

“Responsible investment in Germany, Austria and Switzerland”

AUTHORS	Sebastian Lobe Christian Walkshausl
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Sebastian Lobe (Germany), Christian Walkshäusl (Germany)

Responsible investment in Germany, Austria, and Switzerland

Abstract

Sustainable and Responsible Investments (SRI) are booming in the US and Europe. In German-speaking countries, Switzerland is a leading force for SRI with an overall 2010 market volume of about US\$45 billion, Germany's SRI market covers middle ground with US\$21 billion, while Austria's is relatively small with US\$3 billion. In this paper, we give a timely review on German-speaking countries' attributes, responsible investment, and its legislation, whilst analyzing the financial performance and characteristics of socially responsible investments in the respective country's stock markets. We focus on passive equity investments to obtain a most undistorted view on the performance and style of SRI strategies.

The paper investigates two socially responsible investment strategies which are present in German-speaking countries: SRI in general and green investing in particular. First, both strategies do not have a performance which is different from conventional benchmarks controlling for well known characteristics. This inference is robust to five alternative asset pricing models using unconditional and conditional calendar-time factor regressions. Second, both socially responsible investment strategies have a higher systematic risk than their benchmark. Third, characteristics even beyond a size tilt are important in explaining responsible investment indices' performance attribution like a momentum or an investment anomaly (both with negative coefficients).

Keywords: socially responsible investments, performance evaluation, German-speaking countries.

JEL Classification: G11, G15, M14.

Introduction

Sustainable and Responsible Investments (SRI) in German-speaking countries show a diverse picture. With Switzerland as a leading force for SRI with an overall 2010 market volume of about US\$45 billion, Germany's SRI market covers middle ground with US\$21 billion, while Austria's market is relatively small with US\$3 billion (Panel 2 of Table 1). In this paper, we aim to give a timely review on the financial performance and characteristics of socially responsible investments in the respective country's stock markets as far as the data permit us to do so. We focus on passive equity investments, i.e., indices. This has the methodological advantage over an active investment style, as for example carried out by mutual funds, that no filtering of transaction costs, management skills or timing activities of fund managers is necessary. We therefore obtain a most undistorted view on the performance and style of SRI strategies.

Whenever possible, index data are retrieved from Thomson Financial Datastream, otherwise we obtain data from the respective index provider. For the construction of the various asset pricing models, we use return data from Thomson Financial Datastream and accounting data from Worldscope.

First, we look at the performance of socially responsible investments in general. Second, we

specifically investigate green investing (or eco investing). Panels 1 and 2 of Table 1 suggest that the environmental movement plays a pivotal role to German SRI, even though this matter is not exclusive to Germany. The following Table 1 delivers a concise synopsis on (1) country characteristics: population, life expectancy, literacy rates, school life expectancy, religious groups, government type, legal system, GDP/capita, main industries, unemployment rate, public debt/GDP, market value of publicly traded shares, Internet users/population, and special cultural aspects, (2) responsible investments (RI): volume of overall RI market, overall RI market growth rate, institutional and retail RI market, asset classes used in RI, overall financial market size, launch year of first RI investment fund and national RI organization, three largest RI asset owners and investment managers, important RI professional service partners and other relevant RI organizations, currently debated environmental, social and corporate governance (ESG) issues, and the number of Principles for Responsible Investment (PRI):

- ◆ signatories;
- ◆ asset owner signatories;
- ◆ investment managers;
- ◆ professional service provider partners; and

(3) legislation on corporations and ESG issues with Panel 4 referencing the sources to construct Table 1.

Table 1. Overview on country characteristics, responsible investment, and its legislation for Germany, Austria and Switzerland

	Germany	Austria	Switzerland
Panel 1: Country overview			
Population (July 2012 est.)	81,305,856	8,219,743	7,655,628
Life expectancy (2012 est.)	Total population: 80.19 years Male: 77.93 years Female: 82.58 years Country comparison to the world: 28	Total population: 79.91 years Male: 77 years Female: 82.97 years Country comparison to the world: 33	Total population: 81.17 years Male: 78.34 years Female: 84.16 years Country comparison to the world: 17
Literacy rates (2003 est.)	Total population: 99% Male: 99% Female: 99%	Total population: 98% Male: NA Female: NA	Total population: 99% Male: 99% Female: 99%
School life expectancy	Total: 16 years Male: 16 years Female: 16 years (2006)	Total: 15 years Male: 15 years Female: 15 years (2008)	Total: 16 years Male: 16 years Female: 15 years (2008)
Religious groups	Protestant: 34% Roman Catholic: 34% Muslim: 3.7% Unaffiliated or other: 28.3%	Roman Catholic: 73.6% Protestant: 4.7% Muslim: 4.2% Other: 3.5% Unspecified: 2% None: 12% (2001 census)	Roman Catholic: 41.8% Protestant: 35.3% Muslim: 4.3% Orthodox: 1.8% Other Christian: 0.4% Other: 1% Unspecified: 4.3% None: 11.1% (2000 census)
Government type	Federal republic	Federal republic	Formally a confederation but similar in structure to a federal republic
Legal system	Civil law system	Civil law system; judicial review of legislative acts by the Constitutional Court	Civil law system; judicial review of legislative acts, except for federal decrees of a general obligatory character
GDP/capita (PPP) (2011 est.)	\$37,900 Country comparison to the world: 28	\$41,700 Country comparison to the world: 17	\$43,400 Country comparison to the world: 14
Main industries	Among the world's largest and most technologically advanced producers of iron, steel, coal, cement, chemicals, machinery, vehicles, machine tools, electronics, food and beverages, shipbuilding, textiles	Construction, machinery, vehicles and parts, food, metals, chemicals, lumber and wood processing, paper and paperboard, communications equipment, tourism	Machinery, chemicals, watches, textiles, precision instruments, tourism, banking, and insurance
Unemployment rate (2011 est.)*	6% Country comparison to the world: 60	5.4% Country comparison to the world: 53	3.1% Country comparison to the world: 26
Public debt/GDP (2011 est.)	81.5% of GDP Country comparison to the world: 20	72.1% of GDP Country comparison to the world: 29	52.4% of GDP Country comparison to the world: 48
Market value of publicly traded shares (December 31, 2010)	\$1,430 billion Country comparison to the world: 9	\$118 billion Country comparison to the world: 39	\$1,230 billion Country comparison to the world: 15
Internet users/ population (2010)	82.45%	72.78%	82.17%
Special cultural aspects	◆ strong green party ◆ environmental movement ◆ climate change ◆ animal welfare	◆ strong green party ◆ nuclear phase-out ◆ development of renewable energy ◆ climate protection ◆ sustainable policy	◆ renewable energy ◆ sustainable technology ◆ strong green party ◆ political neutrality ◆ tradition ◆ banking discretion
Panel 2: Responsible investment overview			
Overall RI market (in US\$)(2010)	\$21.08 billion	\$3.22 billion	\$44.54 billion
Overall RI market growth rate (3-year arithmetic average) (2008-2010)	17%	45%	22%
Institutional RI market (in US\$)(2010)	\$16.23 billion (77% of overall RI Market)	\$2.38 billion (74% of overall RI Market)	\$19.15 billion (43% of overall RI Market)
Retail RI market (in US\$) (2010)	\$4.85 billion (23% of overall RI Market)	\$0.84 billion (26% of overall RI Market)	\$25.39 billion (57% of overall RI Market)
# of PRI signatories	25	3	52
# of PRI asset owner signatories	6	1	6

Table 1 (cont.). Overview on country characteristics, responsible investment, and its legislation for Germany, Austria and Switzerland

	Germany	Austria	Switzerland
# of PRI investment managers	11	2	35
# of PRI professional service provider partners	8	0	11
Asset classes used in RI (2010)	Bonds (65.3%) Equity (27.8%) Money market (4.1%) Others (2.3%) Real estate (0.4%) Hedge funds (0.1%)	Bonds (70.0%) Equity (27.2%) Others (1.3%) Money market (1.2%) Real estate (0.2%)	Equity (63.3%) Bonds (20.5%) Not assignable (13.8%) Money market (1.2%) Direct investments (0.7%) Real estate (0.4%) Hedge funds (0.1%)
Overall financial market size (in US\$)	\$30,996 billion 2010	\$3,272 billion 2010	\$9,144 billion 2009
Launch year of first RI investment fund	1989	1988	1990
Launch year of national RI organization	2001	2001	2001
Three largest RI asset owners (as measured by total balance sheet assets)	Allianz SE KfW Bankengruppe Landesbank Baden-Württemberg	VBV-Vorsorgekasse AG	Pensionskasse Stadt Zürich Swiss Reinsurance Company Zürcher Kantonalbank
Largest 3 RI investment managers (as measured by total assets under management)	BayernInvest Kapitalanlagegesellschaft mbH Deutsche Asset Management (DB Advisors) Union Asset Management Holding AG	Absolute Portfolio Management GmbH Erste-Sparinvest KAG	Bank Sarasin & Co. Ltd Lombard Odier Darier Hentsch & Cie Pictet Asset Management
Important RI professional service partners	Imug Beratungsgesellschaft mbH Oekomresearch AG SD-M Sustainable Development Management	-	Care Group AG INrate AG On Values Ltd.
Other relevant RI organizations	Forum Nachhaltige Geldanlagen (FNG) European Sustainable Investment Forum (Eurosif) Sustainable Business Institute (SBI) Nachhaltiges Investment.org	Forum Nachhaltige Geldanlagen (FNG) European Sustainable Investment Forum (Eurosif) Sustainable Business Institute (SBI) Nachhaltiges Investment.org Gruenesgeld.at	Forum Nachhaltige Geldanlagen (FNG) European Sustainable Investment Forum (Eurosif) Sustainable Business Institute (SBI) Nachhaltiges Investment.org
Currently debated ESG issues	- Resource conservation - Impact of climate change - Development of renewable energy - Exit from the nuclear industry - Temporary employment, '1-euro-jobs' - Pension with 67 - Poverty among the elderly - Health-care reform - Skills shortage - Suspension of military service - Gender disparity in executive positions - Executive board compensation	- Anti-nuclear policy - Reforestation and expansion of adequate cultivation of land - Introduction of so-called eco-taxes - Impact of climate change - Skills shortage - Equal opportunities for people with and without disabilities - Demographic change	- Impact of climate change - Wood and forest conservation - Vehicle fuels (solar power, hydrogen) - Recycling (sustainable material management) - Integration of immigrants - Skills shortage - Pay disparity - Corruption - Whistle-blowing
Panel 3: Responsible investment legislation			
Legislation on corporations and ESG issues	German Corporate Governance Code (DCGK) German Sustainability Code (DNK)	Austrian Code of Corporate Governance ÖVFA Ethic Code	Swiss Code of Best Practice Corporate Governance Directive (DCG)
Panel 4: Sources employed in Panels 1-3			
	Central Intelligence Agency (2012) Deutsche Bundesbank (2011) Deutsche Bundesbank (2012) Forum Nachhaltige Geldanlagen e.V. (2011) Möhrle (2002) Principles for Responsible Investment (2012) Rat für Nachhaltige Entwicklung (2012) Regierungskommission (2012) World Bank (2012)	Central Intelligence Agency (2012) Deutsche Bundesbank (2012) Forum Nachhaltige Geldanlagen e.V. (2011) ÖGUT - Österreichische Gesellschaft für Umwelt und Technik (2012) Österreichische Nationalbank (2011) Österreichische Vereinigung für Finanzanalyse und Asset Management (2012) Österreichischer Arbeitskreis für Corporate Governance (2012) Principles for Responsible Investment (2012) World Bank (2012)	Central Intelligence Agency (2012) Credit Suisse (2009) Deutsche Bundesbank (2012) Economiesuisse - Verband der Schweizer Unternehmen (2007) Forum Nachhaltige Geldanlagen e.V. (2011) Möhrle (2002) Principles for Responsible Investment (2012) Schweizerische Nationalbank (2011) SIX Exchange Regulation (2008) World Bank (2012)

Note: * This is the International Labor Organization's estimated rate for international comparisons.

The rest of the paper is organized as follows. Section 1 analyzes socially responsible investments. Section 2 studies the performance of green investments. The final section concludes.

1. Socially responsible investing

The SRI market segment has reached a noteworthy volume in Switzerland and Germany, thus making it worthwhile to establish indices which track the performance of an SRI strategy in these domestic markets. The DAXglobal® Sarasin Sustainability Indices are equal-weighted (EW). Stocks are selected according to negative and positive screening criteria. Negative criteria employed for these indices filter out vice industries belonging to

the ‘Sextet of Sin’ (Lobe and Walkshäusl, 2014) such as adult entertainment, nuclear power, tobacco, and weapons. Positive criteria at the industry and corporate levels define which stocks receive the highest SRI rating and are thus applicable for the index. At the time of both indices’ launch in mid-October 2007, 34 stocks made up the German index and 27 the Swiss index. By now, the German index has 42 constituents, and the Swiss 28. As we require a full month of data, the sample period ranges from November 2007 to November 2011 spanning 49 monthly observations of real index data. We analyze total returns (i.e., dividends are included). To facilitate comparisons, all returns are denominated in euros. Table 2 displays summary statistics.

Table 2. Summary statistics

Index	Calculation	Start date	Obs	Mean	Std	Min	Max	Corr
DAXglobal Sustainability Switzerland	Performance	11/2007	49	0.13	6.33	-12.25	20.90	0.86
BM: SMI				0.04	4.56	-10.03	10.29	
DAXglobal Sustainability Germany	Performance	11/2007	49	-0.53	8.03	-22.52	24.66	0.90
BM: DAX				-0.31	7.01	-19.19	16.76	

Notes: This table presents summary statistics calculated from monthly returns denominated in euros. The table includes the index calculation methodology, the start date of the index time series, the number of monthly observations, the mean, standard deviation, minimum, and maximum of monthly returns for the responsible indices and the official benchmarks (BM) along with the correlation measure between the two indices. The sample period for each responsible index and the corresponding benchmark starts as indicated and ends in November 2011.

We use the total return version of the Swiss market index (SMI) as a benchmark. The SMI is float-weighted (FW), i.e., it is value-weighted with a free float adjustment, and consists of the 20 largest stocks. Inspecting raw returns, the Swiss SRI index seems to do better than its benchmark. However, the standard deviation is also higher. The German SRI index does worse with respect to risk and return characteristics than its benchmark DAX which is a float-weighted index based on total returns made up of the 30 largest stocks. The Pearson correlation coefficient is highly positive in both domestic markets. This says two things: (1) The SRI index and its benchmark move tightly together; (2) The diversification potential of adding the market portfolio to an SRI portfolio is very limited from the perspective of an SRI investor, and vice versa.

To gain a more profound and robust understanding of the financial performance of SRI and the drivers thereof, we employ five capital asset pricing models. The most important is the market model based on the seminal Capital Asset Pricing Model (CAPM) by Treynor (1961, 1962), Sharpe (1964), Lintner (1965), and Mossin (1966). Since empirical tests have shown time and again that several other factors explain returns beyond the CAPM, we also test a size-adjusted version (CAPMS). Fama and French (1993) extend the CAPM further to a multi-factor model (FF) with

mimicking portfolios for the size (SMB) and value (HML) anomaly as explanatory variables¹. Carhart (1997) adds a mimicking portfolio for the momentum (WML) anomaly to their three-factor model (FFC). Chen, Novy-Marx, and Zhang (2010) suggest an alternative three-factor model (CNZ) with an investment (DMI) and profitability (PMU) factor beside the market factor². Table 3 documents the premia. During the sample period, the strongest anomalies with respect to economic and statistical significance are investment and value in German-speaking markets.

We employ calendar-time factor regressions based on these five models to ensure that inferences are not the result of a specific model and to analyze investment styles. The dependent variable is the abnormal return (SRI monthly index return minus the risk-free rate of return which is the one-month EURIBOR). Independent variables vary by model. For example, the CAPM postulates that one factor, the market risk premium (domestic market index return minus the risk-free rate of return) is a sufficient statistic to explain stock or portfolio returns. Table 4 shows unconditional regression estimates in conjunction with spanning tests.

¹ Inferences on the performance do not change considerably throughout this paper when using the enterprise multiple as in Walkshäusl and Lobe (2013) instead of book-to-market (HML) when forming the value premium.

² Details on the construction of the premia and their relevance in an international context are in Walkshäusl and Lobe (2014).

Table 3. Factor premia

	SMB	HML	WML	DMI	PMU
Switzerland, 11/2007 to 11/2011					
Mean	-0.36	0.63	1.00	1.07	0.17
<i>t</i> (Mean)	-0.83	1.50	1.23	2.83	0.46
Germany, 11/2007 to 11/2011					
Mean	-0.33	1.07	1.27	1.12	0.07
<i>t</i> (Mean)	-0.60	3.13	1.49	3.36	0.18

Note: This table presents average monthly premia on the size (SMB), value (HML), momentum (WML), investment (DMI), and profitability (PMU) factors along with *t*-statistics for average monthly premia over the considered time period. The construction of the zero-investment, factor-mimicking portfolios follows Fama and French (1993), Carhart (1997), and Chen, Novy-Marx, and Zhang (2010). The explanatory factors are created from a two-by-three sort on market equity and the second variable of interest using book-to-market equity, prior twelve-month return, investment-to-assets, and earnings-to-assets. SMB, small minus big, mimics the common pattern in returns related to size. HML, high minus low, mimics the return behavior associated with book-to-market equity. WML, winner minus loser, mimics the return pattern related to short-term past returns. DMI, disinvest minus invest, mimics the return behavior associated with firm investment. PMU, profitable minus unprofitable, mimics the return pattern associated with profitability.

The intercept (*a*), commonly labeled as Jensen's (1968) alpha, is in all regressions the measure of out- or underperformance relative to its benchmarks (see Tables 2 and 3). A main result is that both indices do not exhibit any statistically significant under- or outperformance. The other coefficients indicate the investment style. Beta, the market sensitivity factor (*b*) is in almost all specifications above one. This implies that these SRI portfolios take on more systematic risk than their benchmarks. Size (*s*) is a salient feature of these indices which is to be expected because they are equally weighted giving relatively more exposure to smaller firms. Finally, negative momentum (*w*) which could be interpreted as counter cyclicity plays an important role in explaining SRI portfolio behavior.

The spanning test for the CAPM tests the joint hypothesis that the alpha estimate is zero and the market beta equals one. For the multi-factor models, we test the joint null that alpha is zero, beta is one, and the other factor coefficients are zero, as one would expect from a market portfolio. Whilst the null cannot be rejected for the CAPM of both indices which indicates that the local SRI index does not behave differently relative to a local market index, this is not the case for almost all other multi-factor specifications. In short, incorporating styles in the analysis implies that SRI indices are different from their market benchmarks with respect to economic and statistical significance. Hence, the spanning tests confirm further the economic importance of the point estimates for the style biases.

Table 4. Unconditional regression results and spanning tests

Model	Regression estimates								Spanning	
	<i>a</i>	<i>b</i>	<i>s</i>	<i>h</i>	<i>w</i>	<i>d</i>	<i>p</i>	<i>R</i> ²	<i>F</i> -stat	<i>p</i> -value
DAXglobal Sustainability Switzerland										
CAPM	0.11	1.19						0.73	1.89	0.16
	(0.28)	(11.76)								
CAPMS	0.24	1.22	0.35					0.75	2.66	0.06
	(0.61)	(11.58)	(1.90)							
FF	0.04	1.21	0.43	0.36				0.78	3.58	0.01
	(0.09)	(11.84)	(2.63)	(2.74)						
FFC	0.35	1.05	0.30	0.21	-0.28			0.82	5.03	0.00
	(0.85)	(10.71)	(2.18)	(1.77)	(-2.70)					
CNZ	0.23	1.14				-0.02	-0.62	0.78	6.39	0.00
	(0.41)	(12.16)				(-0.09)	(-4.31)			
DAXglobal Sustainability Germany										
CAPM	-0.20	1.04						0.81	0.16	0.85
	(-0.47)	(7.82)								
CAPMS	0.04	1.22	0.47					0.84	4.22	0.01
	(0.11)	(9.67)	(3.54)							
FF	-0.34	1.19	0.55	0.37				0.84	3.93	0.01
	(-0.79)	(9.98)	(3.78)	(1.44)						
FFC	0.04	0.97	0.27	0.20	-0.32			0.87	5.34	0.00
	(0.11)	(8.56)	(1.58)	(0.76)	(-2.83)					

Table 4 (cont.). Unconditional regression results and spanning tests

Model	Regression estimates								Spanning	
	<i>a</i>	<i>b</i>	<i>s</i>	<i>h</i>	<i>w</i>	<i>d</i>	<i>p</i>	R^2	<i>F</i> -stat	<i>p</i> -value
CNZ	-0.11	1.03				-0.09	0.09	0.81	0.18	0.95
	(-0.27)	(8.43)				(-0.27)	(0.34)			

Note: This table reports time series factor regression estimates and corresponding *t*-statistics (in parentheses) for responsible indices over their respective sample period using the unconditional versions of the Capital Asset Pricing Model (CAPM), the size factor-augmented CAPM (CAPMS), the Fama-French three-factor model, the Fama-French-Carhart four-factor model, and the Chen-Novy-Marx-Zhang alternative three-factor model. *a* is the average alpha estimate. *b*, *s*, *h*, *w*, *d*, and *p* are the factor loadings related to the market, size, value, momentum, investment, and profitability factors. *t*-statistics are based on robust standard errors using the Newey and West (1987) methodology. Regression R^2 values are adjusted for degrees of freedom. For the spanning test, the *F*-statistic and the corresponding *p*-value is reported. For the CAPM, we test the joint hypothesis that the alpha estimate is zero and the market beta is one, while we test for multi-factor models the joint hypothesis that *a* is zero, *b* is one, and additional factor loadings are zero.

The unconditional approach, however, can have its disadvantages. This can be the case if expected returns and risks vary over time. Our information variables follow closely the seminal work of Ferson and Schadt (1996) with the lagged level of the one-month EURIBOR, the lagged dividend yield based on the Datastream Total Market Index for Switzerland and Germany, the lagged term yield spread as the difference between the 10-year Swiss

(German) government bond yield and the three-month Swiss (German) interbank yield, and the lagged quality spread in the corporate bond market as the difference between the Thomson Reuters Eurozone Corporate Benchmark BBB yield and the Thomson Reuters Eurozone Corporate Benchmark AAA yield. For the sake of brevity, Table 5 reports the results for the CAPM, the four-factor model, and the alternative three-factor model.

Table 5. Conditional regression results

CAPM		FFC		CNZ	
<i>a</i> _{Cond}	R^2	<i>a</i> _{Cond}	R^2	<i>a</i> _{Cond}	R^2
Daxglobal Sustainability Switzerland					
0.46	0.74	0.25	0.87	0.31	0.80
(1.07)		(0.64)		(0.57)	
Daxglobal Sustainability Germany					
0.16	0.87	-0.58	0.93	-0.28	0.89
(0.39)		(-0.82)		(-0.61)	

Note: This table reports time series factor regression estimates and corresponding *t*-statistics (in parentheses) for the responsible indices over their respective sample period using the conditional versions of the Capital Asset Pricing Model (CAPM), the Fama-French-Carhart four-factor model, and the Chen-Novy-Marx-Zhang alternative three-factor model. *a*_{Cond} is the conditional average alpha estimate. *t*-statistics are based on robust standard errors using the Newey and West (1987) methodology. Regression R^2 values are adjusted for degrees of freedom. For the CAPM, the conditional alpha estimate is obtained by regressing the excess returns of the responsible index on the benchmark and the product of the benchmark with the vector of predetermined information variables. For multi-factor models, conditional alpha estimates are obtained by regressing excess returns of the responsible index on the explanatory factors and the products of the factors with the vector of predetermined information variables. Information variables (lagged by one month) are the dividend yield of the broad market index, the yield on the one-month EURIBOR, the yield spread (long-term minus short-term bonds), and the corporate bond yield spread (low-grade minus high-grade corporate bonds).

For all specifications and both indices the performance is not different from their respective benchmarks because conditional alphas are still insignificant. However, conditional alphas are on average slightly higher than the unconditional alphas suggesting some variation of expected returns and risks over time.

Overall, these results establish that SRI in Switzerland and Germany shows no signs of over- or underperformance, but a greater market sensitivity coupled with an anticyclical investment style.

2. Green investing

Green investing is a prominent issue for German investors. The German environmental bank Um-

weltBank launched its own stock index UBAI at the end of September 2002 covering German green companies. Starting with 18 stocks, the index comprises now 37 stocks. The index has negative criteria excluding vice industries such as nuclear power and weapons. Positive criteria such as the extent to which a specific company contributes to renewable energy determine which stocks make it finally in the index. The index is generally float-weighted, but has a cap allowing a single stock not to receive a weight larger than ten per cent in the portfolio. The sample period is from October 2002 to November 2011. Since the UBAI is a price index we compare it with the price version of the DAX which is its official benchmark.

A second, relatively new index is the equal-weighted ÖkoDAX including the ten biggest German companies in the renewable energy sector issued by Deutsche Börse. It was introduced during June 2007¹. Hence, the sample period is from July 2007 to November 2011. Again, the real data history is rather short for the ÖkoDAX. As one official benchmark, we use the DAXglobal® Alternative Energy index issued by Deutsche Börse which renders a better fit, though its stock universe is global and not domestic². It tracks the performance of the 15 largest alternative energy companies belonging to one of the sectors of Natural Gas, Solar, Wind, Ethanol, or Geothermal/Hybrids/Batteries. Every sector is equally weighted within the index, while three stocks are assigned in proportion to their market value to each sector. For the ÖkoDAX and its benchmark, we analyze monthly total returns (i.e., dividends are included). In comparing UBAI and ÖkoDAX, both indices cover the German eco market and focus on renewable

energy instead of the broader concept of alternative energy as followed by the DAXglobal® Alternative Energy index. Both indices also comprise merely pure play companies, but no conglomerates. Both indices follow a rule based approach, however the transparency standards for the UBAI do not seem to match those of the ÖkoDAX. While the UBAI is more inclusive, the ÖkoDAX covers only the ten largest stocks. We restate the facts that the weighting scheme (FW with a ten per cent cap vs. EW) and the index construction (price vs. performance) differ for both indices. This short summary has shown that although both indices share similarities, they have important dissimilarities. One has to keep this caveat in mind when comparing their performance and style. Hence, a direct comparison of both indices is not easy. Table 6 displays summary statistics showing that raw returns of German green indices are lower than their benchmark indices, are not highly correlated, but exhibit a higher volatility.

Table 6. Summary statistics

Index	Calculation	Start date	Obs	Mean	Std	Min	Max	Corr
UBAI	Price	10/2002	110	0.65	11.62	-35.82	45.14	0.50
BM: DAX				0.66	6.11	-19.19	20.28	
ÖkoDAX	Performance	07/2007	53	-3.05	11.32	-38.54	23.13	0.78
BM: DAXglobal Alternative Energy				-1.18	6.89	-19.99	12.67	

Note: For a description see Table 2.

For a performance analysis and attribution we need factor premia of the respective asset pricing models. These are reported in Table 7 for both sample

periods restating investment and value as the strongest anomalies with respect to economic and statistical significance.

Table 7. Factor premia

	SMB	HML	WML	DMI	PMU
Germany, 10/2002 to 11/2011					
Mean	-0.36	1.04	0.86	0.95	-0.09
t(Mean)	-1.02	3.61	1.50	4.30	-0.28
Germany, 07/2007 to 11/2011					
Mean	-0.51	1.19	1.29	1.25	0.12
t(Mean)	-0.95	3.66	1.63	3.90	0.31

Note: For a description see Table 3.

Table 8 underlines that similar to SRI both green indices do not under- or outperform in a statistically significant manner. The performance of the ÖkoDAX reflects especially the hardships of the German solar industry at the time (e.g., the near-bankrupt Q-Cells SE stock). Again, beta (β) is in almost all specifications above one. Only the UBAI exhibits a statistically significant small size (s) tilt across all specifications, while the ÖkoDAX has a strong negative momentum tilt (w) similar to SRI. Different from SRI, the investment factor (d) is strong for both indices. Its

coefficient indicates that green investing commits to companies which devote a lot of their resources to asset investments. Since all but one spanning test rejects the null, we can conclude that green indices do not behave similar to their benchmarks.

¹ Backtested data are available from March 2003 on. However, backtested data are suspicious in the sense that they could be prone to a look-ahead bias. Because of this issue and to maintain comparability with the analysis in the previous section with real data, we do not pursue this.

² Inference on the performance remains unaltered if we use instead the DAX.

Table 8. Unconditional regression results and spanning tests

Model	Regression estimates								Spanning	
	<i>a</i>	<i>b</i>	<i>s</i>	<i>h</i>	<i>w</i>	<i>d</i>	<i>p</i>	<i>R</i> ²	<i>F</i> -stat	<i>p</i> -value
UBAI										
CAPM	0.01	0.95						0.25	0.04	0.96
	(0.01)	(5.91)								
CAPMS	0.24	1.35	1.16					0.33	5.29	0.00
	(0.24)	(6.82)	(3.68)							
FF	0.75	1.43	1.07	-0.56				0.34	4.93	0.00
	(0.69)	(7.57)	(3.31)	(-1.52)						
FFC	0.80	1.41	1.05	-0.57	-0.04			0.33	3.92	0.00
	(0.72)	(6.00)	(3.19)	(-1.51)	(-0.24)					
CNZ	1.16	0.83				-1.20	-0.49	0.28	2.29	0.06
	(0.97)	(5.37)				(-2.37)	(-1.41)			
ÖkoDAX										
CAPM	-1.50	1.28						0.60	4.17	0.02
	(-1.33)	(10.56)								
CAPMS	-1.71	1.23	-0.29					0.60	4.02	0.01
	(-1.51)	(9.87)	(-1.25)							
FF	-1.62	1.23	-0.32	-0.08				0.60	2.99	0.03
	(-1.17)	(8.30)	(-1.29)	(-0.12)						
FFC	-0.82	1.05	-0.43	-0.42	-0.55			0.65	4.34	0.00
	(-0.68)	(7.06)	(-2.17)	(-0.76)	(-3.25)					
CNZ	-0.54	1.21				-0.82	-0.20	0.60	4.97	0.00
	(-0.51)	(9.28)				(-1.86)	(-0.44)			

Note: For a description see Table 4.

Testing the robustness of the results with conditional performance measures shown in Table 9 does not change the overall inference.

Table 9. Conditional regression results

CAPM		FFC		CNZ	
<i>a</i> _{Cond}	<i>R</i> ²	<i>a</i> _{Cond}	<i>R</i> ²	<i>a</i> _{Cond}	<i>R</i> ²
UBAI					
0.47	0.27	0.73	0.37	1.46	0.30
(0.43)		(0.60)		(1.15)	
ÖkoDAX					
-1.51	0.61	-1.92	0.74	-1.28	0.69
(-1.49)		(-1.56)		(-1.22)	

Note: For a description see Table 5.

In sum, similar to SRI, green investing achieves no over- or underperformance, but a higher market sensitivity. Additionally, green investing seems to tilt towards heavily investing companies which is rather plausible.

Conclusions and outlook

We review two socially responsible investment strategies which are present in German-speaking countries: SRI in general and green investing in particular. First, both strategies do not have a performance which is different from conventional benchmarks controlling for well known characteristics. This inference is robust to five alternative asset pricing models using unconditional and conditional calendar-time factor regressions. Second, both socially

responsible investment strategies have a higher systematic risk than their benchmark. Third, characteristics even beyond a size tilt are important in explaining responsible investment indices' performance attribution like a momentum or an investment anomaly (both with negative coefficients).

If we were to give an outlook on German-speaking countries, Islamic investing as a special branch of SRI could become an important trend in the future. Walkshäusl and Lobe (2012a, b) and Lobe, Rößle, and Walkshäusl (2012) analyze these investments in international markets from a financial point of view. Although Christians are in the majority, Christian investing seems to play a relatively smaller role compared to the US. The Muslim

population is expected to experience a rapid growth rendering this SRI segment even more influential. According to the Pew Research Center (2011) Muslims will make up 9.3 per cent of Austria's, 8.1

per cent of Switzerland's, and 7.1 per cent of Germany's total projected population by 2030. Whether this trend will hold and translate to a significant market volume remains to be seen.

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