German and Swiss Equity Funds

Name	Abbrev.	Region	Start Date ¹	Volume (mn. €) ²	Portfolio Characteristics
Activest Lux Ecotech	Activest	World	11/90	34.2	Environment friendly products or technologies
CS Fund Global Sustainability	CS Fund	World	01/99	95.4	Ecological and social responsive investments. Negative criteria: tobacco, arms, pornography, gambling, nuclear energy.
Focus GT Umwelttechnologie	Focus	World	12/90	50.3	Environment friendly technologies.
Fürst Fugger Sustainability Fund	Fugger	World	04/00	--	Index fund, Benchmark: Dow Jones Sustainability Group World index
KD Fonds Ökoinvest	KD	World	11/94	19.4	Environment friendly products or technologies.
Ökoverision	Ökovi	World	05/98	77.6	Ecological and social criteria. Negative criteria: arms, nuclear energy, social/political/racial discrimination, animal experiments.
Oppenheim Topic DJ Sustainability World Index Equities	Oppen	World	02/00	5.3	Basis: investment universe of the Dow Jones Sustainability Group World index
Pictet Global Sector Water Fund	Pictet	World	04/00	358.1	Concentrates on the sectors “water” and “prevention of air pollution”
SAM Sustainability Index Fund	Sam1	World	04/00	39.6	Basis: investment universe of the Dow Jones Sustainability Group World index
SAM Sustainability Pioneer Fund	Sam2	World	04/00	11.2	Sustainability. Concentrates on small and mid caps
SEB Invest Ökolux	SEB	World	10/92	33.3	Ethical and ecological criteria. Negative criteria: arms, nuclear energy, bio-genetics, animal experiments, addictive drugs.
AXA World Funds II – Global Ethical Equities	AXA	World	01/97	4.6	Ecological and social criteria.
Sun Life Ecological Portfolio	Sun	World	10/91	5.0	Environment friendly products and technologies.
Swissca Green Invest	Swissca	World	12/98	--	Ecological and social criteria. Negative criteria: arms, tobacco, fossil fuels, nuclear energy, genetic technology, special chemicals, etc.
UBS Equity Fund Eco Performance	UBS	World	07/97	261.5	Ecological and social criteria. Negative criteria: arms, tobacco, nuclear energy, bio-genetics.
ValueSar Equity	SAR	World	07/99	68.2	Sustainability. Negative criteria: tobacco, arms, pornography, nuclear energy, automobiles, bio-genetics, special chemicals.

Notes: ¹ Start date in the Thomson Financial Datastream database. ² Mid-2002.

Table 2 – US Equity Funds

<i>Name</i>	<i>Abbrev.</i>	<i>Region</i>	<i>Start Date¹</i>	<i>Volume² (mn. US\$)</i>	<i>Portfolio Characteristics</i>
Amana Growth Fund	Amana1	US	08/95	17.5	Long-term capital growth consistent with Islamic principles. Negative criteria: alcohol, gambling, pornography, non-islamic banks, etc.
Amana Income Fund	Amana2	US	07/93	16.4	Like Amana Growth fund, but 80% invested in income-producing equities.
American Trust Allegiance	Americ	US	12/98	19.3	Socially responsible investments. Negative criteria: tobacco, alcohol, gambling, pharmaceutical industry.
Aquinas Growth Fund	Aquina1	US	03/94	50.0	Follows the Catholic investment guidelines. Negative criteria: arms, gender and race discrimination, abortion, contraception, pornography, tobacco, sweatshop labor, Northern Ireland, etc.
Aquinas Income Fund	Aquina2	US	03/94	36.0	Like Aquinas Growth fund, but invests primarily in income-producing equities.
Ariel Growth Fund	Ariel1	US	01/90	1132.2	Positive criteria: Environment, diversity. Negative criteria: Tobacco, arms, nuclear energy. Invests in medium-sized companies (market cap. below \$1.5 bn.).
Ariel Appreciation Fund	Ariel2	US	08/90	1384.7	Like Ariel Growth fund, but invests in medium-sized companies with market cap. between \$1 bn. and \$10 bn.
Calvert Capital Accumulation Fund	Calvert1	US	11/95	8.8	Investment according to the social criteria of Calvert. No negative impact on the environment, positive labor relations, production of healthy and useful products. Negative criteria: nuclear energy, poor labor relations, strong environmental pollution, arms, tobacco, alcohol, gambling, etc.
Calvert New Vision Small Cap Fund	Calvert2	US	02/98	108.9	Investment according to the social criteria of Calvert (see above).
Calvert World Value Inter-national Equity Fund A	Calvert3	World	11/92	129.9	Investment according to the social criteria of Calvert (see above). Investment in the U.S. < 5%
Citizens Emerging Growth Fund	Citizen1	US	06/94	167.0	Negative criteria: alcohol, tobacco, arms, nuclear energy, gambling, unnecessary animal testing, no effective management of environmental resources, no promotion of diversity and equal opportunity. Invests primarily in medium-cap. companies.
Citizens Global Equity Fund	Citizen2	World	06/00	111.0	See above. Invests in companies of all size.

<i>Name</i>	<i>Abbrev.</i>	<i>Region</i>	<i>Start Date¹</i>	<i>Volume² (mn. US\$)</i>	<i>Portfolio Characteristics</i>
Citizens Index Institutional Fund	Citizen3	US	08/97	282.8	See above. Invests primarily in large-cap. U.S. companies. New name: Citizens Core Growth Fund.
Domini Social Equity Fund	Domini	US	11/93	875.1	The funds seeks to match the performance of the Domini 400 Social index. Social and environmental criteria. Positive criteria: environment, diversity, community involvement, employee relations, etc. Negative criteria: alcohol, tobacco, arms, gambling, nuclear energy, etc.
Dreyfus Premier Third Century	Dreyfus	US	01/90	572.9	Positive criteria: environment, product safety, employee safety, equal employment opportunity. Negative criteria: tobacco.
Green Century Equity Fund	Green	US	10/97	24.5	Social and environmental criteria. Excludes companies with the worst records according to these criteria. Negative criteria: alcohol, tobacco, gambling, military weapons.
Meyers Pride Value/Citizens Value	Meyers	US	10/98	15.2	Social criteria: open workplace policy, anti-discrimination, in addition to social and environmental criteria of Citizen (see Citizens Emerging Growth Fund).
MMA Praxis Growth Fund	MMA1	US	03/94	106.6	Social criteria, Christian values. Medium and large cap companies.
MMA Praxis International	MMA2	World	07/97	17.2	Invests > 65 % in non-US countries, up to 20% in emerging markets. Negative criteria: alcohol, tobacco, gambling, abortion products, pornography, nuclear energy, military contracting.
Neuberger&Berman Social Responsibility Fund	Neu	US	05/96	71.2	Social criteria. Positive criteria: leadership in environment, diversity, workplace, community. Negative criteria: tobacco, gambling alcohol, weapons, nuclear energy.
New Alternatives Fund	New	US	02/90	34.6	Socially responsible fund emphasising the environment and alternative energy. Negative criteria: weapons, animal testing, nuclear energy.
Parnassus Fund	Parnas1	US	01/90	307.8	Contrarian investment strategy: favours undervalued stocks. Positive criteria: environment, equal employment opportunity, ethical business dealings, etc. Negative criteria: alcohol, tobacco, weapons, gambling, nuclear energy.
Paranassus Income Equity Fund	Parnas2	US	05/93	173.3	Invests > 75 % in dividend paying equities. Same criteria as Parnassus fund.

<i>Name</i>	<i>Abbrev.</i>	<i>Region</i>	<i>Start Date¹</i>	<i>Volume² (mn. US\$)</i>	<i>Portfolio Characteristics</i>
Pax World Growth Fund	Pax	US	02/98	21.7	Invests > 75 % in companies with market cap above \$200 mn. Favours industries like pollution control, health care, food housing, technology and education. Negative criteria: weapons, nuclear energy, gambling, alcohol, tobacco.
Righttime Social Awareness	Right	US	07/90	--	Social criteria.
Security Social Awareness A	Secur1	US	12/98	7.4	Social criteria: contribution to communities , employee relations, promoting women, minorities and the environment. Negative criteria: weapons, tobacco, alcohol, gambling, nuclear energy.
Security Social Awareness B	Secur2	US	12/98	6.0	Same criteria as Security Social Awareness A fund.
Smith Barney Concert Social Awareness B	Smith	US	11/98	259.2	Invests in companies with positive contribution to society.
Walden BBT International Social Index Fund	Wald1	World	10/99	42.8	Tracks MSCI/EAFE-index. Negative criteria: tobacco, alcohol, weapons, nuclear power, etc.
Walden Social Equity Fund	Wald2	US	07/99	22.7	Same social criteria as Walden BBT International Social Index Fund.

Notes: ¹ Start date in the Thomson Financial Datastream database. ² Mid-2002.

Table 3 – Equity Indices

<i>Name</i>	<i>Abbrev</i>	<i>Company</i>	<i>Region</i>	<i>Start Date¹</i>	<i>Characteristics</i>
Calvin	Calv	Calvert	US	06/00	Consist of large, US-based socially responsible companies. Positive criteria: environment, workplace issues / employee relations, good community relations. Negative criteria: weapons, tobacco, alcohol, gambling, pornography. 637 companies in Sept. 2002. This number changes over time.
FTSE4Good Europe 50	FTI	Financial Times	EU	02/99 (01/2001)	Socially responsible investments. Criteria: environmental sustainability, positive relationships with stakeholders, universal human rights. Starting universe: FTSE Developed Europe.
FTSE4Good Global 100	FT2	Financial Times	World	08/96 (01/2001)	Same criteria as FTSE4Good Europe 50. Starting universe: FTSE Developed index.
FTSE4Good US 100	FT3	Financial Times	US	08/96 (01/2001)	Same criteria as FTSE4Good Europe 50. Starting universe: FTSE Developed index for USA.
Naturaktien-index (NAX)	NAX	Öko-Invest-Verlag	World	05/97	Consists of 20 companies. Environmental, sustainability and social criteria. Negative criteria: weapons, discrimination of women, nuclear energy, tobacco, etc.
S&P 500 Environment Services	S&P	Standard & Poor's	US	01/95	Special industrial sector index for environment services in the USA.
World – DS Environmental Control	DS	Thomson Financial Datastream	World	01/90	Special industrial sector index for environmental control. World-wide coverage.
DJSI World	DJSI1	Dow Jones	World	01/94 (01/1999)	Major criterion: Sustainability. Top 10 % of sustainable companies in each of the DJGI industry groups.
DJSI Stoxx	DJSI2	Dow Jones	EU	01/1999	Major criterion: Sustainability. Top 10 % of sustainable companies in each of the DJ STOXX 600 industry groups.
Domini 400 Social Index	DSI	KLD Research & Analytics	US	05/90	Social and environmental criteria. E.g. employee relations, diversity, environment friendly products and production methods.

Notes: ¹Start date in the Thomson Financial Datastream database. Figures in brackets indicate the official launch date of the index. Those values of the index that are available in periods before the official start date have therefore been calculated backwards.

Table 4a – Mean return and Sharpe ratios: German and Swiss SRI funds

Abbrev.	Period ¹	Mean Fund ²	Mean MSCI ²	SR Fund ³	SR MSCI ³
Activest	12/90	0.53	0.71	0.028	0.064
CS Fund	02/99	-0.77	-0.55	-0.204	-0.156
Focus	01/91	0.03	0.71	-0.074	0.063
Fugger	05/00	-1.28	-2.13	-0.438	-0.438
KD	12/94	0.066	0.62	-0.043	0.062
Ökovi	06/98	-0.27	-0.35	-0.117	-0.110
Oppen	03/00	-2.07	-1.78	-0.483	-0.377
Pictet	05/00	-0.82	-2.13	-0.276	-0.438
Sam1	05/00	-2.25	-2.13	-0.544	-0.438
Sam2	05/00	-3.11	-2.13	-0.425	-0.438
SEB	11/92	-0.11	0.75	-0.089	0.084
AXA	02/97	-0.23	0.30	-0.102	0.001
Sun	11/91	0.031	0.56	-0.065	0.035
Swissca	01/99	-0.47	-0.36	-0.150	-0.120
UBS	08/97	-0.09	-0.09	-0.070	-0.069
SAR	08/99	-0.73	-1.08	-0.201	-0.253

Notes: ¹ Period begins at the indicated date and ends Sept. 02. ² Mean log return of the fund and the MSCI World index, respectively. Returns (% per month) are denominated in German mark until 12/98 and in euro from 01/99 on. ³ Sharpe ratio (= SR) of the fund and the MSCI World index, respectively. Sharpe ratios are calculated using the 1-month Fibor as risk-free interest rate.

Table 4b – Mean return and Sharpe ratios: U.S. SRI funds

Abbrev.	Period ¹	Mean Fund ²	Mean MSCI ²	SR Fund ³	SR MSCI ³
Amana1	09/95	0.55	0.20	0.026	-0.049
Amana2	08/93	0.29	0.37	-0.042	-0.008
Americ	01/99	-0.64	-0.75	-0.169	-0.243
Aquina1	04/94	-0.58	0.31	-0.173	-0.026
Aquina2	04/94	-0.00	0.31	-0.083	-0.026
Ariel1	02/90	0.28	0.34	-0.033	-0.017
Ariel2	09/90	0.60	0.40	0.050	0.000
Calvert1	12/95	-0.26	0.18	-0.112	-0.053
Calvert2	03/98	-0.12	-0.47	-0.085	-0.178
Calvert3	12/92	-0.08	0.49	-0.131	0.025
Citizen1	07/94	0.02	0.33	-0.057	-0.021
Citizen2	07/00	-3.27	-2.17	-0.779	-0.522
Citizen3	09/97	-0.44	-0.22	-0.158	-0.129
Domini	12/93	0.54	0.39	0.034	-0.004
Dreyfus	02/90	0.05	0.34	-0.085	-0.017
Green	11/97	-0.28	-0.32	-0.148	-0.148
Meyers	11/98	-0.83	-0.59	-0.187	-0.210
MMA1	04/94	0.09	0.31	-0.089	-0.026
MMA2	08/97	-0.65	-0.26	-0.221	-0.138
Neu	06/96	0.05	0.07	-0.088	-0.075
New	03/90	0.04	0.40	-0.082	-0.002

<i>Abbrev.</i>	<i>Period1</i>	<i>Mean Fund2</i>	<i>Mean MSCI2</i>	<i>SR Fund3</i>	<i>SR MSCI3</i>
Parnas1	02/90	0.18	0.34	-0.038	-0.017
Parnas2	06/93	0.42	0.40	0.005	0.000
Pax	03/98	-0.49	-0.47	-0.177	-0.177
Right	08/90	-0.35	0.60	-0.178	0.041
Secur1	01/99	-0.84	-0.75	-0.294	-0.242
Secur2	01/99	-0.93	-0.75	-0.319	-0.243
Smith	12/98	-0.53	-0.73	-0.307	-0.242
Wald1	11/99	-1.29	-1.44	-0.425	-0.385
Wald2	08/99	-0.51	-1.23	-0.243	-0.344

Notes: ¹ Period begins at the indicated date and ends Sept. 02. ² Mean log return of the fund and the MSCI World index, respectively. Returns(% per month) are denominated in US dollar. ³ Sharpe ratio (= SR) of the fund and the MSCI World index, respectively. Sharpe ratios are calculated using the 1-month US interbank offered rate as risk-free interest rate.

Table 4c – Mean return and Sharpe ratios: SRI Indices

<i>Abbrev.</i>	<i>Period1</i>	<i>Mean Index2</i>	<i>Mean MSCI2</i>	<i>SR Index3</i>	<i>SR MSCI3</i>
Calv	07/00	-2.49	-2.17	-0.453	-0.522
FT1	03/99	-0.81	-0.88	-0.210	-0.275
FT2	09/96	0.60	0.10	0.036	-0.067
FT3	09/96	0.70	0.10	0.052	-0.067
NAX	06/97	0.22	-0.17	-0.028	-0.121
S&P	02/95	-0.32	0.34	-0.066	-0.019
DS	02/90	-0.04	0.34	-0.054	-0.017
DJSI1	02/94	0.42	0.35	0.002	-0.015
DJSI2	02/99	-1.04	-0.92	-0.266	-0.287
DSI	06/90	0.82	0.46	0.089	0.013

Notes: ¹ Period begins at the indicated date and ends Sept. 02. ² Mean log return of the fund and the MSCI World index, respectively. Returns (% per month) are denominated in US dollar. ³ Sharpe ratio (= SR) of the fund and the MSCI World index, respectively. Sharpe ratios are calculated using the 1-month US interbank offered rate as risk-free interest rate.

Table 5a – Jensen's Alpha: German and Swiss SRI Funds

<i>Abbrev.</i>	<i>Start of Period</i> ¹	<i>Version 1</i>	<i>Version 2</i>	<i>Version 3</i>
Activest	01/91	0.102	-0.016	-0.011
CS Fund	02/99	0.152	-0.351	-0.507
Focus	01/91	-0.317	-0.373	-0.400
Fugger	05/00	-1.333**	-1.786**	-1.697**
KD	12/94	-0.014	-0.057	-0.189
Ökovi	06/98	0.387	0.444	0.121
Oppen	03/00	-0.656	-0.873	-1.816**
Pictet	05/00	0.867	0.516	-0.442
Sam1	05/00	-0.743	-1.357***	-2.177***
Sam2	05/00	-0.611	-1.724	-2.373
SEB	11/92	-0.244	-0.191	-0.323

<i>Abbrev.</i>	<i>Start of Period</i> ¹	<i>Version 1</i>	<i>Version 2</i>	<i>Version 3</i>
AXA	02/97	-0.070	0.283	0.127
Sun	11/91	-0.766	-0.919	-1.109*
Swissca	01/99	0.242	-0.050	-0.339
UBS	08/97	0.276	0.434	0.285
SAR	08/99	0.694	0.111	-0.619

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations based on excess returns in German mark and euro (since 01/99), respectively. ¹ End of period is Sept. 02.

Table 5b – Jensen’s Alpha: U.S. SRI Funds

<i>Abbrev.</i>	<i>Start of Period</i> ¹	<i>Version 1</i>	<i>Version 2</i>	<i>Version 3</i>
Amana1	09/95	0.176	-0.241	-0.159
Amana2	08/93	-0.308*	-0.275	-0.219
Americ	01/99	-0.044	0.105	-0.249
Aquina1	04/94	-1.054*	-0.181	-0.137
Aquina2	04/94	-0.479	-0.143	-0.072
Ariel1	02/90	-0.482	-0.370	-0.313
Ariel2	09/90	-0.281	-0.195	-0.138
Calvert1	12/95	-0.647	-0.543	-0.455
Calvert2	03/98	-0.132	-0.121	-0.136
<i>Calvert3</i>	<i>12/92</i>	<i>-0.286</i>	<i>-0.251</i>	<i>-0.312</i>
Citizen1	07/94	-0.800	-0.989	-0.939
<i>Citizen2</i>	<i>07/00</i>	<i>-2.055*</i>	<i>-1.953**</i>	<i>-2.647**</i>
Citizen3	09/97	-0.624	-0.477	-0.387
Domini	12/93	-0.174	-0.073	-0.031
Dreyfus	02/90	-0.666**	-0.656**	-0.673***
Green	11/97	-0.515	-0.369	-0.329
Meyers	11/98	-1.325	-1.221	-0.930
MMA1	04/94	-0.581*	-0.545*	-0.506*
<i>MMA2</i>	<i>08/97</i>	<i>-0.542</i>	<i>-0.360</i>	<i>-0.252</i>
Neu	06/96	-0.584*	-0.428	-0.379
New	03/90	-0.448	-0.508	-0.518*
Parnas1	02/90	-0.883*	-1.054**	-1.061**
Parnas2	06/93	-0.115	-0.052	-0.022
Pax	03/98	-0.568	-0.305	-0.403
Right	08/90	-0.971***	-1.110***	-1.01***
Secur1	01/99	-0.464	-0.403	-0.375
Secur2	01/99	-0.560	-0.504	-0.471
Smith	12/98	-0.490**	-0.393	-0.367
<i>Wald1</i>	<i>11/99</i>	<i>-0.544</i>	<i>-0.798</i>	<i>-1.595**</i>
Wald2	08/99	-0.098	0.027	0.237

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations are based on excess returns in US dollar. Rows in italics indicate that the fund invests internationally. ¹ End of period is Sept. 02.

Table 5c – Jensen’s Alpha: SRI Indices

Abbrev.	Start of Period ¹	Version 1	Version 2
Calv	07/00	-1.922*	-1.876***
FT1	03/99	-1.258* (-2.889**) ²	-1.047 (-2.165***) ²
FT2	09/96	0.318 (-0.231) ²	0.246 (-0.090) ²
FT3	09/96	0.212 (-0.168) ²	0.211 (-0.081) ²
NAX	06/97	0.363	0.353
S&P	02/95	-0.830	-0.839
DS	02/90	-0.427	-0.422
DJSI1	02/94	0.073 (-0.492) ²	0.129 (-0.784*) ²
DJSI2	02/99	-0.271	0.002
DSI	06/90	0.276	0.224

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations are based on excess returns in US dollar. ¹ End of period is Sept. 02, ² Results in brackets: This period begins at the date of the start of the index family which is 01/2001 for the FTSE4Good-indices and 01/99 for the DJSI-indices. For the months before, these indices have been calculated backwards.

Table 6a – Impact of Blue Chips, Small Caps and Timing Capabilities: German and Swiss SRI Funds (= Model Version 3)

Abbrev.	Blue Chip Index	BC Index Squared	Small Cap Index	SC Index Squared	R ²
Activest	0.298***	-0.011**	0.379***	0.005	0.586
CS Fund	0.248**	-0.004	0.445***	-0.010*	0.589
Focus	0.299***	-0.014*	0.415***	0.002	0.416
Fugger	0.140	0.044***	0.348***	-0.017	0.298
KD	0.317***	-0.021***	0.459***	0.003	0.536
Ökovi	0.162**	-0.023***	0.327***	-0.0008	0.494
Oppen	0.430***	0.004	0.286***	-0.009	0.609
Pictet	0.009	0.261*	-0.024**	-0.011	0.475
Sam1	0.292**	0.006	0.402***	-0.006	0.645
Sam2	0.188	-0.014	0.677**	0.001	0.389
SEB	0.261***	-0.022***	0.465***	-0.0023	0.527
AXA	0.284***	-0.017**	0.336***	-0.008*	0.541
Sun	0.242***	0.009	0.553***	0.008	0.402
Swissca	0.395***	0.0006	0.339***	-0.013*	0.628
UBS	0.416***	-0.016***	0.378***	-0.002	0.692
SAR	0.359***	-0.018	0.328***	0.001	0.635

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations are based on excess returns in German mark and euro (since 01/99), respectively. See also the notes of table 5a.

Table 6b – Impact of Blue Chips, Small Caps and Timing Capabilities: U.S. SRI Funds
(= Model Version 3)

<i>Abbrev.</i>	<i>Blue Chip Index</i>	<i>BC Index Squared</i>	<i>Small Cap Index</i>	<i>SC Index Squared</i>	<i>R²</i>
Amana1	0.575***	-0.007	0.361***	0.009***	0.574
Amana2	0.341***	0.006	0.118***	-0.003	0.481
Americ	0.662***	-0.002	0.300***	-0.008**	0.535
Aquina1	0.225*	0.014	0.313**	-0.036*	0.436
Aquina2	0.635***	-0.005	-0.077	-0.011*	0.324
Ariel1	0.517***	0.011	0.026	-0.006	0.296
Ariel2	0.511***	0.016*	0.065	-0.004	0.395
Calvert1	0.715***	-0.004	0.165*	-0.005	0.471
Calvert2	0.558***	0.009	0.311***	-0.002	0.441
<i>Calvert3</i>	<i>0.289***</i>	<i>-0.015</i>	<i>0.326***</i>	<i>-0.002</i>	<i>0.450</i>
Citizen1	0.761***	0.007	0.324***	0.0016	0.415
<i>Citizen2</i>	<i>0.396**</i>	<i>0.019</i>	<i>0.186</i>	<i>-0.029</i>	<i>0.364</i>
Citizen3	0.792***	0.008	0.133**	-0.004	0.676
Domini	0.683***	0.006	0.094**	-0.005*	0.746
Dreyfus	0.676***	0.000	0.159***	-0.001	0.604
Green	0.725***	0.010**	0.099*	-0.004	0.731
Meyers	0.762***	0.030***	0.254***	-0.005	0.452
MMA1	0.529***	0.005	0.109**	-0.003	0.568
<i>MMA2</i>	<i>0.267***</i>	<i>-0.014</i>	<i>0.387***</i>	<i>-0.000</i>	<i>0.417</i>
Neu	0.578***	0.009	0.095**	-0.005	0.630
New	0.364***	-0.009	0.334***	0.000	0.397
Parnas1	0.747***	0.010	0.317***	0.007	0.453
Parnas2	0.431***	0.000	0.034	-0.003	0.407
Pax	0.630***	0.011	0.217**	-0.007*	0.640
Right	0.524***	-0.009	-0.068	0.008	0.224
Secur1	0.610***	-0.003	0.126**	-0.003	0.642
Secur2	0.606***	-0.003	0.124**	-0.003	0.640
Smith	0.502***	0.003	0.083**	-0.003	0.752
<i>Wald1</i>	<i>0.228***</i>	<i>0.001</i>	<i>0.337***</i>	<i>-0.007</i>	<i>0.505</i>
Wald2	0.652***	0.015	0.087	-0.004	0.603

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations are based on excess returns in U.S. dollar. Rows in italics indicate that the fund invests internationally. See also the notes of table 5b.

Table 6c – Impact of Blue Chips and Small Caps: SRI Indices
(= Model Version 2)

Abbrev.	Blue Chip Index	Small Cap Index	R ²
Calv	0.007	0.554***	0.467
FT1	-0.377***	0.827***	0.341
FT2	1.022***	-0.277***	0.606
FT3	0.917***	0.055	0.738
NAX	0.482***	0.330**	0.391
S&P	0.101	0.210	0.001
DS	0.437***	-0.088	0.030
DJSI1	0.425***	0.474***	0.549
DJSI2	1.447***	-0.631***	0.503
DSI	0.158*	0.292***	0.193

Notes: Significance levels: *** = 1%, ** = 5%, * = 10%, Newey-West corrected standard errors. All calculations are based on excess returns in US dollar. See also the notes of table 5c.

Table 7a – Factor Sensitivities: German and Swiss SRI Funds

Abbrev.	Unexpected Factor
Activest	+4***
CS Fund	--
Focus	+4**
Fugger	+2**, +6***, +7**
KD	--
Ökovi	+6**
Oppen	+6**
Pictet	+2**, +4***, +6***
Sam1	+2**, +3***
Sam2	+2***+3***
SEB	+2**
AXA	+2**, +4**, +6***
Sun	--
Swissca	+6***, +7**
UBS	+1**, +4**, +6***
SAR	+1**, +5**, +6***

Notes: Significance levels: *** = 1%, ** = 5%, Newey-West corrected standard errors. All calculations are based on excess returns in German mark and euro (since 01/99), respectively. Example: +4*** e.g. means that factor no. 4 is significantly positive at the 1% level.

Table 7b – Factor Sensitivities: U.S. SRI Funds

Abbrev.	Unexpected Factor
Amana1	--
Amana2	+7**
Americ	+7**
Aquina1	--
Aquina2	--
Ariel1	+4**
Ariel2	+4***, -8**, -11**

<i>Abbrev.</i>	<i>Unexpected Factor</i>
Calvert1	+4**
Calvert2	+11**
Calvert3	--
Citizen1	+1**
Citizen2	--
Citizen3	--
Domini	--
Dreyfus	--
Green	-8**
Meyers	+3**
MMA1	--
MMA2	--
Neu	+7**
New	+11**
Parnas1	+2**
Parnas2	--
Pax	--
Right	-5**
Secur1	--
Secur2	--
Smith	--
Wald1	-4***, +6***, +7**
Wald2	--

Notes: Significance levels: *** = 1%, ** = 5%, Newey-West corrected standard errors. All calculations are based on excess returns in U.S. dollar. Example: +7**e.g. means that factor no. 7 is significantly positive at the 5% level.

Table 7c – Factor Sensitivities: SRI Indices

<i>Abbrev.</i>	<i>Unexpected Factor</i>
Calv	-1***
FT1	+9**
FT2	+2**, +3**, +4**, +7**
FT3	--
NAX	-4***
S&P	-7***
DS	+4**
DJSI1	+1**, -3***, -5***, -11**
DJSI2	+1***
DSI	-5**

Notes: Significance levels: *** = 1%, ** = 5%, Newey-West corrected standard errors. All calculations are based on excess returns in U.S. dollar. Example: -1*** e.g. means that factor no. 1 is significantly negative at the 1% level.

Table 8a – Investment Style - Sectors: German and Swiss SRI Funds

Abbrev.	We1	We2	We3	We4	We5	We6	We7	We8	We9	We10	SC	R ²
Activest	0	0	0	0	0.0701	0.1462	0.1801	0	0.2033	0	0.4003	0.780
CS Fund	0	0	0	0	0.0587	0.2264	0.1641	0.0542	0	0	0.4965	0.721
Focus	0	0	0	0	0.1241	0	0.1035	0	0.3585	0	0.4140	0.556
Fugger	0.1402	0	0	0	0	0.1287	0.3146	0	0.0528	0	0.3637	0.484
KD	0	0	0	0	0.0845	0.0980	0.3104	0	0.0605	0	0.4466	0.743
Ökovi	0	0	0	0	0	0.0262	0.1482	0	0.3349	0.1880	0.3027	0.731
Oppen	0	0	0	0	0.0422	0.2507	0.2885	0	0	0	0.4186	0.782
Pictet	0.1210	0.0190	0	0	0	0.3642	0.0771	0	0.0641	0	0.3547	0.706
Sam1	0	0	0	0	0.0205	0.2564	0.2326	0	0	0	0.4905	0.875
Sam2	0	0	0	0	0.2606	0	0.0944	0	0.1138	0	0.5311	0.787
SEB	0	0	0	0	0.0835	0.0963	0.2749	0.1026	0	0	0.4426	0.744
AXA	0	0	0	0	0.0358	0	0.1451	0	0.2318	0.2096	0.3777	0.724
Sun	0.1876	0	0	0	0.0358	0.0317	0.1639	0.1275	0		0.4535	0.587
Swissca	0	0	0	0	0.0152	0.2357	0.3165	0	0.0561		0.3706	0.836
UBS	0	0	0	0.0524	0.0504	0.1673	0.2568	0	0.0276	0.0118	0.4337	0.864
SAR	0	0	0	0	0.0390	0.1816	0.2286	0	0.1596		0.3912	0.836

Notes: Columns 2 to 11 show the weightings of the 10 sectoral blue-chip indices in the factor-mimicking portfolio. Factor no. 11 is a small cap index (SC). All returns are calculated in German mark and euro (since 01/99), respectively.

Table 8b – Investment Style - Sectors: US SRI Funds

Abbrev.	US1	US2	US3	US4	US5	US6	US7	US8	US9	US10	SC	R ²
Amana1	0	0	0	0	0.1896	0.2133	0.1518	0	0	0	0.4385	0.583
Amana2	0.051	0.0268	0	0	0	0.2870	0.1714	0.0234	0.1265	0	0.2698	0.420
Americ	0	0	0	0	0.1760	0.2887	0.1213	0	0	0	0.4140	0.569
Aquina1	0	0	0	0.1966	0.0432	0.0117	0.0766	0.1204	0.0570	0	0.4946	0.310
Aquina2	0.0439	0	0	0.1695	0.0177	0.4608	0	0.1584	0	0	0.1496	0.263
Ariel1	0	0.0894	0.0576	0.1829	0.0022	0.3456	0	0	0.0845	0.1018	0.1359	0.341
Ariel2	0.0238	0.0998	0.1568	0.1493	0	0.3569	0	0	0.0287	0	0.1830	0.435
Calvert1	0	0.0872	0	0.1064	0.2028	0.2742	0.0168	0	0	0	0.3041	0.467
Calvert2	0.0224	0	0.0502	0	0.1249	0.2534	0.0866	0.0489	0	0.0658	0.3479	0.567
Calvert3	0	0.0507	0	0.0154	0.0266	0.2367	0.2187	0.0374	0	0	0.4144	0.677
Citizen1	0	0	0	0	0.2984	0.2592	0	0	0	0	0.4424	0.418
Citizen2	0	0	0	0	0.0591	0.2008	0.2699	0	0	0	0.4702	0.682
Citizen3	0	0	0	0	0.1545	0.4411	0.1430	0	0	0	0.2614	0.584
Domini	0	0	0	0.0404	0.1120	0.4038	0.1653	0	0	0	0.2784	0.577
Dreyfus	0	0	0.0108	0.1038	0.1455	0.2946	0.0791	0	0.0552	0	0.3109	0.408
Green	0	0	0	0	0.1224	0.4717	0.1554	0	0	0	0.2505	0.635
Meyers	0.0112	0.0497	0	0.2488	0.0458	0.1423	0.1172	0	0	0.0531	0.3318	0.515
MMA1	0.1101	0.0274	0	0.0235	0.0195	0.3567	0.0982	0.0600	0	0	0.3044	0.388
MMA2	0	0	0	0	0.0239	0.1758	0.3511	0	0	0	0.4493	0.711
Neu	0.1131	0.0995	0	0	0	0.4088	0.0827	0	0	0	0.2920	0.518
New	0	0	0	0	0.1213	0.0906	0.0545	0.0492	0.2325	0.0766	0.3751	0.404
Parnas1	0.0844	0.0818	0	0.0249	0.2478	0.1354	0.0441	0	0	0	0.3816	0.406
Parnas2	0.0665	0.0561	0	0.0260	0.0748	0.3594	0.1162	0	0.0887	0	0.2122	0.328
Pax	0	0	0	0.0128	0.1001	0.3434	0.1679	0	0.242	0	0.3516	0.568
Right	0.0930	0	0	0.0492	0.1264	0.4494	0.0178	0	0.2154	0	0.0488	0.101

<i>Abbrev.</i>	<i>US1</i>	<i>US2</i>	<i>US3</i>	<i>US4</i>	<i>US5</i>	<i>US6</i>	<i>US7</i>	<i>US8</i>	<i>US9</i>	<i>US10</i>	<i>SC</i>	<i>R²</i>
Secur1	0	0	0	0.0360	0.0869	0.3905	0.1955	0	0	0	0.2911	0.549
Secur2	0	0	0	0.0440	0.0841	0.3913	0.1925	0	0	0	0.2881	0.550
Smith	0.0297	0	0	0.0839	0.0365	0.3991	0.1805	0	0	0	0.2705	0.626
<i>Wald1</i>	0	0	0	0	0	0.2215	0.2750	0	0.0986	0	0.4049	0.698
Wald2	0.0698	0	0	0.0569	0.0262	0.3853	0.1824	0	0	0	0.2793	0.510

Notes: Columns 2 to 11 show the weightings of the 10 sectoral indices in the factor-mimicking portfolio. Factor no. 11 is a small cap-index (SC). The 4 rows in italics indicate funds with world-wide diversification, all other funds invest only in the United States. All returns are calculated in US dollar.

Table 8c – Investment Style - Sectors: SRI Indices

<i>Abbrev.</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>S5</i>	<i>S6</i>	<i>S7</i>	<i>S8</i>	<i>S9</i>	<i>S10</i>	<i>SC</i>	<i>R²</i>	<i>Span.</i>
Calv	0	0	0	0.1115	0	0.2813	0	0	0	0	0.6073	0.464	Rej. ***
<i>FT1</i>	0	0	0	0.3505	0.1496	0.2162	0.0835	0.2002	0	0	0	0.953	Rej. **
<i>FT2</i>	0	0.1161	0	0.2407	0.1914	0.2388	0.2130	0	0	0	0	0.950	Not rej.
FT3	0.0306	0.0848	0.1028	0.0976	0.2473	0.2821	0.1487	0	0	0	0	0.930	Not rej.
<i>NAX</i>	0	0	0	0	0	0	0.0559	0.0444	0.1714	0	0.7284	0.332	Rej. *
S&P	0.2303	0.1156	0	0	0	0.3120	0	0	0	0	0.3420	0.023	Rej. **
<i>DS</i>	0.2455	0	0.1432	0	0	0.4771	0	0.1195	0	0	0.0148	0.163	Not rej.
<i>DJSII</i>	0	0	0	0	0	0.1370	0.0572	0	0.0536	0	0.7521	0.493	Not rej.
<i>DJSI2</i>	0	0	0	0	0	0.1309	0	0	0.1436	0	0.7255	0.385	Rej. ***
DSI	0	0	0	0	0	0.1718	0.1377	0	0.2485	0	0.4419	0.135	Rej. ***

Notes: Columns 2 to 11 show the weightings of the 10 sectoral indices in the factor-mimicking portfolio. Factor no. 11 is a small cap-index (SC). The 4 rows in italics indicate indices with a world-wide diversification, the 2 rows with underlined figures those which concentrate on European stocks. The other 4 rows are U.S. indices. The last column “Span.” indicates if the spanning test is rejected at the significance levels: *** = 1%, ** = 5%, * = 10%. All returns are calculated in U.S. dollar.

Table 9a – Investment Style - Regions: German and Swiss SRI Funds

Abbrev.	R1	R2	R3	SC	R ²
Activest	0.2737	0.2189	0.0735	0.4340	0.737
CS Fund	0.5529	0	0.0685	0.3787	0.756
Focus	0.3522	0.1957	0.0042	0.4479	0.517
Fugger	0.3307	0	0.3699	0.2994	0.445
KD	0.455	0.1377	0.0015	0.4053	0.685
Ökovi	0.5504	0	0.1127	0.3369	0.667
Oppen	0.6253	0.0963	0.0441	0.2343	0.892
Pictet	0.6194	0.0537	0.0653	0.2616	0.556
Sam1	0.5195	0.0906	0.0863	0.3036	0.885
Sam2	0	0.4939	0.0490	0.4571	0.628
SEB	0.3411	0.2480	0.0191	0.3918	0.705
AXA	0.5585	0.0614	0.0032	0.3741	0.717
Sun	0.0439	0.1414	0.3145	0.5000	0.549
Swissca	0.5800	0.1654	0.0129	0.2420	0.893
UBS	0.3870	0.222	0.0363	0.3552	0.885
SAR	0.4258	0.1160	0.1064	0.3016	0.854

Notes: Columns 2 to 4 show the weightings of the 3 regional indices in the factor-mimicking portfolio. Factor no. 4 is a small cap-index (SC). All returns are calculated in German mark and euro (since 01/99), respectively.

Table 9b – Investment Style - Regions: US SRI Funds (world-wide diversification)

Abbrev.	R1	R2	R3	SC	R ²
Calvert3	0.4072	0.2089	0.1729	0.2110	0.510
Citizen2	0.2739	0.5908	0.1282	0.0071	0.731
MMA2	0.5878	0	0.1926	0.2196	0.538
Wald1	0.7153	0	0.1979	0.0868	0.689

Notes: Columns 2 to 4 show the weightings of the 3 regional indices in the factor-mimicking portfolio. Factor no. 4 is a small cap-index (SC). All Returns are calculated in U.S. dollar.

Table 9c – Investment Style - Regions: Indices (world-wide diversification)

Abbrev.	R1	R2	R3	SC	R ²	Span.
FT2	0.2103	0.6030	0.1867	0	0.655	Rej. *
NAX	0.2440	0	0	0.7560	0.337	Rej. ***
DS	0.2328	0.6774	0	0.0898	0.1006	Rej. *
DJSII	0.2502	0.0178	0	0.7320	0.515	Rej. ***

Notes: Columns 2 to 4 show the weightings of the 3 regional indices in the factor-mimicking portfolio. Factor no. 4 is a small cap-index (SC). The last column “Span.” indicates if the spanning test is rejected at the significance levels: *** = 1%, ** = 5%, * = 10% . All returns are calculated in U.S. dollar.