

# Performance of Socially Responsible Investment Funds against an Efficient SRI Index: The Impact of Benchmark Choice when Evaluating Active Managers – An update

March 2012





This study updates an initial version released in 2011 and which was based on a three-year data history (cf. Le Sourd 2011). The present version includes one year of additional data, and thus covers the period from 2008 to 2011.

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# About the Author

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# Executive Summary



# Executive Summary

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Performance measurement of socially responsible investment (SRI) has been the subject of numerous studies in various countries. However, the conclusions of performance assessments always depend on the choice of the reference index one uses. SRI criteria lead to a reduction of the stock universe. Typical SRI indices respect such screenings and then simply weight the acceptable stocks by market cap, or alternatively by sustainability scores. They thus ignore the risk/return properties of stocks and in particular the correlations. Consequently, they do not necessarily reflect the performance available from a well-diversified portfolio of SRI-compliant stocks. Efficient SRI indices on the other hand, apply an optimal weighting scheme to the screened universe. They thus constitute a relevant proxy for the performance that is achievable through a sole focus on improving diversification within an SRI universe. In that sense they constitute a useful yardstick for active SRI funds from which investors would at least expect improved diversification, if not additional value added through stock picking. Given that such efficient SRI indices are also easy to replicate at low cost, they constitute investable alternatives to actively managed funds, and are thus relevant for practical comparisons of performance.

This paper conducts a performance measurement of SRI funds and assesses the impact of changing the reference from a standard SRI index to an efficient SRI index. The analysis of fund performance shows that an efficient SRI index raises the bar for actively managed SRI funds. While about 62% of funds have a positive information ratio when compared to the cap-weighted EuroStoxx Sustainability Index, only about

36% of funds do so with respect to the Efficient SRI Index. It is also interesting to note that the median information ratio across funds is slightly positive (0.04) when using the standard SRI index, but it is more clearly negative (-0.12) when using the Efficient SRI index.

# 1. Introduction and Motivation



# 1. Introduction and Motivation

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Socially Responsible Investment has carried on developing in recent years, showing both a rise in the amount of assets under management and in the number of investors involved. According to Novethic<sup>1</sup>, the French research centre dedicated to socially responsible investment and corporate social and environmental responsibility, the total amount of assets under management (including all asset classes – equities, bonds, money market) has experienced a 35% rise between the end of 2009 and the end of 2010.

The performance of SRI appears to be a controversial topic between those who predict a performance reduction, compared to non-SRI, and those who anticipate the opposite result. The first group argues that using SRI screens will necessarily reduce the investment universe and thus lead to poor diversification (Barnett and Salomon 2006). Reducing the investment universe appears to be similar to an investment constraint that leads to efficiency losses (Adler and Kritzman 2008). In addition, portfolio restriction to the only companies that fulfil SRI criteria tends to create portfolios more exposed to specific risk (e.g. industry biases, style biases; see Rudd 1981; Kurtz 1997; DiBartolomeo and Kurtz 1999). On the contrary, SRI proponents argue that extra-financial aspects of investments are part of the investment decisions even though they may be hard to define, hard to quantify and often specific to each particular investment (Teoh and Shiu 1990; Bassen and Kovacs 2008).

For several years EDHEC has produced research studies analysing the performance

of Socially Responsible Investment (SRI) over different time periods. The purpose was to determine if these funds could generate positive alpha (i.e. if the selection of assets with an SRI label could produce a positive performance, after isolating the performance due to portfolio style choices). The conclusions of these various studies were mostly the same, namely that the vast majority of SRI funds produced negative and non-significant alpha. More specifically, over a six-year period (2002-2007), only 9 of 62 SRI funds were identified as generating a significant alpha with the Fama-French three-factor model, and in all cases, this alpha was strongly negative (see Le Sourd 2010; Amenc and Le Sourd 2008). On an extended period of eight years (2002-2009), including the financial crisis, and using the same model, only 5 funds of a sample of 69 obtain significant – though negative – alpha (see Amenc and Le Sourd 2010).

Socially responsible investment, which gathers a large range of concepts (negative screening, positive screening, ethical concepts, environmental concepts...), has recently turned to more and more standardization. AFG (Association Française de Gestion) – the French Asset Management Association – published a French version of the European transparency code at the end of 2009. All French SRI funds that are proposed to investors adhere to this code. This code is completed by a guidance document that serves to help asset management companies provide investors with the adequate information in order to give them a clearer view of SRI. Moreover, the extra-financial notation of individual

1 - The French SRI market in 2010. Novethic research.

# 1. Introduction and Motivation

firms delivered by rating agencies (as with Vigeo in France, for example) is now completed by an SRI label launched in 2009 by Novethic. According to SRI promoters, all these initiatives that tend to achieve a better definition and a better control of SRI, will contribute to rendering it more accessible to a vast audience.

However, our previous studies raised two questions. The first one concerns the setting up of the fund, It seems that SRI fund producers mostly focus on qualitative SRI screening and forget to apply the quantitative methods provided by portfolio theory to the screened universe. The second one concerns the efficiency of indices that serve as a reference in factor models to evaluate SRI fund performance.

The importance of benchmark choice and its consequences on the results of performance measurement have been the subject of quite a few studies including Roll (1978), Peterson and Rice (1980), Kochman and Badarinathi (1981), Kochman (1984), Lehman and Modest (1987), Admati and Pfleiderer (1997), Daniel, Grinblatt, Titman and Wermers (1997), Campisi (2002), Kuenzi (2003), Arnott, Hsu and Moore (2005), Ben Dor, Budinger, Dynkin and Leech (2008), Sensoy (2009), Alexander and Baptista (2010), and Cremers, Petajisto and Zitzewitz (2010). These studies conclude that performance measurement is all the more dependent on benchmark choice to the extent that this benchmark is not efficient. The non-efficiency of market indices no longer needs to be proved (EDHEC has authored some studies on this subject<sup>2</sup>) and leads to call into question the cap-weighting system used by the vast majority of index

providers. The majority of SRI indices follow the same construction rules as their conventional counterparts, namely the cap-weighting system. So we can wonder if it is relevant to evaluate fund performance using indices that are certainly not efficient as a reference. Referring to an efficient benchmark is liable to be more informative.

This paper will highlight the differences in performance evaluation depending on the benchmark used as reference. The paper is organised as follows. We first describe our data and introduce the FTSE EDHEC-Risk ERAFP SRI Index<sup>3</sup>, which was derived to be both SRI-compliant and risk/reward efficient. Then, we reproduce our previous studies over a more recent period (2008-2011) using the sample of SRI funds available over those four years. In a second time, we use the ERAFP SRI Index to evaluate the performance of SRI funds, and compare the results with those obtained with cap-weighted SRI indices, as well as with those of some conventional indices. We finally conclude on the contribution of this new index for SRI players in terms of portfolio management and performance evaluation. The performance of the ERAFP SRI Index, compared to that of other SRI indices will be specifically detailed in the appendix located at the end of the paper, as well as a description of a collection of Eurozone SRI indices.

<sup>2</sup> - See Amenc, Goltz, and Le Sourd (2006), Goltz and Le Sourd (2010).

<sup>3</sup> - The full name of this index is FTSE EDHEC-Risk Efficient Eurobloc ERAFP Large Cap Custom SRI index. We will shorten the name in ERAFP SRI Index the text for convenience.

# 1. Introduction and Motivation

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## 2. Data and Methodology



## 2. Data and Methodology

### 2.1. Data

Our study period was determined by the availability of the ERAFP SRI Index. We thus use a four-year period covering years 2008 to 2011. We collected data on all SRI equity funds distributed in France, including funds that were registered in France, Belgium or Luxembourg and available over the four-year period from January 2008 to December 2011. We restricted our analysis to funds investing in assets from France, the Eurozone and Europe, discarding funds that invested in international assets which were part of our previous studies.

Though our study is supposed to be restricted to the Eurozone universe, we also choose to include the collection of funds declared to be invested in European assets, a universe that is essentially slightly larger than the Eurozone and that may include other currencies than Euro. Indeed, we had reached the conclusion in our previous studies that there was hardly any difference in the behaviour of funds classified as investing in the Eurozone and funds classified as investing in Europe, especially since some funds had changed from one zone to another over time. Furthermore, within European funds, the share invested in currency assets other than the Euro is weak. So it appears to us that it was legitimate not to deprive us of these funds, which account for about 40% of our fund sample. Note, that if there is hardly any difference in terms of asset universe between Eurozone and European funds, this is not the case for Eurozone and European indices. That is why we strictly limited the market and style factors that serve in our analysis to Eurozone indices.

As shown in our previous studies the green orientation is not the dominant feature in European<sup>4</sup> SRI funds. These funds were more likely to be found in the group of funds that invest in international assets. Thus, it appears not to be relevant in the present study to segregate funds into green funds – those that primarily focus on environment concerns – and traditional SRI funds – those that select assets that meet ESG criteria in all sectors.

The list of funds published by Novethic remained our reference to build our sample of SRI funds. Over our study period, we analysed 77 SRI funds, split into 9 funds for France, 35 for the Eurozone and 33 for Europe.<sup>5</sup> Fund and index data were provided by Datastream. We used weekly<sup>6</sup> data and computed total returns (dividend included) on Friday, as the few funds in our sample evaluated only once a week were evaluated on Friday.

### 2.2. Methodology

The purpose of the present study is two-fold. The first objective is to reproduce prior studies, but on a more recent period and including additional funds. The second objective is to analyse how the use of an efficient index, namely the ERAFP SRI Index, as a benchmark can improve the performance measurement of SRI funds.

For each fund, we computed descriptive statistics and risk indicators (including average mean return, standard deviation, skewness, excess kurtosis, Cornish-Fisher VaR). We also computed tracking-error, information ratio and evaluated the percentage of weeks during which the index or the fund over-performs its benchmark.

4 - When referring to funds, we will use the term "European" to include France, Eurozone and European funds.

5 - The initial version of this study, based on data ending in December 2010, analysed 87 funds (10 funds for France, 36 funds for Eurozone, and 41 funds for Europe). Extending the period makes us lose 10 funds that stop reporting, mainly in the Europe group.

6 - We choose to use weekly data returns for our analysis, in order to have enough data, as we only consider a four year data period due to the ERAFP SRI Index availability period. As we work on funds and not on individual stocks, we do not think that this will generate too much noise in our data series.

## 2. Data and Methodology

Additionally, we computed a risk-adjusted performance measure, with the Sharpe ratio and relative performance measures, using factor models to evaluate index and fund alpha. As in the previous studies, alpha was computed using the capital asset pricing model (CAPM) and the Fama-French three-factor model. We also used an additional factor, the Carhart four-factor model which includes the three Fama-French factors and a fourth factor measuring the momentum.

The main indicators and models used in the present study have been previously described in Le Sourd (2010). We will just say a few words about the indicators we added here. The tracking-error, which is defined as the standard deviation of the difference in return between the fund and the benchmark, allows us to evaluate how the fund deviates from the market factor. The information ratio, which is obtained as the difference in return between the fund and its benchmark divided by the tracking error, evaluates the rewarding of the tracking-error. Note that those two indicators need not to be dissociated; as for a same level of information ratio, the lower the tracking-error is, the higher the chance that the fund's performance will persist over time.

### Carhart four-factor model (1997)

The Carhart four-factor model is an extension to Fama and French's three-factor model, which includes a momentum factor as additional factor. This factor enables to evaluate the persistence of the returns and was added to take the anomaly revealed by Jegadeesh and Titman (1993) into account. The evaluation of the fund's alpha, as well as the fund's exposure (beta) to each risk

factor, is obtained with the following regression:

$$R_{P_t} - R_{F_t} = \alpha_P + b_{P1}(R_{M_t} - R_{F_t}) + b_{P2}(SMB_t) + b_{P3}(HML_t) + b_{P4}(PR1YR_t) + \varepsilon_{P_t}$$

where:  $R_{P_t}$  is the return of fund P at time  $t$ ;  $R_{F_t}$  is the rate of return of the risk-free asset at time  $t$ ;

$R_{M_t}$  is the return of the market portfolio at time  $t$ ;

$SMB_t$  (small minus big) is the difference at time  $t$  between returns on two portfolios: a small-capitalisation portfolio and a large-capitalisation portfolio;

$HML_t$  (high minus low) is the difference at time  $t$  between returns on two portfolios: a portfolio with a high book-to-market ratio and a portfolio with a low book-to-market ratio;

$PR1YR_t$  denotes the difference between the average of the highest returns and the average of the lowest returns from the previous year;

$b_{P_k}$  is the factor loadings;

$\varepsilon_{P_t}$  is the portfolio residual return not explained by the model.

We used Eurozone style indices as factors in our models, except for the momentum factor for which only a Europe index, provided by MSCI, was available. Table 1 gives the list of style indices we used.

Table 1. List of style indices used in factor models.

Factor	Index
Main Market factor	Euro Stoxx
Risk-free rate	Euribor 3 months offered rate
Value index	Euro Stoxx TM Large Value
Growth index	Euro Stoxx TM Large Growth
Small cap index	Euro Stoxx Small
Large cap index	Euro Stoxx 50
Momentum factor	MSCI Europe Barra Momentum - MSCI Europe

## 2. Data and Methodology

One of our objectives was to evaluate the influence of the index used as market factor on the result of SRI fund performance analysis, especially on alpha value. We thus use four different indices in turn as market factor, two SRI indices and two conventional indices, including a cap-weighted index and an efficient index for each category. Table 2 sums up the various choices made for the market factor.

Table 2. List of the alternative market factors used in factor models.

Market factors	Non-SRI	SRI
Cap-weighted	Euro Stoxx	Euro Stoxx Sustainability
Efficient	FTSE EDHEC-Risk Efficient Eurobloc	SRI ERAFP FTSE EDHEC-Risk Efficient Eurobloc

As tracking-error, information ratio and percentage of over-performing weeks compared to the benchmark also depends on the choice of the market factor, computations of those indicators for funds will also be made with these four market factors.

### 2.3 Introducing the ERAFP SRI Index

Before displaying our analysis, it would be useful to say a few words about the ERAFP SRI Index. If the index universe was the place for numerous studies in the conventional world, improving the efficiency of SRI indices had not raised lots of interest until now. This lack was filled by a joint study by ERAFP<sup>7</sup>, FTSE and EDHEC-Risk, which led to the creation of a new SRI efficient index – the FTSE EDHEC-Risk Efficient Eurobloc ERAFP Large Cap SRI Index. This index is derived from the FTSE Eurobloc large/mid cap index. ERAFP provides a selection of stocks among this index universe, based on SRI criteria.

EDHEC-Risk's efficient weighting scheme<sup>8</sup> is then applied to this set of constituents. FTSE, as the index provider, provides data on live performance and constitutions of the custom index. This index differs from other indices in its rule-setting. Indeed, it relies on return data history to select its asset constituent based on their risk and return, while cap-weighted indices base their selection on the only consideration of asset representation in terms of cap-weighting with regards to total market cap-weighting. The main idea of the efficient index weighting methodology is to attribute higher weights to stocks that positively contribute to the index Sharpe ratio. The ERAFP SRI Index does not exclude any sectors and uses a best-in-class policy. This index was launched at the beginning of 2011, with a three-year track-record. Below are some more details about the weighting methodology and the SRI screening.<sup>9</sup>

#### 2.3.1. Efficient weighting methodology

The methodology was developed in Amenc, Goltz, Martellini and Retkowsky (2010). Observing that global minimum portfolios lead to portfolios that are not diversified enough, they propose not to minimise the portfolio volatility, but instead to maximise the portfolio Sharpe ratio, while assuming that a trade-off between a stock's riskiness and its expected return holds. The penalty on the expected return side counterbalances the natural attractiveness of low risk stocks from the risk perspective and thus avoids excessive concentration in low volatility stocks. Such an approach is consistent with obtaining the tangency portfolio of Modern Portfolio Theory and puts the focus back on improving portfolio diversification.

7 - ERAFP is the French organism that manages pensions for civil servants.

8 - See Amenc, Goltz, Martellini, and Retkowsky (2010).

9 - The description of the methodology used to evaluate stocks' expected returns is beyond the scope of this paper. The methodology, fully described in Martellini (2008), involves using an estimate of the stock's risk to proxy for a stock's expected return. This approach is based on the principle that investors expect an additional return for taking more risk.

## 2. Data and Methodology

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### 2.3.2. SRI screening<sup>10</sup>

The ERAFP SRI screening is based upon five principles:

- a. human rights, including non-discrimination, freedom of expression, the fight against corruption and money laundering;
- b. social progress, including compliance with fundamental rules of labour law and contribution to professional development;
- c. democratic labour environment, including the respect of employee rights and employee representatives;
- d. environment, including activity environment impact and the existence of environmental risk management plans;
- e. good governance and transparency, including the correct application of legal and fiscal rules, compliance with ethical rules and the transparency about operations and financial performance.

10 - The documents that present the criteria in details can be found at the following address: <http://www.rafp.fr/The-SRI-approach-en-ru136/The-SRI-Charter-ar360>.

Those criteria mostly serve in a best-in-class approach, by selecting assets that obtained the highest rating towards those criteria within an investment sector. The aim is not to exclude any sector and to remain fully diversified in terms of sector exposition.

## 2. Data and Methodology

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### 3. Performance Analysis of SRI Funds Using Factor Models



## 3. Performance Analysis of SRI Funds Using Factor Models

Here, we will present the analysis of SRI funds using classical references as market factor (i.e. cap-weighted indices). As our sample of funds is quite large, here we will only produce a description of the distribution of results, rather than results on individual funds. Given the considerable decline experienced by the financial markets during the 2008 year, as well as a new decline during the 2011 year, we expect a negative performance over the four-year period for all indices and funds.

### 3.1. Statistical Indicators

Table 3 exhibits a summary of distribution of the mean return, standard deviation, skewness, excess kurtosis, as well as extreme risks (Cornish-Fisher Var) and absolute risk-adjusted performance measure (Sharpe ratio) for SRI funds. It appears that hardly any funds produce a positive mean return, since at least 95% of the SRI funds had produced a negative return. Looking at the results in detail, we indeed identified 1 fund among 77 with a positive mean return. For comparison purposes, the table includes indicator values for two conventional indices (the cap-weighted Euro Stoxx index and the efficient FTSE EDHEC-Risk Eurobloc index) and two SRI indices (the cap-weighted Euro Stoxx Sustainability and the efficient SRI FTSE EDHEC-Risk ERAFP Index). Note that we have chosen the Euro Stoxx index here for two main reasons.<sup>11</sup> First, this index family is without doubt the most popular and widely-used for Eurozone equity investments. Second, this index series allows us to use a range of indices based on a homogeneous universe. For instance, the Euro Stoxx Sustainability index is based on a screening applied to constituents of the standard Euro Stoxx

index and thus the non-SRI index and the SRI index are directly comparable, similar to the case of the Efficient non-SRI index and the Efficient SRI index, which are based on the FTSE Eurobloc universe before and after screening.

Looking at the results reported in Table 3, we can conduct a broad comparison between the performance of these funds and that of the indices. For instance, it appears that the median value of SRI fund mean return is in the same range as the Euro Stoxx Sustainability mean return (precisely, at the SRI fund 45th percentile mean return), while the ERAFP SRI Index is located between the median value and the SRI fund 75th percentile mean return (at the SRI fund 64th percentile mean return). As expected, all skewness figures are negative, given that the market was in decline during the evaluation period, with efficient index figures slightly higher than those of the median SRI fund. All indices have kurtosis figures in the same range than SRI fund 25th percentile kurtosis, with figures for efficient indices slightly lower than that for cap-weighted indices. Looking at Value-at-Risk (VaR) – computed according to the Cornish-Fisher extension – that evaluates the amount of the portfolio that can be lost in one week, we see that the SRI ERAFP index produces a lower figure than the SRI cap-weighted index. The SRI ERAFP index VaR is located between the median value and the SRI fund 75th percentile mean return (at the SRI fund 65th percentile mean return), while the SRI cap-weighted Var is in the same range as SRI fund 90th percentile.

11 - In addition to these initial reasons, also note that when comparing the performance of the EuroStoxx Sustainability index to a wide range of Eurozone SRI indices, we can see that its risk and return profile is broadly comparable to other indices, see Table A.3. in the appendix.

## 3. Performance Analysis of SRI Funds Using Factor Models

Table 3. Distribution of statistical and risk indicators for SRI funds over the period from 2008 to 2011.

Jan. 2008 - Dec.2011	Mean	Stand Dev	Skewness	Kurtosis	Sharpe ratio	Cornish-Fisher VaR (in %)*
<b>5th percentile</b>	-19.12%	18.32%	-1.49	2.06	-0.88	5.28%
<b>10th percentile</b>	-11.00%	22.35%	-1.21	2.62	-0.48	5.68%
<b>25th percentile</b>	-8.87%	24.03%	-0.95	4.08	-0.42	5.95%
<b>Median</b>	-6.98%	26.65%	-0.82	4.47	-0.34	6.52%
<b>75th percentile</b>	-5.16%	28.06%	-0.73	5.76	-0.28	7.04%
<b>90th percentile</b>	-3.60%	28.95%	-0.42	6.96	-0.23	7.29%
<b>95th percentile</b>	-2.91%	29.33%	-0.34	7.77	-0.20	7.51%
<b>Conventional Indices</b>						
EURO STOXX	-7.85%	28.73%	-0.80	4.15	-0.34	7.24%
FTSE EDHEC-Risk Eurobloc	-4.37%	26.11%	-0.89	3.88	-0.24	6.63%
<b>SRI Indices</b>						
EURO STOXX SUSTAINABILITY	-7.35%	29.30%	-0.64	3.83	-0.32	7.23%
SRI FTSE EDHEC-Risk ERAFP	-5.92%	26.63%	-0.91	3.71	-0.30	6.81%

The mean returns and standard deviations, computed with weekly returns are annualised.

\* non-annualised 5%-quantiles are estimated.

Table 4. Proportion of negative and positive alpha values obtained with the CAPM, Fama-French and Carhart model over the period from 2008 to 2011 (Euro Stoxx index was used as proxy for the market factor).

Single-factor model		Fama-French 3-factor		Carhart 4-factor	
Nb of alpha >0 (significant)	Nb of alpha <0 (significant)	Nb of alpha >0 (significant)	Nb of alpha <0 (significant)	Nb of alpha >0 (significant)	Nb of alpha <0 (significant)
42.86%	57.14%	38.96%	61.04%	38.96%	61.04%
(0%)	(11.36%)	(0%)	(12.77%)	(0%)	(12.77%)

In conclusion the median SRI fund appears to have mean returns in the same range as that of the SRI cap-weighted index, with a little less standard deviation and risk, and a little more skewness and kurtosis. Note that all these results were not dependent on the choice of the benchmark.

### 3.2. Factor Models

We also perform analysis using three factor models in turn. First, we use the single-factor model, as usual choosing a cap-weighted index as market proxy. We then add factors to obtain in turn a three-factor (Fama-French) and a four-factor (Carhart) model. A multi-factor benchmark enables us to accurately

describe the risk factors to which the fund is exposed. If the fund does not outperform such a benchmark, it means that the same performance could have been obtained by directly investing in a combination of style indices, or using financial instruments to replicate the performance of style indices.

If quite a large number of funds (about 40%) obtained a positive alpha with the three models, we observed that none of these positive values is significant. Indeed, hardly any funds obtain a significant alpha, whatever the factor model used, with 5 funds among 77 for the single-factor model and 6 funds for the three-factor model and the four-factor model, and in all cases,

### 3. Performance Analysis of SRI Funds Using Factor Models

Table 5. Distribution of alpha, t-stat and R<sup>2</sup> for SRI funds obtained with the CAPM, Fama-French and Carhart model over the period from 2008 to 2011 (Euro Stoxx index was used as proxy for the market factor).

Jan. 2008 – Dec. 2011	Single factor model			Fama-French 3-factor			Carhart 4-factor		
	Alpha	t-stat	Adj R <sup>2</sup>	Alpha	t-stat	Adj R <sup>2</sup>	Alpha	t-stat	Adj R <sup>2</sup>
<b>Benchmark</b>	Eurostoxx (cap-weighted non SRI index)								
<b>5th percentile</b>	-13.43%	-2.19	0.68	-14.73%	-2.42	0.69	-15.11%	-2.57	0.69
<b>10th percentile</b>	-3.81%	-1.04	0.75	-4.63%	-1.21	0.76	-4.85%	-1.35	0.76
<b>25th percentile</b>	-2.27%	-0.62	0.84	-2.66%	-0.66	0.85	-2.82%	-0.68	0.86
<b>Median</b>	-0.67%	-0.16	0.90	-0.67%	-0.18	0.92	-0.84%	-0.19	0.92
<b>75th percentile</b>	1.29%	0.37	0.94	0.83%	0.27	0.95	0.77%	0.27	0.95
<b>90th percentile</b>	2.28%	0.71	0.96	2.09%	0.72	0.97	2.06%	0.69	0.97
<b>95th percentile</b>	3.29%	0.92	0.97	2.72%	0.89	0.97	2.66%	0.85	0.97

the significant values are still negative. Table 4 displays the proportion of negative and positive alpha values for each model with the respective proportion of significant values.

Table 4 shows that the proportion of funds exhibiting a positive alpha is still lower than that of funds exhibiting a negative alpha. Few alpha values appear to be significant and all these significant values are negative.

In order to have a more complete view of SRI fund range of alpha values, we look at the complete alpha distribution. Table 5 gives a summary of those distributions and compares alpha values successively obtained with the one-, three- and four-factor model, using a cap-weighted index as proxy for the market factor. Thus, we observe that the more factors we have, the more alpha value distribution is drawn towards negative values.

The analysis was performed over a period of only four years, as we wanted to restrict it to the period over which the ERAFP SRI Index data was available. This could render the significance of the results we obtained questionable.<sup>12</sup> However, note that

these results are in accordance with those obtained in previous EDHEC studies (see Le Sourd 2010; Amenc and Le Sourd 2008, 2010) whose results were referred to in the introduction. Those studies were carried out over longer periods, namely six and eight years. In addition, if the present data period is shorter, the number of SRI funds included in the study has been slightly widened, considering that we analysed 77 funds, versus 62 and 69 previously.

12 - Note that the results we obtain here are also in accordance with those obtained in the initial version of this study performed over three years and using 87 funds.

## 4. Performance Analysis of SRI Funds with Respect to a Reference Index



## 4. Performance Analysis of SRI Funds with Respect to a Reference Index

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Here, we propose to investigate how SRI funds performed when compared to an efficient benchmark. Indeed, the three-factor and four-factor models we used in the previous section to analyse the performance of SRI funds may appear as theoretical *ex-post* models far from the considerations of SRI asset managers. It should be noted that, compared to using an efficient index as a benchmark, the use of a multifactor benchmark comes with three challenges. First, the multifactor benchmark builds on factors using long and short positions in stocks. For example, the value factor is built by holding a long position in value stocks and a short position in growth stocks. For many investors such a factor portfolio may not be a practical investment alternative to SRI funds which hold long-only portfolios. Second, a multifactor benchmark allows reconstructing *ex-post* of which factor exposures a given active manager has taken on average. However, when considering an actual investment alternative to active managers, the investor is left with the question of how best to allocate his portfolio across different factors, which for example requires estimation of the factor risk premia which is notoriously difficult to estimate. Third, while efficient SRI indices respect the investor's constraint to not invest in any stocks which fail to pass the SRI screen, multifactor benchmarks are in fact based on portfolios made up of all available stocks without imposing any SRI screen. If we take the definition of a good benchmark set up by Bailey (1992) and Bailey *et al.* (1990), the condition that a benchmark needs to be appropriate (i.e. "consistent with the manager's investment style"), does not seem to be fulfilled by a

multifactor approach, considering that an SRI universe will differ in style from a non-SRI universe.

In addition, the managers that proceed to SRI asset selection do not necessarily seek to mimic style biases *ex ante*. Looking through the documentation of SRI funds, we only identify one SRI fund in our whole sample claiming that it replicates an index. For all other SRI funds which were part of our study, the documentation stresses that the fund management was not supposed to follow the performance of a particular index, though they sometimes indicate that the fund performance could be compared with the performance of a specific index. It comes from this observation that SRI fund management is essentially active management seeking to produce added value through SRI asset selection. For that reason, it may seem more adequate to evaluate the performance of SRI funds using efficient benchmarks rather than a combination of cap-weighted style indices through a factor model. Thus, here we propose using efficient indices to evaluate SRI fund performance and compare the results we obtain to those produced with traditional cap-weighted indices.

### 4.1. The Influence of Benchmark Choice on SRI Fund Information Ratio

We computed some indicators that may change depending on the choice of the reference index. Those indicators are the information ratio and the tracking error, as well as the percentage of weeks during which a fund displays a higher

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Table 6. Distribution of information ratio, tracking error and percentage of outperforming weeks for SRI funds according to the benchmark choice over the period from 2008 to 2011.

Jan. 2008 – Dec. 2011	Cap-weighted benchmark			Efficient benchmark		
	Information ratio	Tracking-error	% Week Fund>Market	Information ratio	Tracking-error	% Week Fund>Market
<b>Non SRI Benchmark</b>	<b>Eurostoxx</b>			<b>FTSE EDHEC-Risk Eurobloc</b>		
5th percentile	-0.60	5.07%	43.92%	-0.91	7.45%	42.87%
10th percentile	-0.39	5.72%	45.74%	-0.69	7.84%	44.31%
25th percentile	-0.11	7.21%	48.80%	-0.47	8.61%	46.41%
Median	0.11	9.04%	51.20%	-0.27	9.46%	48.33%
75th percentile	0.31	11.88%	53.11%	-0.09	11.00%	50.24%
90th percentile	0.47	15.52%	54.74%	0.08	14.49%	52.63%
95th percentile	0.57	16.79%	55.50%	0.18	16.00%	53.68%
<b>SRI Benchmark</b>	<b>Eurostoxx Sustainability</b>			<b>SRI FTSE EDHEC-Risk ERAFP</b>		
5th percentile	-0.59	5.97%	44.98%	-0.80	6.99%	43.92%
10th percentile	-0.40	6.52%	47.66%	-0.56	7.49%	45.93%
25th percentile	-0.13	8.03%	49.28%	-0.29	8.14%	46.89%
Median	0.04	10.04%	51.20%	-0.12	9.11%	48.80%
75th percentile	0.22	12.93%	53.59%	0.07	11.08%	50.72%
90th percentile	0.37	16.22%	54.74%	0.26	14.34%	53.59%
95th percentile	0.43	17.63%	55.98%	0.34	15.77%	54.26%

performance than its benchmark. The results are displayed in table 6. We used two cap-weighted indices and two efficient indices, with for each case one SRI index and one non-SRI index.

If we compare the results obtained using the four indices, we observe that the results are modified more by the weighting scheme of the index, than by its SRI or non-SRI feature. For example, the use of efficient indices instead of cap-weighted indices to evaluate the information ratio moves the distribution to the left, namely towards the negative values. The median value moves from 0.11 to -0.27 with conventional indices, and from 0.04 to -0.12 with the SRI indices. The tracking-error distribution appears to be truncated on both sides when the benchmark is efficient. Finally, we observe that SRI funds outperform their cap-

weighted benchmarks a little more than half of the time (51.20% versus both the conventional index and the SRI index, for the median fund). On the contrary, SRI funds outperform efficient benchmarks a little less than half of the time (48.33% versus the conventional index and 48.80% versus the SRI index, for the median fund).

To complete these results, we compared the proportion of funds that exhibit a positive information ratio according to the benchmark choice. The results are presented in table 7.

We observed that the proportion of funds that obtained a positive information ratio is dramatically higher when the benchmark is a cap-weighted index, than when it is an efficient index. This is true both for conventional and SRI indices. Meanwhile, the spread is smaller for SRI

## 4. Performance Analysis of SRI Funds with Respect to a Reference Index

Table 7. Comparison of SRI fund information ratio (IR) according to benchmark index over the period from 2008 to 2011.

Jan. 2008 – Dec. 2011	Cap-weighted benchmark		Efficient benchmark	
	Non SRI Benchmark	SRI Benchmark	Non SRI Benchmark	SRI Benchmark
%SRI funds with IR >0	62.34%	59.74%	15.58%	36.36%
%SRI funds with IR >0.1	50.65%	41.56%	10.39%	23.38%
%SRI funds with IR >0.2	38.96%	31.17%	5.19%	12.99%

indices than for conventional indices. For example, looking at the results obtained with conventional benchmarks, table 7 shows that about 62% of SRI funds exhibit a positive information ratio, with a non-efficient benchmark. This percentage decreases to about 16% with an efficient benchmark. With the SRI benchmark, the percentage value decreases from about 60% to about 36%. We thus demonstrate that if the reference is an efficient and well-diversified index, few funds achieve a positive information ratio. Given that the rate of funds exhibiting performance persistence is quite weak in the active management area, the value of 64% of SRI funds exhibiting a negative information ratio does not give an encouraging signal about the ability of an SRI fund to perform well.

### 4.2. The Influence of Benchmark Choice on SRI Fund Alpha

To complement our analysis of information ratio with regards to various benchmarks, we also compare fund alpha obtained with efficient and cap-weighted market factors, including SRI and non-SRI indices. Replacing the single-factor model traditional cap-weighted benchmark with an improved benchmark can be seen as an alternative to active management for investors. The choice of an improved benchmark not only allows the investor to have different risk exposures than

when choosing a cap-weighted index, but also to implement an optimal asset diversification strategy when the benchmark chosen is an efficient index. As before, here we will only present a description of the distribution of results, rather than results on individual funds.

Using the classical single-factor model, we again did the same analysis as in section 3, changing the market factor proxy. We used the same indices as in table 6 in turn, namely a cap-weighted SRI index (Euro Stoxx Sustainability index), an efficient conventional index (FTSE EDHEC-Risk Eurobloc index) and an efficient SRI index (SRI FTSE EDHEC-Risk ERAFP Index) to replace the cap-weighted conventional Euro Stoxx index and analysed the differences in results for alpha. We observed contrasted results for alpha.

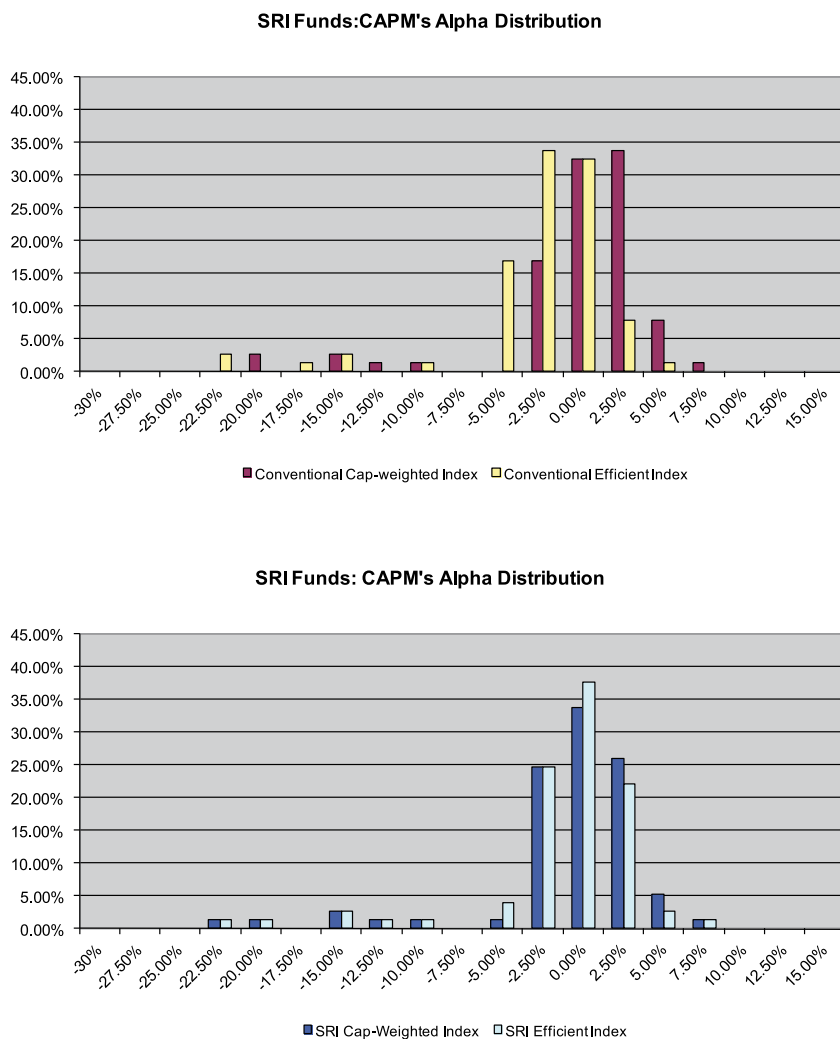
Graph 1.a and graph 1.b reproduce the whole distribution of alpha values obtained with the single-factor model and separately compare the distributions obtained with the two conventional indices and the two SRI indices. It thus appears that the use of efficient indices tends to draw the distribution towards more negative values, especially for conventional indices. The graphical result is not so obvious for SRI indices. This observation is confirmed by the summary of the distributions obtained with the

## 4. Performance Analysis of SRI Funds with Respect to a Reference Index

four indices that appears in table 8. Alpha distributions are clearly moved to the left for conventional benchmark indices, with a reduction of alpha median value that skips from -0.67% to -3.23%. If we look at the SRI benchmark indices, we observe a more limited variation of alpha median value from -1.31% to -1.85%. The median values also indicate that whatever the benchmark, funds that produce a negative alpha are more numerous than those that produce a positive alpha, T-stat seems to increase slightly in absolute

value with efficient indices. Meanwhile the number of significant alpha is very small. Looking in detail, we only identify 5 funds among 77 with a significant alpha when the computation was made using cap-weighted indices as benchmark, and 6 funds with a significant alpha when the computation was made using efficient indices, and those significant alpha values were negative. The use of an efficient index as market factor also slightly reduces the R-square of the regression.

Graph 1.a and 1.b. Distribution of SRI fund alpha obtained with the CAPM model using the two conventional indices (first graph) and the two SRI indices (second graph) as factor model over the period from 2008 to 2011.



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Table 8. Distribution of alpha, t-stat and R<sup>2</sup> for SRI funds obtained with cap-weighted and efficient non-SRI and SRI indices for the CAPM model over the period from 2008 to 2011.

Jan. 2008 - Dec. 2011	Single factor model		
	Alpha	t-stat	Adj R <sup>2</sup>
<b>Benchmark</b>	<b>Eurostoxx (cap-weighted non-SRI index)</b>		
5th percentile	-13.43%	-2.19	0.68
10th percentile	-3.81%	-1.04	0.75
25th percentile	-2.27%	-0.62	0.84
Median	-0.67%	-0.16	0.90
75th percentile	1.29%	0.37	0.94
90th percentile	2.28%	0.71	0.96
95th percentile	3.29%	0.92	0.97
<b>Benchmark</b>	<b>Eurostoxx Sustainability (cap-weighted SRI index)</b>		
5th percentile	-14.15%	-2.16	0.65
10th percentile	-4.47%	-1.10	0.73
25th percentile	-2.99%	-0.74	0.82
Median	-1.31%	-0.25	0.89
75th percentile	0.61%	0.15	0.93
90th percentile	1.58%	0.49	0.95
95th percentile	2.64%	0.63	0.96
<b>Benchmark</b>	<b>FTSE EDHEC-Risk Eurobloc (Efficient non-SRI index)</b>		
5th percentile	-15.71%	-2.53	0.67
10th percentile	-6.68%	-1.46	0.73
25th percentile	-4.78%	-1.09	0.83
Median	-3.23%	-0.59	0.88
75th percentile	-1.37%	-0.32	0.91
90th percentile	-0.12%	-0.02	0.92
95th percentile	0.76%	0.16	0.93
<b>Benchmark</b>	<b>SRI FTSE EDHEC-Risk ERAFP (Efficient SRI index)</b>		
5th percentile	-14.42%	-2.40	0.69
10th percentile	-5.13%	-1.16	0.74
25th percentile	-3.54%	-0.83	0.83
Median	-1.85%	-0.34	0.89
75th percentile	0.01%	0.00	0.91
90th percentile	1.13%	0.33	0.93
95th percentile	2.11%	0.48	0.94

The analysis above shows that when using better-diversified SRI indices as a benchmark, the alpha of actively managed SRI funds is considerably reduced compared to the case where the standard cap-weighted index is used as a benchmark. As efficient indices have also been designed to be easily implementable for actual

investments with low turnover and high liquidity (see Amenc *et al.* 2010), they are not only a relevant benchmark for active SRI funds (see Bailey *et al.* 1990 who require a benchmark to be easily investable) but also a possible alternative for implementing SRI investments, while allowing for high transparency and low costs.

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Table 9. Comparison of SRI fund CAPM\_alpha. according to benchmark index over the period from 2008 to 2011.

January 2008 - December 2011	Cap-weighted benchmark		Efficient benchmark	
	Non SRI Benchmark	SRI Benchmark	Non SRI Benchmark	SRI Benchmark
%SRI funds with Alpha_CAPM >0	42.86%	32.47%	9.09%	25.97%
%SRI funds with Alpha_CAPM >1%	25.97%	23.38%	3.90%	14.29%
%SRI funds with Alpha_CAPM >2%	16.88%	7.79%	2.60%	6.49%
%SRI funds with Alpha_CAPM >0 and significant	0.00%	0.00%	0.00%	0.00%

In addition, if we compare the alpha reduction resulting of benchmark modification in table 8 to the one resulting of the use of additional factors in the factor model (see table 5 in section 3), we observe that the use of a more efficient benchmark tends to considerably reduced alpha value, from  $-0.67\%$  to  $-3.23\%$  with conventional indices, and in a less spectacular way, from  $-1.31\%$  to  $-1.85\%$  with SRI indices (see table 8), while the change resulting in the introduction of additional factors only moves alpha from  $-0.67\%$  to  $-0.84\%$  (see table 5), definitely a narrower spread.

Finally, to give some further intuition about the impact of replacing a standard benchmark by an efficient benchmark in performance evaluation of actively managed SRI funds, we compared the proportion of funds that exhibit a positive alpha according to the benchmark used to make the evaluation. Clearly, the overall conclusion on the performance of actively managed funds as a whole depends on the percentage of funds that effectively have attractive performance against the benchmark. Table 9 indicates this percentage of funds with attractive performance at different thresholds when using different benchmarks, standard cap-weighted ones and efficient ones.

We observed that the proportion of funds that obtained a positive alpha is dramatically higher when the benchmark is a cap-weighted index, than when it is an efficient index, especially for conventional indices, while the spread is smaller for SRI indices. For example, looking at the results obtained with conventional benchmarks, table 9 shows that about 43% of SRI funds exhibit a positive alpha with regards to a non-SRI cap-weighted benchmark, while only 9% of SRI funds obtain the same result with a non-SRI efficient benchmark. If we use SRI benchmarks, this proportion only declines from 32% to 26%. These results show that efficient indices are less easy to beat than cap-weighted indices.

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# Conclusion



## Conclusion

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The question of weighting stocks to create well-diversified portfolios is crucial in SRI. It does not make any sense for investments that rely on SRI selections/exclusions to follow the cap-weighting scheme (which is sometimes argued to be optimal) when investing in a broad market portfolio. Alternatively, choosing to weight the stocks by SRI scores would completely ignore basic risk management information provided by asset return correlations and volatilities. Efficient weighting based on careful examination of risk and return properties of screened stocks allows for the implementation of an SRI strategy with an improved level of diversification. A focus on extra-financial analysis should not come as an excuse to ignore results based on 50 years worth of research in optimal portfolio construction. Therefore, when assessing the performance of actively managed SRI funds, using standard SRI indices may not be the most relevant assessment criteria. Rather, one should perhaps raise the bar for fund managers and compare them to an index which builds in a systematic exploitation of diversification potential within the SRI universe.

Our analysis of SRI funds with classical factor models has confirmed our previous results of few significant alpha values and all those that are significant, being negative. The specific analysis of fund performance using various benchmarks (including efficient benchmarks) has shown that SRI funds beat efficient indices less often than cap-weighted ones, in terms of a positive information ratio or in terms of positive alpha with respect to the reference index. While about 62% of funds have a positive information ratio

when compared to the cap-weighted EuroStoxx Sustainability Index, only about 36% of funds do so with respect to the Efficient SRI Index. It is also interesting to note that the median information ratio across funds is slightly positive (0.04) when using the standard SRI index, but it is clearly negative (-0.12) when using the Efficient SRI index. This analysis should deserve to be further updated as longer historical data will be available for the ERAFP SRI Index, to test the robustness of the results.<sup>13</sup>

The weak relative performance of actively managed SRI funds compared to an efficient SRI index shows that the question of the active management value-added compared to index investing is also relevant in SRI investments, which at their origin had been portrayed as being purely alpha oriented through their security selection. In the end, SRI investments are also concerned with the question of improved management of risk and thus of the beta component of portfolio performance. The extent to which the Efficient SRI Index raises the bar for active SRI managers shows that SRI fund performance is not to be sought only through SRI security screening. This means that the asset weighting scheme (i.e. the diversification approaches applied within an SRI universe) are also decisive, SRI funds will only be able to reach valuable performance with an accurate association of security selection and a smart weighting scheme that is able to consider the relationship between securities (i.e. the correlations). In the end, while SRI and quantitative financial analysis rely on different skill sets and types of analysis, they are not opposed.

13 - Note that the present update confirms the results that were obtained last year with a three-year data history.

## Conclusion

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They can be combined for investors to better incorporate both extra-financial and purely financial aspects of investment. Efficient SRI indices thus constitute a relevant proxy for the performance that is achievable through a sole focus on improving diversification within an SRI universe. In that sense they constitute a useful yardstick for active SRI funds from which investors would at least expect improved diversification, if not additional value added through stock picking. Given that such efficient SRI indices are also easy to replicate at low cost, they constitute investable alternatives to actively managed funds, and are thus relevant for practical comparisons of performance.

# Conclusion

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# Appendix



# Appendix

## 1. A Brief Description of the SRI Eurozone Index Landscape

### 1.1. The collection of Eurozone SRI indices

As the focus of this article was a new SRI efficient index, the ERAFP SRI efficient index, it is interesting to show how this index stands compared to other SRI indices. This new SRI index was derived to benchmark the Eurozone. Thus, in the present study, in order to keep the same universe, we choose to consider only SRI indices that cover the 12 Eurozone countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain).

Here, we first present the existing Eurozone SRI indices with a brief description of their methodology. Reviewing all SRI index providers, we identified five main Eurozone indices – with additional variations for some of them, Table A.1 gives the list of providers with the name of the main index variation for each of them, as well as the number of existing variations. The index variations include market-cap variations and exclusion indices. Note that, as this study focuses on the Eurozone, we could not consider a FTSE4GOOD index, as this index only has a Europe variation. The Stoxx and Dow Jones

index families appear to be structured in the same way. They both include a main index, two exclusion indices and a large cap index. The E. Capital Partner index family includes two variations for the Eurozone, a broad one and another one made of half the number of components corresponding to the largest cap.

We reviewed the characteristics of all these indices, including the date they were set up, their number of components, their asset universe, the criteria used to screen the assets, their weighting system and their frequency of revision. If we only consider the main variations of these indices, most of them are based on a positive screening. E. Capital Partner Indices make the exception as they used sector exclusion. Stoxx and Dow Jones, for their part, have created specific variations for sector exclusion. Concerning the weighting system, most of these indices use cap-weighting system (ASPI Eurozone, Euro Stoxx Sustainability, Dow Jones Sustainability, E. Capital Ethical Euro). Some of them use the sustainability scores (Euro Stoxx Sustain 40, Dow Jones Sustainability Eurozone 40, which are the two SRI large cap variations of the Stoxx and Dow Jones families). Most of these indices – in fact all cap-weighted indices – are revised quarterly. Only the two indices weighted by sustainability scores

- 14 - <http://www.vigeo.com/csr-rating-agency/en/nos-produits-isr/indice-aspi/indice-aspi.html>  
 15 - <http://www.stoxx.com/indices/types/sustainability.html>  
 16 - <http://www.sustainability-index.com/>  
 17 - [http://www.ecpigroup.com/ecpi\\_indices.asp?ldSEZ=15](http://www.ecpigroup.com/ecpi_indices.asp?ldSEZ=15)  
 18 - <http://www.vigeo.com/csr-rating-agency/en/nos-produits-isr/indices-esi/indices-ethibel-sustainability.html>

Table A.1. Eurozone SRI Indices

Name of the indices	Promoters	Nb of variations
ASPI (Advanced Sustainable Performance Index) Eurozone <sup>14</sup>	Vigeo / Stoxx Limited/ France	1
Euro Stoxx Sustainability Index <sup>15</sup>	Bank Sarrasin / Stoxx Limited / Switzerland	4
Dow Jones Sustainability Eurozone Index <sup>16</sup>	Dow Jones / SAM / Switzerland	4
E. Capital Partner Index (ECPI) <sup>17</sup>	E. Capital Partners / Italy	2
Ethibel Sustainability Index <sup>18</sup>	Vigeo / Ethibel	1

# Appendix

Table A.2. Eurozone indices characteristics

Name of the index	Promoter	Creation Date	Number of Components	Universe	Methodology	Weighting	Revision
ASPI Eurozone (Advanced Sustainable Performance Index)	Vigeo / Methodology implemented by IEM Finance / calculated by Stoxx Limited / France	July 2001 (available since 1 January 1992)	120	DJ Euro Stoxx	ESG criteria / Best in class screening (exclusion restricted to anti-personnel landmines and cluster munitions)	Free float market capitalisation (same rules as Euro Stoxx indices) + no weight >10%	Quarterly (March. June. September. December) Reassessment in September
Euro Stoxx Sustainability	Bank Sarasin since March 2011 (previously. SAM -Sustainable Asset Management) / calculated by Stoxx Limited / Switzerland	15 October 2001 (available since 31 December 1998)	Variable (88. February 2011)	DJ Stoxx 600 restricted to Euro assets	ESG criteria	Free float market capitalisation	Quarterly (March. June. September. December) + Reassessment in September
Euro Stoxx Sustainability ex AGTAF <sup>19</sup>			Variable (75. February 2011)	DJ Euro Stoxx Sustainability	Exclusion of assets involved in alcohol. gambling. tobacco. armaments and firearms		
Euro Stoxx Sustainability ex AGTAF <sup>20</sup>			Variable (74. February 2011)		Exclusion of assets involved in alcohol. gambling. tobacco. armaments. firearms and adult entertainment.		
Euro Stoxx Sustain 40		31 January 2006 (available since 15 October 2001)	40		Blue chip	Sustainability scores	Annually (September)
Dow Jones Sustainability Eurozone Index	Dow Jones / SAM	04 August 2010 (available since 30 September 2001)	Variable (96. February 2011)	Dow Jones Sustainability Europe Index restricted to Eurozone companies	Eurozone sustainability leaders as identified by SAM	Free float market capitalisation	Quarterly (March. June. September. December) + Reassessment in September
Dow Jones Sustainability Eurozone Index ex AGTAF					Exclusion of assets involved in alcohol. gambling. tobacco. armaments and firearms		
Dow Jones Sustainability Eurozone Index ex All / AE <sup>21</sup>					Exclusion of assets involved in alcohol. gambling. tobacco. armaments. firearms and adult entertainment.		
Dow Jones Sustainability Eurozone 40 Index		22 July 2010 (available since 28 September 2001)	40		Blue chip	Sustainability scores	Annually (September)
ECPI Ethical Index Euro	E. Capital Partners (independent financial adviser) / Italy	May 2000	150 (Large cap)	EMU Market	ESG criteria validated by a Catholic committee / Negative screening (exclusion of assets involved in tobacco. alcohol. pornography). Positive screening (social and environmental concerns).	Free float market capitalisation	Quarterly
ECPI EMU ESG Equity Index		January 2003	300				
ESI (Ethibel Sustainability Index) Excellence Euro	Vigeo / Ethibel	February 2010	114 (February 2011)	Ethibel Investment Registers / Eurozone	Positive screening + negative screening for controversial activities	Free float market capitalisation	Around 8 times a year

19 - AGTAF is the acronym for Alcohol. Gambling. Tobacco. Armaments and Firearms.

20 - AGTAF is the acronym for Alcohol. Gambling. Tobacco. Armaments. Firearms and Adult entertainment.

21 - All is for Alcohol. Gambling. Tobacco. Armaments. Firearms and AE for Adult Entertainment.

# Appendix

are revised just once a year. Most of these indices were created in the early 2000s. The Dow Jones Sustainability indices were introduced only in 2010, but historical data are provided started in 2001. The Ethibel index was also created in 2010 and is only available from this date, so it will not be included in our computations.

The main characteristics of all these indices are summed up in table A.2. Indeed, none of these indices were set up with the aim of producing an efficient performance benchmark. Meanwhile, indices are often used as benchmarks by fund managers, whose main objective is to generate performance while controlling their risks and remaining diversified. In the conventional investment universe, lots of studies have been done in the recent years to develop indices based on weighting systems other than cap-weighting in the aim of producing performance indices. Such initiatives had not yet been conducted in the SRI universe, which deprived SRI managers from optimisation methodologies developed in financial theory.

## 2. Performance Analysis of SRI Indices

The performance of the ERAFP SRI efficient index has been analysed and compared to the one of other SRI Eurozone indices, as well as to the one of conventional SRI indices. We collected all SRI indices in existence for the Eurozone and having at least four years of data. We thus gathered eleven indices belonging to four families.<sup>22</sup> We also added to our sample two conventional indices representing the Eurozone, one Stoxx index and one FTSE

index. The methodology was the same as the one used for funds, except that computation for indices was made using only one market factor, the Euro Stoxx.

### 2.1. Statistical Indicators

Table A.3 exhibits the mean return, standard deviation, skewness, excess kurtosis for the SRI and conventional indices. Extreme risks (Cornish-Fisher Var) and absolute risk-adjusted performance measure (Sharpe ratio) are also shown. Note that all these indicators are completely free from a benchmark choice. The reference benchmark, the Euro Stoxx (which is mentioned in the table) only serves for tracking-error and information ratio computations, as well as for the evaluation of the percentage of weeks indices produce a higher performance than the market. The characteristics of the SRI indices were detailed above (see table A.2). Concerning the conventional indices, the Stoxx index uses a cap-weighting system, while the weights of the FTSE EDHEC-Risk Eurobloc index are computed according to the same methodology as the ERAFP SRI Index, the latter index deemed to be efficient.

Looking at the means, we observe that the ERAFP SRI Index is one of the two indices obtaining the least negative figure among all twelve SRI indices. Only the E-Capital Ethical Euro Index obtains a less negative mean, but with higher standard deviation and higher kurtosis. The FTSE EDHEC-Risk Eurobloc index, one of the conventional indices, produces the less negative mean among all indices. Note that this index is weighted according to the same efficient methodology as the ERAFP SRI Index. The ERAFP SRI Index is the one with the

22 - A fifth SRI index family (Ethibel) was created too recently (about two years of data) to be used in our performance evaluation tests.

# Appendix

Table A.3. Statistical and risk indicators for SRI and conventional indices over the period from 2008 to 2011<sup>23</sup>.

Jan. 2008 – Dec. 2011 Benchmark: Euro Stoxx	Mean	Stand Dev	Skewness	Kurtosis	Cornish-Fisher Var (95 %)*	Sharpe ratio	Tracking-error	Information ratio	% Week Index>Market
<b>SRI Indices</b>									
SRI FTSE EDHEC-Risk ERAFP	-5.92%	26.63%	-0.91	3.71	6.81%	-0.30	5.61%	0.34	53.11%
ASPI EUROZONE E	-7.19%	29.32%	-0.75	4.10	7.31%	-0.31	2.47%	0.27	51.20%
EURO STOXX SUSTAINABILITY	-7.35%	29.30%	-0.64	3.83	7.23%	-0.32	2.98%	0.17	50.24%
EURO STOXX SUSTAIN 40	-6.99%	28.88%	-0.55	3.63	7.04%	-0.31	4.12%	0.21	50.24%
EURO STOXX SUSTEXAL TOB GAM F&A	-7.94%	30.04%	-0.53	3.47	7.33%	-0.33	3.83%	-0.02	48.33%
EURO STOXX SUST EX AGTAF A E	-7.81%	30.08%	-0.53	3.45	7.34%	-0.33	3.88%	0.01	50.72%
DJSI EUROZONE E	-7.06%	29.86%	-0.64	3.48	7.39%	-0.30	3.01%	0.26	49.28%
DJSI EUROZONE 40 E	-7.25%	29.39%	-0.66	3.77	7.27%	-0.32	3.78%	0.16	50.72%
DJSI EZONExA/T/G/A/F E	-7.42%	30.40%	-0.60	3.36	7.48%	-0.31	3.83%	0.11	50.72%
DJSI EZONExA/T/G/A/F & ADULT ENT E	-7.54%	30.61%	-0.57	3.23	7.52%	-0.31	3.99%	0.08	49.28%
E. CAPITAL ETHICAL EURO	-5.22%	27.99%	-0.69	4.68	6.85%	-0.26	5.35%	0.49	55.50%
E CAPITAL ETHICAL EURO(EMU MRKT.)	-8.60%	29.42%	-0.58	2.63	7.31%	-0.36	3.39%	-0.22	44.50%
<b>Conventional Indices</b>									
EURO STOXX	-7.85%	28.73%	-0.80	4.15	7.24%	-0.34	0.00%	NA	NA
FTSE EDHEC-Risk Eurobloc	-4.37%	26.11%	-0.89	3.88	6.63%	-0.24	6.53%	0.53	53.11%

The mean returns and standard deviations, computed with weekly returns are annualised.

\*non-annualised 5%-quantiles are estimated.

23 - See table 2 for a detailed description of the SRI indices analysed in this table. For the Euro Stoxx family, the extension ex AL TOB GAM F&A is for excluding Alcohol, Gambling, Tobacco, Armaments and Firearms and the extension ex AGTAF A is for excluding Alcohol, Gambling, Tobacco, Armaments, Firearms and Adult entertainment. For the DJSI Eurozone family, similarly, the extension ex A/T/G/A/F is for excluding Alcohol, Gambling, Tobacco, Armaments and Firearms and the extension ex A/T/G/A/F & ADULT ENT is for excluding Alcohol, Gambling, Tobacco, Armaments, Firearms and Adult entertainment.

24 - Note that the conventional efficient counterpart produces a lower kurtosis figure than the cap-weighted index.

lowest standard deviation among all SRI indices. Here again, among conventional indices, only FTSE EDHEC-Risk Eurobloc index produces a slightly lower volatility. As expected all skewness values are negative, given that the market was decreasing during the evaluation period. The kurtosis figure is not the lowest value for the ERAFP SRI efficient index. It appears to be a median value for the index sample.<sup>24</sup> Meanwhile, looking at Value-at-Risk (VaR) – computed according to the Cornish-Fisher extension – that evaluates the amount of the portfolio that can be lost in one week, the ERAFP SRI Index is the one that produces the lowest figure

among SRI indices. The E-Capital Ethical Euro Index follows close behind. The FTSE EDHEC-Risk Eurobloc index does the same in the conventional group. Tracking-error, evaluated with regard to the Euro Stoxx index, produces the largest figures for the efficient ERAFP SRI Index, a result we could have anticipated as this index does not use the same weighting schemes as the others and as such is more likely to deviate from the index chosen as a market proxy. The E-Capital Ethical Euro exhibits the second largest figure for tracking error among SRI indices. As a result, these two indices are also the ones that produce the highest information ratios. Finally, we

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looked at the number of weeks for which the indices beat the market (Euro Stoxx index). The ERAFP SRI Index arrives in the second place, just behind the E. Capital Ethical Euro index. We also note that the FTSE EDHEC-Risk Eurobloc index – the conventional efficient index – beats the market more than once over two times.

### 2.2. Factor models

We also performed analysis using three factor models in turn: the single-factor model, the Fama-French three-factor model and the Carhart four-factor model. Looking at the results produced by the CAPM model (see table A.4), we observed that positive alpha values are dominant, as only one index produces a negative alpha. However, none of the alpha values are significant. Note that the two efficient indices (ERAFP SRI Index and FTSE EDHEC-Risk Eurobloc Index) are least exposed to the market factor, though the difference

with others is slight. This is not surprising considering they used a different weighting scheme. Note that the Euro Stoxx index could not be analysed with a factor model, as it serves as the market factor.

Now looking at the results obtained with the Fama-French three-factor model (see table A.5), we observed again that only one SRI index still produces a negative alpha (the broad E. Capital Ethical index). Once again none of the positive alpha values in the SRI group is significant. Concerning the style biases, growth biases are dominant in the SRI group. The ERAFP SRI Index stands out, being the only one with a significant value bias. The conventional efficient index also exhibits a significant value bias. More surprising, the ERAFP SRI Index exhibits a significant small-cap bias, though its reference universe is made of large cap and medium

Table A.4. Measure of alpha obtained with the CAPM model from 2008 to 2011.

January 2008 - December 2011			
Benchmark: DJ Euro Stoxx	alpha	Mkt beta	Adj R <sup>2</sup>
<b>SRI Indices</b>			
SRI FTSE EDHEC-Risk ERAFP	1.05%	0.91	0.96
ASPI EUROZONE E	0.83%	1.02	0.99
EURO STOXX SUSTAINABILITY	0.64%	1.01	0.99
EURO STOXX SUSTAIN 40	0.81%	0.99	0.98
EURO STOXX SUSTEXAL TOB GAM F&A	0.28%	1.04	0.99
EURO STOXX SUST EX AGTAF A E	0.42%	1.04	0.98
DJSI EUROZONE E	1.13%	1.03	0.99
DJSI EUROZONE 40 E	0.75%	1.01	0.98
DJSI EZONExA/T/G/A/F E	0.93%	1.05	0.99
DJSI EZONExA/T/G/A/F & ADULT ENT E	0.88%	1.06	0.99
E. CAPITAL ETHICAL EURO	2.21%	0.96	0.97
E CAPITAL ETHICAL EURO(EMU MRKT.)	-0.58%	1.02	0.99
<b>Conventional Indices</b>			
EURO STOXX	NA	NA	NA
FTSE EDHEC-Risk Eurobloc	2.37%	0.89	0.95

Alpha, computed with weekly return is annualised. The significant of regression parameters is measured with a t-statistic at the threshold of 5%. Figures for significant alpha are in bold.

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cap stocks. Its conventional counterpart also shares this same characteristic, while the vast majority of all other SRI indices produce a significant large cap bias.

Note that all biases are evaluated using the Euro Stoxx index, which is a cap-weighted index, as market index proxy in the factor model. In fact, there is no reason to consider that a cap-weighted index is more neutral towards style biases than an index obtained with another weighting scheme. As a result, styles bias estimation is not absolute, but rather relative and will depend on the reference index. The finding that efficient indices, SRI and non-SRI, exhibit value biases in reference to a cap-weighted index, can also be seen from another point of view. Indeed, we can conclude that the cap-weighted index has a growth bias relative to the efficient indices. In the same way, similar considerations can lead to the conclusion

that cap-weighted indices exhibit a large cap bias with regard to efficient indices. Perhaps these are not the efficient indices, which have a small cap bias, but rather the cap-weighted indices have a large cap bias. Indeed cap-weighted indices are somewhat constructed with a large cap-bias since the small cap assets contribute with a non significant share, leading to indices concentrated on the largest market caps. Thus, a more diversified index will necessarily appear with a small cap bias with regard to a cap-weighted index, even if it is based on a universe made of large cap and mid cap assets. The issue is to determine which the true style neutral reference is, You can also refer to Amenc, Goltz, Martellini and Tang (2011) which presents similar considerations.

Finally, with the Carhart four-factor model (see table A.6), we obtained results quite similar with those obtained with the

Table A.5. Measure of alpha obtained with the Fama-French three-factor model and style factor exposures for SRI and conventional Eurozone indices from 2008 to 2011.

January 2008 - December 2011					
Benchmark: DJ Euro Stoxx	alpha	Beta Mkt	Beta V-G	Beta SC-LC	Adj R <sup>2</sup>
<b>SRI Indices</b>					
SRI FTSE EDHEC-Risk ERAFP	0.08%	0.93	0.06	0.32	0.98
ASPI EUROZONE E	1.29%	1.00	<i>0.01</i>	-0.14	1.00
EURO STOXX SUSTAINABILITY	1.06%	1.01	<i>-0.02</i>	-0.14	0.99
EURO STOXX SUSTAIN 40	1.07%	1.00	-0.09	-0.10	0.98
EURO STOXX SUSTEXAL TOB GAM F&A	0.63%	1.03	<i>-0.02</i>	-0.11	0.99
EURO STOXX SUST EX AGTAF A E	0.78%	1.03	<i>-0.02</i>	-0.12	0.99
DJSI EUROZONE E	1.57%	1.03	<i>-0.02</i>	-0.14	0.99
DJSI EUROZONE 40 E	1.10%	1.01	-0.05	-0.12	0.99
DJSI EZONExA/T/G/A/F E	1.30%	1.04	<i>-0.03</i>	-0.12	0.99
DJSI EZONExA/T/G/A/F & ADULT ENT E	1.23%	1.05	<i>-0.02</i>	-0.11	0.99
E. CAPITAL ETHICAL EURO	2.05%	0.97	<i>-0.05</i>	<i>0.04</i>	0.97
E CAPITAL ETHICAL EURO(EMU MRKT.)	-0.67%	1.03	<i>-0.03</i>	<i>0.02</i>	0.99
<b>Conventional Indices</b>					
EURO STOXX	NA	NA	NA	NA	NA
FTSE EDHEC-Risk Eurobloc	1.06%	0.92	0.06	0.42	0.98

Alpha. computed with weekly return is annualised. The significant of regression parameters is measured with a t-statistic at the threshold of 5%. Beta that is not statistically significant is in italics.

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three-factor model, in terms of alpha and style factor exposures. In the SRI group, the same index produces the negative alpha. None of the positive alpha is significant. The ERAFP SRI Index is still the only one with a significant value bias in the SRI group. All other SRI indices exhibit growth biases, whether they are significant or not. We still observe a significant small cap bias for the ERAFP SRI Index, a characteristic which is again shared by its conventional counterpart. Finally, we observe that all beta momentum figures are negative and that all significant figures are quite comparable in terms of range value. Meanwhile, the two SRI blue chip indices exhibit the most negative value.

In conclusion, we observed that during this period of declining markets, a vast majority of indices, whether they belong to the SRI or to the conventional group, have produced positive alpha, according to

factor model evaluation, but none of them were identified as significant.

We also made some additional computations to test the influence of the choice of index factor on style biases. We used the Euro Stoxx TM index to replace the Euro Stoxx index as market factor and obtained quite similar results both for alpha values and style exposures. We also replaced the Large Cap factor by a Mid Cap factor. Here again, the style exposures we obtained were quite similar. The range of alpha values was modified, but sign and significance remain similar.

Another test has consisted of performing the same computations on index excess return, namely the difference in return between each index and the market factor. For this part, the interesting results were those provided by the R-squares of the various regressions (see table A.7). As

Table A.6. Measure of alpha obtained with the Carhart four-factor model and style factor exposures for SRI and conventional Eurozone indices from 2008 to 2011.

January 2008 – December 2011	alpha	Mkt Beta	V-G Beta	SC-LC Beta	Momentum Beta	Adj R <sup>2</sup>
<b>SRI Indices</b>						
SRI FTSE EDHEC-Risk ERAFP	0.19%	0.93	<i>0.04</i>	0.32	-0.16	0.98
ASPI EUROZONE E	1.35%	1.00	<i>0.00</i>	-0.14	-0.09	1.00
EURO STOXX SUSTAINABILITY	1.09%	1.01	<i>-0.03</i>	-0.13	<i>-0.04</i>	0.99
EURO STOXX SUSTAIN 40	1.19%	1.00	-0.11	-0.10	-0.19	0.98
EURO STOXX SUSTEXAL TOB GAM F&A	0.66%	1.03	<i>-0.03</i>	-0.11	<i>-0.04</i>	0.99
EURO STOXX SUST EX AGTAF A E	0.79%	1.03	<i>-0.02</i>	-0.12	<i>-0.01</i>	0.99
DJSI EUROZONE E	1.61%	1.02	<i>-0.03</i>	-0.14	<i>-0.06</i>	0.99
DJSI EUROZONE 40 E	1.22%	1.01	-0.08	-0.12	-0.18	0.99
DJSI EZONExA/T/G/A/F E	1.33%	1.04	<i>-0.03</i>	-0.12	<i>-0.05</i>	0.99
DJSI EZONExA/T/G/A/F & ADULT ENT E	1.25%	1.05	<i>-0.03</i>	-0.11	<i>-0.04</i>	0.99
E. CAPITAL ETHICAL EURO	2.06%	0.97	<i>-0.05</i>	<i>0.04</i>	<i>-0.02</i>	0.97
E CAPITAL ETHICAL EURO(EMU MRKT.)	-0.59%	1.02	-0.04	<i>0.02</i>	-0.12	0.99
<b>Conventional Indices</b>						
EURO STOXX	NA	NA	NA	NA	NA	NA
FTSE EDHEC-Risk Eurobloc	1.14%	0.92	0.04	0.42	-0.12	0.98

Alpha. computed with weekly return is annualised. The significant of regression parameters is measured with a t-statistic at the threshold of 5%. Beta that is not statistically significant is in italics.

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expected, the  $R^2$  for the CAPM were very weak. For the multi-factor models, the results are a bit more contrasted, with values ranging from 3% to 75%. In the SRI group, the ERAFP SRI Index and the ASPI Eurozone index are the two indices for which the models are the most explicative with  $R^2$  values around 50-60%. All other  $R^2$  values are quite weak, though larger than the ones obtained with the CAPM model. The conventional index exhibits a higher  $R^2$  showing that the model was somewhat explicative.

Table A.7. Measure of  $R^2$  obtained with the CAPM, Fama-French three-factor and Carhart four-factor model applied to index excess return from 2008 to 2011.

January 2008 - December 2011	Adj $R^2$		
Benchmark: DJ Euro Stoxx	CAPM	Fama-French	Carhart
<b>SRI Indices</b>			
SRI FTSE EDHEC-Risk ERAFP	0.20	0.58	0.60
ASPI EUROZONE E	0.04	0.48	0.51
EURO STOXX SUSTAINABILITY	0.02	0.26	0.26
EURO STOXX SUSTAIN 40	0.00	0.09	0.14
EURO STOXX SUSTEXAL TOB GAM F&A	0.08	0.17	0.17
EURO STOXX SUST EX AGTAF A E	0.08	0.18	0.18
DJSI EUROZONE E	0.11	0.37	0.37
DJSI EUROZONE 40 E	0.01	0.12	0.19
DJSI EZONExA/T/G/A/F E	0.15	0.25	0.25
DJSI EZONExA/T/G/A/F & ADULT ENT E	0.18	0.26	0.26
E. CAPITAL ETHICAL EURO	0.05	0.06	0.06
E CAPITAL ETHICAL EURO(EMU MRKT)	0.02	0.03	0.06
<b>Conventional Indices</b>			
EURO STOXX	NA	NA	NA
FTSE EDHEC-Risk Eurobloc	0.24	0.74	0.75

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# About EDHEC-Risk Institute

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Nbr of permanent staff	80
Nbr of research associates	18
Nbr of affiliate professors	6
Overall budget	€11.200.000
External financing	€6.215.000
Nbr of conference delegates	1.850
Nbr of participants at EDHEC-Risk Indices & Benchmarks seminars	391
Nbr of participants at EDHEC-Risk Institute Risk Management seminars	419
Nbr of participants at EDHEC-Risk Institute Executive Education seminars	356

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# EDHEC-Risk Institute Publications and Position Papers (2009-2012)



## EDHEC-Risk Institute Publications (2009–2012)

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### 2012

- Martellini, L., V. Milhau and A.Tarelli. Dynamic investment strategies for corporate pension funds in the presence of sponsor risk (March).
- Goltz, F. and L. Tang. The EDHEC European ETF survey 2011 (March).
- Sender, S. Shifting towards hybrid pension systems: A european perspective (March).
- Blanc-Brude, F. Pension fund investment in social infrastructure (February).
- Ducoulombier, F., Lixia, L., and S. Stoyanov. What asset-liability management strategy for sovereign wealth funds? (February).
- Amenc, N., Cocquemas, F., and S. Sender. Shedding light on non-financial risks – a European survey (January).
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