

Article

Responsible or Thematic? The True Nature of Sustainability-Themed Mutual Funds

Federica Ielasi ^{1,*}  and Monica Rossolini ² 

¹ Department of Economics and Management, University of Florence, 50127 Florence, Italy

² Department of Business and Law, University of Milano-Bicocca, 20126 Milan, Italy;
monica.rossolini@unimib.it

* Correspondence: federica.ielasi@unifi.it; Tel.: +39-339-8510987

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Abstract: The aim of the paper is to compare the risk-adjusted performance of sustainability-themed funds with other categories of mutual funds: sustainable and responsible mutual funds that implement different approaches in portfolio selection and management, and thematic funds not committed to responsible investments. The study analyses a sample of about 1000 European mutual open-end funds where 302 are sustainability-themed funds, 358 are other responsible funds, and 341 other thematic funds. Risk-adjusted performance is analyzed for the period 2007–2017 using different methodologies: a single factor Capital Asset Pricing Model (CAPM), a Fama and French (1993) 3-factor model, and a Fama and French (2015) 5-factor model. Our main findings demonstrate that the risk-adjusted performance of ST funds is more closely related to their responsible nature than to their thematic approach. Sustainability-themed mutual funds are more similar to other socially responsible funds than to other thematic funds, as confirmed by performance analysis over time. They are also better than other thematic funds in overcoming financially turbulent periods and currently benefit from SRI regulation and disclosure.

Keywords: fund managers; mutual fund; ESG investing; socially responsible funds; thematic funds; sustainability-themed funds

1. Introduction

Sustainable and Responsible funds integrate financial analysis with environmental, social and good governance (ESG) criteria in the selection and management of assets [1,2]. In doing so, they can apply different approaches for portfolio composition and asset allocation [3]. These strategies include the exclusion of securities from the eligible investment universe (negative screening), best-in-class selection (positive screening), sustainability-themed investment, norms-based screening, impact investing, engagement, and voting on sustainability issues [2,4].

Among these approaches, sustainability-themed funds, sustainable product following a thematic strategy, grew with a Compound Annual Growth Rate of 25% from 2009 and 2017, reaching over 148 billion euro of Asset Under Management [3]. Since this approach translates into the selection of securities related to sustainability, it benefits from investors' increasing interest in themes such as climate change and water management [5]. From the point of view of clients, climate change discussions at international policy level have impacted public opinion and demand, and there are signs that investors increasingly understand that water is one of the main ways in which we will experience the worst of climate change. This rising awareness has increased the demand for investments in particular in the area of sustainability [3]. Investors are then seeking funds able to produce attractive financial performance, as well as a positive social and environmental impact [6–9].

The fast increase in the development of sustainability-themed funds is not related just on investors demand, but also to portfolio managers' attempt to mitigate risks [10]. In particular, environmental risks are considered for the near future to be the most severe type of risk in terms of probability and impact [11]. The five most serious risks for 2018 included natural disasters, failure of climate change mitigation, and water-related extreme events [11]. To reduce these risks, which also impact the financial risk of a portfolio, asset managers are more and more inclined towards portfolios specialized in assets with an environmental and ecological inclination, aimed at developing a sustainable economy.

This research aims to verify whether sustainability-themed funds (ST funds) are actually able to produce benefits for investors in terms of risk-adjusted returns compared to other responsible funds (SR funds), as well as other thematic funds focused on themes other than sustainable economy (TH funds).

Our research questions are:

1. Does the risk-adjusted performance of ST funds statistically differ from SR funds?
2. Does the risk-adjusted performance of ST funds statistically differ from TH funds?

First, the study compares funds classified in general as sustainable and responsible and that apply different investment approaches. The aim is to verify if the managerial strategy applied to funds characterized by the same level of sustainability is able to modify the risk-adjusted performance.

Secondly, the paper deepens the thematic approach, comparing funds specialized in sustainable themes with products focused on other types of themes. In this case, the aim is to verify if the thematic style is suitable for sustainable topics, and if the choice of the theme is able to affect the risk-adjusted performance.

The core of the analysis is represented by sustainability-themed mutual funds, with the purpose of verifying if their true nature, in terms of adjusted returns for investors, is more comparable with other sustainable funds or other thematic funds.

The study is based on a sample of around 1000 open-ended mutual funds. In particular, the sample is made up of 302 ST funds, 358 SR funds, and 341 TH funds. The empirical analysis covers the period from 31 August 2007 to 31 July 2017, and applies the Capital Asset Pricing Model methodology, as well as the Fama and French 3-factor model, and the Fama and French 5-factor model [12–17].

The paper's contribution is twofold.

First, it focuses the analysis on a new and developing investment approach among sustainable and responsible mutual funds. To deepen the study on the relationship between portfolio financial returns and their level of responsibility, some previous empirical analysis distinguished the funds according to their sustainability rating [18]. To the best of our knowledge, few studies have focused on the comparison of performance yielded by different responsible methodologies of portfolio selection, for example, a best-in-class screening criteria with a negative screening approach [19–26]. Other research has analyzed theme-specific funds, such as green funds or water-related funds [6,27–34], but without a general overview of the thematic approach linked to sustainability. This research compares sustainability-themed funds with portfolios based on other responsible screening approaches. Our study documents no statistically significant differences in terms of performance between ST funds and other SR funds. As a consequence, the sustainability-themed approach can be applied as main portfolio strategy or combined with other responsible screening methodology without changing the overall risk-adjusted performance.

Our second contribution is the deepening on the thematic investment strategy. Differently from the traditional sector/regional-based approaches, theme-based strategies look for opportunities related to a key trend and a common theme, such as security, digital innovation, data science, robotics, sustainable economy, or climate change, in order to generate profits and values across economic sectors and geographical areas. Our study compares the returns of thematic funds based on sustainability with portfolios based on other themes, with the intention of verifying the differences in terms of investment style and risk-adjusted performance. Our main findings show that ST funds are characterized by lower risk adjusted performance than TH funds. The lower capability to generate financial returns is

due to differences in terms of investment style and to the long-term orientation of environmental and social themes.

Nevertheless, sovereign and financial crisis negatively affects the performance of TH funds in a more severe way. Our findings demonstrate that ST funds are able to overcome the market turbulence better than other funds.

Moreover, landmark events such as COP21 and the introduction of new measures that can proxy the risk of losses linked to environmental, social or governance factors attract the attention of asset managers and savers on sustainable and responsible investment. According to our results, these conditions are able to impact negatively on the returns of TH funds, and positively in the performance of ST funds.

Based on our results, fund managers can apply the thematic approach in order to efficiently reconcile financial returns and sustainability. This is particularly emphatic since practices and regulation on ESG factors put asset portfolio sustainability in the spotlight and increased the level of transparency. Our findings will help fund managers to understand the true nature of ST funds, which represent an approach to sustainable and responsible investment, but which differ significantly from the general category of thematic funds. They are able to produce quantifiable financial impacts over the long-term, overcoming financial turbulent periods.

The paper is organized as follows. Section 2 presents a review of the literature about the differences in terms of risk-adjusted performance between conventional funds and responsible ones, as well as the literature about the impact of the different asset managers' strategies among responsible investing, with a focus on green funds. Section 3 details the sample data and methodologies carried out in the analysis. Section 4 shows the main results. Lastly, Section 5 concludes and presents implications and limitations of the study.

2. Literature Review and Testable Hypothesis

The structure of this paper is first related to the traditional literature about socially responsible funds, mainly aimed at comparing risk-adjusted returns of responsible and conventional funds, given the different level of diversification and resulting level of profitability [4,19,22,24,27,29,35–56].

In general, the authors tested hypotheses on the existence of a potential ethical sacrifice in terms of returns given the portfolio constraints of sustainable and responsible investment [57].

This literature mainly differs with respect to the specific countries analyzed: starting from studies focused on the US, such as [19,37,48,50,51,53,56], the researches expanded to Canada [38], the UK [37,44,46,47], France [22], Germany [37], other European markets [27,39,54], the Asia-Pacific [39], and Islamic markets [55]. Additionally, studies differ with respect to the specific risk factors considered in multi-factor models for asset pricing (such as fund size [58], fund age [44], cash flows [59], fee structure and fee level for mutual funds [27,60], organization and liquidity [58,61], firms' environmental performances [45], as well as a set of social responsibility indices [39]). The role of investors was investigated as a relevant factor able to impact fund performance, too [47,49,52,59,62]. Responsible investors are shown to be more loyal and less reactive to market shocks, which is consistent with the hypothesis of mixed utility functions with profit and sustainability goals [4,63–65]. Considering the differences in demand, in line with Merton [66] and Luo and Balvers [67], differential expected returns can be linked to an excess demand for stocks of responsible companies and a shortage of demand for stocks of irresponsible businesses [47,68].

The majority of these studies found that responsible funds are able to achieve risk-adjusted performance not significantly different from the overall financial market. In general, the results demonstrate that responsible constraints are not able to reduce funds' returns, either before or after fees. Some authors have highlighted an over- or under-performance of responsible funds compared to conventional ones with respect to a specific period. For example, the effect of the business cycle was studied [38,49,51,69], or the importance of establishment date, distinguishing between more and less young funds [30,36,70], as well as the behaviors of sustainable and responsible products during

financial crisis [51,71,72]. Studies demonstrated in general that responsible investments perform better than conventional ones during periods of economic recession [23,71–74].

Starting from this literature, usually based on a CAPM-based methodology [12–17], we apply multi-factor models to measure and compare the performance of sustainability-themed mutual funds with other sustainable funds, as well as other thematic funds, looking for differences across the analyzed period. Moving from the same hypotheses, we verify how portfolio choice and diversification level can affect performances of sustainability-themed mutual funds.

In particular, given that the selection of assets in ST funds can be significantly constrained by the specific selected theme, we expect a lower diversification level and a correlated higher risk for ST funds compared to other SR funds. On the other hand, since the purpose of a thematic approach is to benefit from megatrends shaping the world, by identifying the long-term winners on the global financial markets, ST funds can generate higher returns compared to SR funds.

H1: *Given the different investment style, ST funds have higher risk-adjusted returns than SR funds.*

Nevertheless, sustainability-themed investing in Europe is mainly focused on themes related to environmental issues, such as renewable energies, mitigation of climate change, energetic efficiency, water consumption, and the low-carbon economy. As with responsible funds in general, ST funds are also long-term oriented, and their typical themes are able to generate returns in the very long term compared to other thematic funds focused on disruptive technologies and innovations. Moreover, the literature shows a high and direct connection between environmental and financial risks: corporate social responsibility, including commitment to environmental issues, decreases firms' systematic risk [50,67,75,76], as well as firms' idiosyncratic risk [77]. Consequently, ST funds should record a lower financial risk than TH funds.

H2: *Given the different investment style, ST funds have lower risk-adjusted returns than TH funds.*

Comparing a specific category of responsible funds (the ST ones) with other SR products, we considered the strategy adopted by the asset managers, following the more recent strand of literature focused on managerial abilities, and the relationship between sustainability and performance considering the specific screening and selection approach adopted for responsible investment [78]. In this context, Capelle-Blancard and Monjon tested whether the specific screening process impacted the performance of socially responsible funds [22]; Morgan Stanley investigated the basis of the performance of different sustainable investment strategies [23]; Chen and Scholtens compared active and passive socially responsible investment funds [24]; Henke investigated the specific effect of social screening on mutual fund returns [25]; and Trinks and Scholtens studied the opportunity cost of negative screening in socially responsible investing [26].

Lastly, the recent development of funds dedicated to environmentally and ecologically friendly securities has opened a new strand of literature dedicated to specific categories of socially responsible mutual funds. Alvarez and Rodriguez studied water-related mutual funds focused on investments in companies responsible for creating water infrastructure, for treating, distributing and conserving this natural resource, or for providing technologies useful for better managing water needs [70]. Other authors have focused on environmental mutual funds [30,56] or green funds [28,31–34], products with an ecological inclination, which invest in assets related to environment-oriented industries or businesses, such as clean technologies, natural resources, waste management, sustainable development, renewable energy and energy efficiency. The studies analyzed the characteristics of these funds, comparing their performance with both sustainable and responsible investment and conventional investment.

Our research, starting from this literature, aims at developing the study of the thematic approach. Since this strategy is used both with reference to sustainable themes and to other ones, our study intends to verify the true nature of sustainability-themed mutual funds: how is their risk-adjusted performance vis-à-vis their conventional thematic funds, as well as their responsible peers?

3. Data, Method and Variables

3.1. Data

Our database was compiled from Bloomberg. We used only data from open-end mutual funds. We selected only open-end mutual funds denominated in Euro, domiciled in Europe and classified as “active” by Bloomberg on the date 31 July 2017.

We then used a Bloomberg function to select specific SR funds on the base of the following attributes: “Ethical” and “Environment, Social, Governance”. We identified Thematic funds, i.e., those focusing on one reference theme, by using the Fund Industry variable provided by Bloomberg; we selected funds identified by the tag “thematic”. To select among thematic funds those related to sustainability, we used the following attributes: “Clean energy”, “Climate change”, “Environmental sustainability”, and “Religiously responsible”.

The final sample consisted of 1001 funds. There were 660 SR funds, among which 302 were thematic funds focused on sustainable themes (ST funds), and 341 were thematic funds focused on themes other than sustainability. We collected data relative to monthly return, age, net asset value, geographical diversification (European, global or other). We analyzed the period between 2007 and 2017; our sample was not affected by survival bias, since all the funds that we selected were active in 2017.

Table 1 presents descriptive statistics relative to ST, SR and TH funds.

Table 1. Descriptive statistics.

	ST Funds		SR Funds		TH Funds		T Test (ST-SR)		T Test (ST-TH)	
	Obs.	Mean	Obs.	Mean	Obs.	Mean				
Return%	29,739	−0.03	33,903	−0.01	31,900	0.5	−0.02		−0.06	*
NAV(log)	28,568	10.12	33,440	10.01	30,997	10.02	0.11	***	0.1	***
Age	29,940	7.81	34,186	7.54	32,093	7.1	0.27	***	0.8	***
Investment strategies										
Global	36,240	0.73	42,960	0.53	40,920	0.79	0.2	***	−0.06	***
European	36,240	0.24	42,960	0.42	40,920	0.12	−0.18	***	0.12	***
Other	36,240	0.03	42,960	0.05	40,920	0.09	−0.02	***	−0.06	***

We tested the equality of means between different groups of funds. We compared Sustainability-themed with Socially Responsible funds and Sustainability-themed with Thematic funds. “*”, “**”, “***” indicate 1%, 5%, 10% significance levels, respectively.

The first two columns represent the number of observations and the mean value of monthly return, NAV, age and investment strategy for ST funds. The third and fourth columns are relative to SR funds, whereas the sixth and seventh columns represent TH funds. The last columns present t tests for testing the equality of means between ST funds and SR funds and between ST funds and TH funds. ST and SR funds differ in terms of NAV, age and asset allocation. ST funds display a higher NAV than SR funds. They are older than SR ones, but with a difference that, although significant, is very low (0.27 years). ST funds invest more in global portfolios (73%) than SR funds (53%). Otherwise, they are less focused on investments in the Euro area (24% of the total) than SR funds (42%). We did not detect any differences in the returns of the two groups of funds.

Table 1 also presents a comparison between ST funds and TH funds. In this case, the main differences are relative to return, NAV, age and asset allocation. ST funds displayed a poorer return than TH mutual funds. They exhibited a higher NAV, and they were 0.80 years older than other thematic funds. ST funds invested 73% in global portfolios; a lower percentage than TH funds (79%). Conversely, they invested more in Euro area investments (24%, instead of 12%)

3.2. Method and Variables

We analyzed funds' risk-adjusted performance by using the Capital Asset Pricing Model (CAPM) model. For several years now, this has been the main model used by influential papers that study mutual funds' performance [78].

We firstly run our analysis using the CAPM-based single-index model. The intercept of the model α_p gives the Jensen Alpha.

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \varepsilon_{pt} \quad (1)$$

where:

r_{pt} represents the return on fund p considering month t ,

r_{ft} represents the return on Euribor (one-month), considering month t ,

r_{mt} represents the benchmark portfolio's considering month t ,

β_p represents the beta of the portfolio p . It, measures the portfolio's risk in comparison to the market risk, ε_{pt} represents the residual term considering period t .

Recent literature has expressed the convenience of adopting multi-factor models to exceed the weaknesses of the CAPM single index (see, e.g., [12,14]). The Fama and French 3-factor model seems to be able to explain better the mutual funds' returns [12]. It contains factors in addition to market risk: the returns on size- and book-to-market-sorted equity portfolios. The idea behind these risk factors is that smaller and value firms (i.e., with a low value of market price/book) are likely to outperform bigger and growth firms.

We estimate:

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \delta_p SMB_t + \rho_p HML_t + \varepsilon_{pt} \quad (2)$$

where:

SMB_t represents the difference in return between a small cap portfolio and a large cap portfolio at time t ,

HML_t represents the difference in return at time t between a portfolio containing value stocks (with a high book-to-market ratio) and one consisting of growth stocks (with a low book-to-market ratio).

The Fama and French 3-factor model was one of the first attempts to mitigate CAPM pricing errors; it was flanked by other multi-factor models. More recently, Fama and French extended their model to include five explanatory factors [13]. The 5-factor model captures the size, value, profitability and investment patterns on average stock returns, and includes two additional factors: profitability (the best performers are firms with a high operating profitability) and investment (firms with the high total asset growth record poorer returns).

The Fama and French 5-factor model is shown in Equation (3):

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \delta_p SMB_t + \rho_p HML_t + \phi_p RMW_t + \sigma_p CMA_t + \varepsilon_{pt} \quad (3)$$

where:

RMW_t represents the difference between the returns of robust and weak profitability stock portfolios; CMA_t represents the difference between the returns of low (conservative) and high (aggressive) investment stocks portfolios.

SMB , HML , RMV and CMA factors relating to European markets were downloaded from Kenneth R. French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#Developed).

Finally, we add three dummy variables to our model. The variable 'financial crisis' (FIN_CRISIS) is equal to one for the period from 2007 to 2009, and zero otherwise. 'Sovereign crisis' (SOV_CRISIS) is a dummy variable equal to one for the period 2011–2013, and zero otherwise. These two variables capture

periods of financial turmoil. ‘SRI regulation’ (*SRI_REG*) is a dummy variable that captures important changes in SRI regulations and practices such as the adoption by United Nations Member States of the 2030 Agenda for Sustainable Development in September 2015, along with the urgent call for action by all countries on 17 Sustainable Development Goals; the COP 21 or CMP 11 Paris conference on climate change held November–December 2015; and the release in 2015 of the Morningstar Sustainability Rating, a measure of how well the holdings in a portfolio are performing on ESG issues relative to a portfolio’s peer group. The ‘SRI regulation’ dummy variable is equal to 1 for the period starting from 2015 and zero for the period before 2015.

$$r_{pt} - r_{ft} = \alpha_p + \beta_p(r_{mt} - r_{ft}) + \delta_pSMB_t + \rho_pHML_t + \phi_pRMW_t + \sigma_pCMA + \varphi_pSRI_REG_t + \psi_pFIN_CRISIS_t + \tau_pSOV_CRISIS_t + \varepsilon_{pt} \quad (4)$$

The first part of our estimations is relative to the subsample of sustainable and responsible investments, looking for the dissimilarities between ST and SR funds. The second part of our estimations focuses on the subsample of thematic funds comparing ST with TH funds.

We applied different benchmarks. Firstly, we used the Dow Jones Sustainability Index as a market return, then we assessed the robustness of our main findings using the MSCI World Index and the Dow Jones Industrial Average Index.

4. Results

Table 2 shows the results of the CAPM models applied to the sample of sustainable funds.

Table 2. ST and SR funds (CAPM model—Dow Jones Sustainability Index).

	ST Funds		SR Funds		Difference	
<i>Single Model</i>						
Alpha	−0.175 (0.027)	***	−0.173 (0.025)	***	−0.002	
Rm-Rf	0.321 (0.005)	***	0.303 (0.005)	***	0.018	***
R ²	0.89		0.80			
<i>3-Factor Model</i>						
3-Factor Alpha	−0.188 (0.027)	***	−0.188 (0.026)	***	0.000	
Rm-Rf	0.330 (0.006)	***	0.312 (0.005)	***	0.018	***
SMB	0.025 (0.014)	***	0.066 (0.014)	***	−0.041	***
HML	−0.036 (−0.188)	***	−0.035 (0.012)	***	−0.001	
R squared	0.89		0.80			
<i>5-Factor Model</i>						
5-Factor alpha	−0.382 (0.021)	***	−0.379 (0.043)	***	0.003	
Rm-Rf	0.298 (0.005)	***	0.266 (0.004)	***	0.032	***
SMB	0.134 (0.011)	***	0.157 (0.009)	***	−0.023	***
HML	0.084 (0.016)	***	0.033 (0.013)	**	0.051	***
CMA	0.151 (0.018)	***	0.162 (0.014)	***	−0.011	***
RMW	0.337 (0.021)	***	0.264 (0.0172)	***	0.073	***
R ²	0.89		0.75			

Table 2. Cont.

	ST Funds		SR Funds		Difference	
Crisis and SRI regulation						
Alpha	−0.042 (0.039)		−0.021 (0.032)		−0.021	
Rm-Rf	0.242 (0.005)	***	0.215 (0.004)	***	0.027	***
SMB	0.108 (0.011)	***	0.130 (0.009)	***	−0.022	***
HML	0.232 (0.016)	***	0.169 (0.013)	***	0.063	***
CMA	0.120 (0.018)	***	0.133 (0.0146)	***	−0.013	***
RMW	0.473 (0.021)	***	0.389 (0.017)	***	0.084	***
FIN_CRISIS	−2.450 (0.06)	***	−2.320 (0.0548)	***	−0.130	
SOV_CRISIS	−0.431 (0.0526)	***	−0.401 (0.0569)	***	−0.030	
SRI_REG	0.091 (0.053)	*	0.1234 (0.0428)	***	−0.032	
R ²	0.80		0.76			
Number of funds	302		358			

This table reports the OLS estimates for the sample of ST and SR Funds (SR). The benchmark is represented by Dow Jones Sustainability Index. We tested the equality of means with two-sample Z tests. “*”, “***”, “****” indicate 1%, 5%, 10% significance levels, respectively. Standard errors are in parenthesis.

ST and SR funds show an equal relevant underperformance respect to the market return, in fact the Alpha estimated is negative and without significant statistical difference between the two groups of funds. Even if both ST and SR funds are characterized by a market Beta inferior to one, some differences are detected between the two samples. The exposure to the market risk is higher for ST funds than for SR funds. The Fama and French 3- and 5-factor models confirm the main findings of the previous models and add interesting results about other risk factors. ST funds invest less in small caps (or more in large caps) and are more value-oriented (or less growth-oriented) than SR funds. ST funds focused more on stocks with robust profitability (or less on stocks with weak profitability) than SR funds. Conversely, they invest less in conservative portfolio. The first Hypothesis (H1) is not confirmed, since no substantial difference is detected between risk-adjusted performance of ST and SR funds.

The financial and sovereign crisis generates a decline in the performance of sustainable funds without particular differences when funds adopt a thematic approach. Sustainability regulations positively affect the funds’ performance, but without differences between ST and SR funds. We do not detect differences in the capacity of ST and SR fund due to overcoming periods of financial distress or benefitting from new SRI regulations and practices.

Table 3 presents the results of the CAPM models for the group of thematic funds, revealing differences between sustainability-themed and other thematic funds.

ST funds show a different market exposure and a different value of alpha from TH funds. ST funds report a higher exposure to market risk, and more serious underperformance compared to the benchmark than TH funds.

The analysis of other risk factors show that ST funds are more growth oriented (or less value-oriented) and invest more in stocks with weak profitability (or less in stocks with robust profitability) than TH funds. They are more exposed to aggressive stocks (or less to conservative stocks) and to large-cap firms (or less to small-cap) than TH funds.

Table 3. ST and TH funds (CAPM model—Dow Jones Sustainability Index).

	ST Funds		TH Funds		Difference	
<i>Single Model</i>						
Alpha	−0.175 (0.027)	***	−0.072 (0.027)	***	−0.103	***
Rm-Rf	0.321 (0.005)	***	0.282 (0.005)	***	0.039	***
R squared	0.89		0.62			
<i>3-Factor Model</i>						
3-Factor Alpha	−0.188 (0.027)	***	−0.075 (0.073)	***	−0.113	***
Rm-Rf	0.330 (0.006)	***	0.279 (0.006)	***	0.051	***
SMB	0.025 (0.014)	***	0.025 (0.0149)	*	0.000	
HML	−0.036 (−0.188)	***	0.013 (0.012)		−0.049	***
R ²	0.89		0.62			
<i>5-Factor Model</i>						
5-Factor alpha	−0.382 (0.021)	***	−0.370 (0.026)	***	−0.012	***
Rm-Rf	0.298 (0.005)	***	0.287 (0.006)	***	0.011	***
SMB	0.134 (0.011)	***	0.159 (0.014)	***	−0.025	***
HML	0.084 (0.016)	***	0.220 (0.02)	**	−0.136	***
CMA	0.151 (0.018)	***	0.292 (0.022)	***	−0.141	***
RMW	0.337 (0.021)	***	0.569 (0.027)	***	−0.232	***
R ²	0.89		0.79			
Crisis and SRI regulation						
Alpha	−0.042 (0.039)		−0.044 (0.05)		0.039	
Rm-Rf	0.242 (0.005)	***	0.231 (0.006)	***	0.011	***
SMB	0.108 (0.011)	***	0.144 (0.014)	***	−0.036	***
HML	0.232 (0.016)	***	0.369 (0.020)	***	−0.137	***
CMA	0.120 (0.018)	***	0.288 (0.022)	***	−0.168	***
RMW	0.473 (0.021)	***	0.710 (0.026)	***	−0.247	***
FIN_CRISIS	−2.450 (0.06)	***	−2.940 (0.086)	***	0.490	***
SOV_CRISIS	−0.431 (0.0526)	***	−1.07 (0.059)	***	0.639	***
SRI_REG	0.091 (0.053)	*	−0.389 (0.067)	***	0.480	***
R ²	0.80		0.59			
	302		341			

This table reports the OLS estimates for ST and TH funds. The benchmark is represented by the Dow Jones Sustainability Index. We tested the equality of means with two-sample Z tests. “*”, “***”, “****” indicate 1%, 5%, 10% significance levels, respectively. Standard errors are in parenthesis.

Hypothesis 2 is confirmed. ST funds have a lower risk-adjusted return than TH funds and a different investment style.

Considering a variable able to distinguish the period pre- and post-2011, we obtained interesting results. Sovereign and financial crisis negatively affects the performance of mutual funds, but ST funds are able to overcome market turbulence better than other funds.

We then considered 2015, as a year in which new important practices and regulations were introduced. Landmark events such as COP21 and the introduction of new measures that can proxy the risk for a portfolio of losses linked to environmental, social or governance factors attract the attention of asset managers and savers on sustainable and responsible investment. Our results show that such events negatively affect the performance of mutual funds, but positively affect sustainable thematic funds.

Robustness Tests

To test the robustness of these results, an analysis is developed using another benchmark. We select the MSCI World Index, which is a general market benchmark, unlike the Dow Jones Sustainable Investment, which only measures sustainable investment.

The same analysis was run using as a benchmark the DJIA index. We obtained similar results (they are available from the authors on request).

Table 4 confirms the results presented in Table 2. The most significant difference between sustainability-themed funds and sustainable responsible funds is related to market risk exposure. ST funds are more exposed to market risk than SR funds.

Table 4. ST and SR funds (CAPM model—MSCI World Index).

	ST Funds		SR Funds		Difference	
<i>Single Model</i>						
Alpha	−0.204 (0.027)	***	−0.201 (0.025)		−0.003	
Rm-Rf	0.359 (0.005)	***	0.340 (0.005)		0.019	***
R ²	0.79		0.75			
<i>3-factor Model</i>						
3-factor Alpha	−0.210 (0.027)	***	−0.212 (0.026)	***	0.002	
Rm-Rf	0.360 (0.006)	***	0.341 (0.006)	***	0.019	***
SMB	0.030 (0.014)	**	0.055 (0.017)	***	−0.025	***
HML	−0.003 (0.012)		−0.004 (0.011)		0.001	
R ²	0.90		0.81			
<i>5-factor Model</i>						
5-factor alpha	−0.385 (0.029)	***	−0.382 (0.028)	***	−0.003	
Rm-Rf	0.375 (0.007)	***	0.355 (0.007)	***	0.020	***
SMB	0.104 (0.015)	***	0.121 (0.014)	***	−0.017	***
HML	0.186 (0.021)	***	0.172 (0.020)	***	0.014	***
CMA	0.141 (0.024)	***	0.148 (0.023)	***	−0.007	***
RMW	0.430 (0.029)	***	0.393 (0.027)	***	0.037	***
R ²	0.89		0.80			

Table 4. Cont.

	ST Funds		SR Funds		Difference	
Crisis and SRI regulation						
Alpha	−0.016 (0.039)		−0.034 (0.058)	**	0.018	
Rm-Rf	0.263 (0.0052)	***	0.232 (0.0043)	***	0.0301	***
SMB	0.097 (0.0111)	***	0.120 (0.0092)	***	−0.023	***
HML	0.263 (0.015)	***	0.198 (0.013)	***	0.065	***
CMA	0.107 (0.017)	***	0.1195 (0.014)	***	−0.0125	***
RMW	0.478 (0.021)	***	0.395 (0.017)	***	0.083	***
FIN_CRISIS	−2.310 (0.066)	***	−2.320 (0.066)	***	0.01	
SOV_CRISIS	−0.417 (0.0523)	***	−0.412 (0.0588)	***	−0.005	
SRI_REG	0.144 (0.052)	***	0.148 (0.043)	***	−0.004	
R ²	0.80		0.76			
Number of funds	302		358			

This table reports the OLS estimates for the sample of ST and funds and SR Funds (SR). The benchmark is represented by MSCI World Index. We tested the equality of means with two-sample Z tests. “*”, “***”, “****” indicate 1%, 5%, 10% significance levels, respectively. Standard errors are in parenthesis.

Table 5 presents the main results of both ST and TH funds. All the findings presented in Table 3 are confirmed.

Table 5. ST and TH funds (CAPM model—MSCI World Index).

	ST Funds		TH Funds		Difference	
Single Model						
Alpha	−0.204 (0.027)	*	−0.103 (0.027)	***	−0.101	***
Rm-Rf	0.359 (0.005)	*	0.317 (0.005)	***	0.042	***
R squared	0.79		0.62			
3-Factor Model						
3-Factor Alpha	−0.210 (0.027)	*	−0.100 (0.027)	***	−0.11	***
Rm-Rf	0.360 (0.006)	*	0.309 (0.006)	***	0.051	***
SMB	0.030 (0.014)	*	0.016 (0.015)		0.014	***
HML	−0.003 (0.012)		0.040 (0.012)	***	−0.043	***
R squared	0.90		0.62		0.28	
5-Factor Model						
5-Factor alpha	−0.385 (0.029)	*	−0.373 (0.029)	***	−0.012	***
Rm-Rf	0.375 (0.007)	*	0.348 (0.0072)	***	0.027	***
SMB	0.104 (0.015)	*	0.141 (0.0157)	***	−0.037	***
HML	0.186 (0.021)	*	0.282 (0.022)	***	−0.096	***

Table 5. Cont.

				ST Funds	TH Funds	Difference
5-Factor Model						
CMA	0.141 (0.024)	*	0.299 (0.024)	***	−0.158	***
RMW	0.430 (0.029)	*	0.622 (0.029)	***	−0.192	***
R squared	0.89		0.61			
Crisis and SRI regulation						
Alpha	−0.016 (0.039)		0.037 (0.05)	***	−0.053	***
Rm-Rf	0.263 (0.0052)	*	0.260 (0.0067)	***	0.003	***
SMB	0.097 (0.0111)	*	0.133 (0.0142)	***	−0.036	***
HML	0.263 (0.015)	*	0.404 (0.019)	***	−0.141	***
CMA	0.107 (0.017)	*	0.275 (0.022)	***	−0.168	***
RMW	0.478 (0.021)	*	0.729 (0.0264)	***	−0.251	***
FIN_CRISIS	−2.310 (0.066)	*	−2.790 (0.086)	***	0.480	***
SOV_CRISIS	−0.417 (0.0523)	*	−1.056 (0.065)	***	0.639	***
SRI_REG	0.144 (0.052)	*	−0.334 (0.066)	***	0.4778	***
R squared	0.80		0.60			
Number of funds	302		341			

This table reports the OLS estimates for the sample of ST and funds and TH Funds. The benchmark is represented by MSCI World Index. We tested the equality of means with two-sample Z tests. “*”, “***”, “****” indicate 1%, 5%, 10% significance levels, respectively. Standard errors are in parenthesis.

5. Discussion and Conclusions

During the last decade, among the different approaches for screening and managing securities in mutual funds’ portfolios, the sustainability-themed strategy has demonstrated a very relevant growth [3,79].

Our study aims at verifying if the risk-adjusted performance of sustainability-themed funds (ST funds) differs significantly from returns produced by other responsible funds, applying other sustainable investment strategy (SR funds), as well as other thematic funds, focused on themes other than sustainability (TH funds).

The analysis aims to verify if the performance differences are accentuated during periods of financial distress, as well as periods in which the level of market awareness about sustainability is increasing. This is particularly relevant today, when the European Union is integrating considerations about sustainability into the financial policy framework, with the purpose of increasing the level of disclosure and channeling public and private funds towards sustainable projects. For example, the Paris agreement includes the commitment to align financial investments with a pathway towards low-carbon and climate-resilient development. Additionally, after the adoption by United Nations Member States of the 2030 Agenda for sustainable development, the European Commission introduced an action plan on sustainable finance and a correlated package of measure for implementing it, through the proposal of amendments on the existing acts or adoption of new acts in view of an increasing connection between finance and sustainability. At the same time, the European Parliament has recently introduced a new regulation on disclosure related to sustainable investments and sustainability risks in the capital market union. In this context, our research aims at verifying if new practices and regulations about sustainability are able to modify the performance profile of specific classes of mutual funds.

Comparing ST funds with SR ones, we found that there are no statistically significant differences in terms of returns and Alpha, but ST funds are more exposed to market risk than SR funds. In general, Hypothesis 1 was not confirmed: the ST approach shows a capacity to generate risk-adjusted returns in line with other SR strategies. Moreover, the performances of ST and SR funds react similarly to period of financial turbulences or introduction of new practices and regulation related to sustainability. The level of portfolio diversification is not compromised, because themes such as energy or environment are widely cross-sector and cross-country. Consequently, different investment approaches to sustainable investment can be simultaneously applied in a growing number of combinations in order to fit investors' needs, without substantially changing the portfolio's expected results. This can offer the opportunity to include in responsible portfolios assets concentrated on issues for which investors are particularly sensitive and aware, such as mitigation of climate change, healthcare, food safety or fight to environmental degradation and pollution.

On the other hand, comparing ST funds with TH ones, we found that ST portfolios underperform TH funds and show a greater exposure to market risk. This is due to the specific investment style and asset allocation of different products. ST funds, compared to TH funds, are more invested in securities with weak short-term profitability and high investment grade, showing a higher growth orientation. In general, Hypothesis 2 is confirmed: the ST approach shows a lower capacity to generate risk-adjusted returns than other TH strategies. Consequently, ST funds are not suitable for investors with a high propensity to risk, aimed to maximize returns in the short run. However, ST funds have proved able to overcome periods of financial distress better than TH funds. In comparing sustainable themes with other themes in the context of thematic investing, our results confirm that ESG factors can act as shock-absorbing elements. In particular, environmental and social responsibility, as well as good governance practices, can serve as a buffer during market turmoil and economic downturns. On the contrary, the lack of consideration of ESG variables in portfolio selection makes performance more vulnerable especially during times of economic turbulence, increasing volatility. Additionally, a focus on sustainability can also produce a mitigating effect on the crash risk, the conditional skewness of return distribution, moderating the asymmetry in risk, as discussed in the literature [72,74].

Moreover, according to our results, ST funds are able to perform better than other TH funds also during periods in which they can benefit from new regulation and practices about sustainability. When the regulation and practices increase the level of market transparency and investor awareness, the role of the demand side is accentuated, in line with the literature that explains fund performances taking into account the investors behaviors [47,49,52,59,62].

In general, our main findings demonstrate that the risk-adjusted performance of ST funds is more closely related to their responsible nature than to their thematic approach. Sustainability-themed mutual funds are more similar to other socially responsible funds than to other thematic funds, as confirmed by performance analysis over time.

Our results can first be useful for investors and asset managers. A deep analysis of risk-adjusted performance of responsible funds applying a specific investment strategy might help investors decide if they should introduce these products to their overall financial portfolio, guiding the choice about time and size of the investment. Moreover, some sustainability-themed mutual funds can represent an opportunity for gain exposure to assets in which it is difficult to make direct investments. As an example, an investor or an asset manager that wants to invest in the commodity of water, given the relevant threats to which water resources are exposed worldwide, can find in the sustainability-themed mutual funds a potential investment vehicle.

The results achieved in our research might also support the activities of the technical expert group on sustainable finance that is now assisting the European Commission in the definition of standards, metrics, methodologies, and classifications for sustainable products and activities, after the work of the high-level expert group on sustainable finance. An in-depth focus on the portfolio characteristics and risk-adjusted performance of specific categories of sustainable funds is then relevant in the current

period of regulatory innovations, which imply the introduction of new taxonomies on what can be considered a sustainable activity or business, as well as unified labels for sustainable financial products.

Lastly, we expect that our research can motivate other studies on the growing category of sustainability-themed funds. The increasing growth of the number of ST funds worldwide will allow in the next years to build a larger sample of ST funds. First, this will make possible to analyze fund performance applying different methodologies, such as matching estimators. Additionally, this will make it possible to overcome the limitation of our sample and to investigate other financial markets, given that, as discussed by the literature, returns and risks of sustainable and responsible funds can widely vary across different geographical areas.

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