Looking at Socially Responsible Investment Strategies Through the Lenses of the Global ETF Industry

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Abstract

Environmental, Social, and Governance (ESG) ratings feature statistical and economic problems undermining their reliability as valid proxies for corporates' social performance. To overcome this *ratings providers specific bias,* we focus on global sample of ESG-oriented Exchange Traded Funds (ETFs). Studying passive and pre-committed strategies provide us with several economic and econometric advantages, allowing us to document that Socially Responsible Investments (SRI)-oriented strategies generate significantly higher average stock market returns and liquidity. However, the identified overperformance is concentrated in months of extreme climate activity, while the effect reverses during financial crises. These findings confirm that investors react to non-pecuniary shocks by increasing the weights assigned to SRI investments in their portfolio, but their preference shifts back towards traditional strategies during economic downturns.

Keywords: Sustainable Investments, Climate Change, Natural Disasters, ETF.
JEL Classification: *G11*, *G12, G18*

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1. Introduction

Sustainable and responsible investments (SRI) have recorded an impressive growth over the last two decades, reaching an aggregate value of $35.3 trillion at the end of 2020, 15% up with respect to year-end 2018.[1] The high growth of SRI investments has led to an increased demand for adequate measures of a firm's Environmental, Social, and Governance (ESG) profile. The availability of such indicators represents a necessary condition to construct portfolios providing

[1] Global Sustainable Investment Alliance, 2020. "Global Sustainable Investment Review 2020". http://www.gsi-alliance.org/trends-report-2020/ .

investors with the desired exposure to climate and social related risks. Yet, the in-house development of such a measure is complicated, as it requires data-intensive analyses embracing multiple and not-necessarily observable features of a corporate strategy and attitude towards a wide array of stakeholders (e.g., customers, employees, the environment). The high costs associated with this process have thus contributed to the rise of ESG rating providers such as KLD (MSCI Stats), Sustainalytics, Vigeo Eiris (Moody's), RobecoSAM (S&P Global), Asset4 (Refinitiv), and MSCI as crucial economic institutions. Indeed, these data providers offer their customers corporate-level ratings summarizing firms' ESG profile along several dimensions, often also providing scores describing a corporations' overall attitude towards ESG engagements. Given their simplicity, these ratings are often used by institutional investors to inform their ESG related investments decisions, ultimately allowing these data providers to influence the allocation of over $80 trillion in combined assets worldwide (PRI, 2020)[2].

Following institutional investors' growing reliance upon these ratings, a rapidly developing literature has scrutinized the association between these commonly used ESG scores and firms' financial and accounting performance, so far reporting contrasting results. Whereas several studies provide support for the standard economic theory postulate indicating that ESG engagements – proxied by ESG ratings - should be the most irrelevant or value-decreasing (Friedman [1970], Bénabou and Tirole [2010], Kitzmueller and Shimshack [2012]),[3] other studies provide empirical support for recent theoretical predictions documenting within a rational framework that these socially desirable practices are consistent with profit maximization (e.g. Tirole [2001], Heinkel,

[2] https://www.unpri.org/

[3] Bhandari and Javakhadze [2017], Hawn, Chatterji, and Mitchell [2017], Lys, Naughton, and Wang [2015], Cheng, Hong, and Shue [2019], Masulis and Reza [2015], Di Giuli and Kostovetsky [2014], Lyon and Maxwell [2011], and Margolis, Elfenbein, and Walsh [2009].

Kraus, and Zechner [2001], Magill, Quinzii, and Rochet [2015], and John, Lee and Oh [2018]).[4] Partially reconciling these conflicting evidences, various papers document that existing ESG scores from different providers actually disagree substantially, featuring very low correlations between themselves (Berg, Fabisk, and Sauter [2020], Berg, Koelbel, and Rigobon [2020], Christensen, Serafeim, and Sikochi [2019]) and systematically failing at predicting firms' future environmental performance (Lattanzio and Litov [2020], Escrig-Olmedo et al. (2019), Chatterji, Levine, and Toffel [2009]). Building on these considerations, critics often interpret these findings as evidence that rating agencies are failing in their task. However, the issue much deeper and economically complex: how should we assess ESG considerations from a quantitative perspective? Which weight should we assign to each of these intangibles? In Edmans (2022) terms, we can't but conclude that "An ESG rating isn't fact; it's opinion". Data provided by ESG rating agencies to decision-makers is thus extremely noisy and opaque, often leading to ratings-specific conclusions limiting our understanding of the economic and financial consequences of corporate ESG engagements.

These considerations lead us to the following research question: is it possible to re-examine the association between corporate ESG engagements and stock market performance without imposing the burden of selecting a single ESG ratings provider upon researchers to base their results on? Answering this question is, in a nutshell, the objective of this paper.

2. Methodological Approach and Hypothesis Development

To overcome limitations concerning eventual *ratings provider specific bias,* we focus on ESG-oriented Exchange Traded Funds (ETFs). This approach provides us with four major advantages. First, it allows us to objectively identify funds following SRI strategies by classifying them based

[4] Albuquerque, Koskinen, and Zhang [2020], Flammer [2015], Hong and Liskovich [2016], Cheng, Ioannou, and Serafeim, [2014], Dhaliwal, Li, Tsang, and Yang [2011], Edmans [2011], and Dowell, Hart, and Yeung [2000]

upon their name[5] (i.e., the ETF name contains either "ESG" or "SRI") and whether asset management company declare the fund as being dealing with sustainability macro themes by checking the reported Prospectus. Second, this approach lets the market select ESG ratings providers for us, thus allowing for (1) the importance of each data provider (i.e., its market share) and (2) their used methodology to change over time (Lattanzio and Litov [2020], Eccles et al. [2013]). Third, our focus on ETFs isolate us from firm-specific idiosyncratic features which might correlate with specific ESG ratings, ultimately resulting in endogeneity concerns (Gibson et al. [2021], Lys, Naughton, and Wang [2015], and Hong, Kubik, and Scheinkman [2012]).[6] Similarly, by focusing on *passively* managed ETFs, rather than on the whole spectrum of mutual funds (Hartzmark and Sussman [2019], Starks, Venkat, and Zhu [2017], and Białkowski and Starks [2015], among others), we can disentangle our findings from considerations related to managerial ability (Muñoz, Vargas, and Marco [2014]), managerial incentives to generate alpha (Del Guercio and Reuter [2014]), and eventual time-varying idiosyncrasies which might result in spurious correlations. Fourth, the global orientation of SRI-oriented ETF investment strategies allows us to take an international rather than country-specific (often U.S.- specific) perspective. Under this perspective we are also free to catch the physical damages suffered by companies involved. Indeed,

[5] The issue of the strategy name is of paramount relevance in the context of the wealth management industry. On March 2001, The Securities and Exchange Commission adopted a new rule under the Investment Company Act of 1940 to address certain broad categories of investment company names that are likely to mislead investors about an investment company's investments and risks. The rule requires a registered investment company with a name suggesting that the company focuses on a particular type of investment (e.g., an investment company that calls itself the ABC Stock Fund, the XYZ Bond Fund, or the QRS U.S. Government Fund) to invest at least 80% of its assets in the type of investment suggested by its name. The rule also would address names suggesting that an investment company focuses its investments on a particular country or geographic region, names indicating that a company's distributions are exempt from income tax, and names suggesting that a company or its shares are guaranteed or approved by the United States Government (https://www.sec.gov/rules/final/ic-24828.htm).

[6] For example, poorly performing firms might lack the financial capability to invest in CSR projects. If this is the case, the reverse causality concerns might emerge when studying the association between firms' ESG commitments and profitability.

the global orientation of the SRI-oriented ETFs avoids having to consider the geo-location of companies involved in natural disasters that are also holdings of the same SRI-oriented ETFs.

Overall, our approach allows us to revisit the central hypothesis of recent ESG literature within an ESG ratings provider bias free framework. That is, in null form:

Hypothesis 1: ESG ratings providers bias free investment strategies are not associated with firms' financial performance.

Our results show that ETFs following global passive SRI-oriented strategies have achieved a significantly higher average performance over the period 2008-2020 – measured as either raw, market-adjusted, ETF strategy-adjusted, and country of domicile adjusted returns -- as well as higher stock market liquidity (as proxied by trading volumes) than comparable non-SRI oriented passive ETFs. However, by using a large sample of global natural disasters,[7] we document that the identified overperformance is concentrated in the months following large, climate change related events receiving global media coverage. Consistent with previous U.S. specific findings, this important result confirms that investors market-wide value sustainability: being categorized as low sustainability resulted in net outflows (Hartzmark and Sussman [2019], Białkowski and Starks [2015]). To further confirm the existence of such an effect, we provide evidence of outperformance of SRI ETFs surrounding and following the approval of the 2015 Paris Climate agreement, corroborating the hypothesis that SRI passive strategies outperformance is concentrated in periods of high attention towards environmental and social considerations. Similarly, we document that SRI ETFs' overperformance disappears during the period of economic and financial distress. This finding confirms our priors by documenting that economic considerations dominate non-pecuniary assessments during period of financial stress. However, the similar performance reported by SRI

[7] Data related to natural disasters are collected from the EM-DAT database, the most popular databases to define the impacts associated with natural disasters.

and non-SRI ETFs during economic downturns further emphasizes the financial soundness of passive SRI strategies as compared to more standard index- or benchmark-based strategies.

All in all, we conclude that passive SRI-oriented investment strategies have thus far overperformed alternative standard index- or benchmark-based strategies. The identified overperformance is, however, concentrated in the period of high attention towards climate change-related policies and issues, while it completely disappears during the periods of economic downturn. This finding is particular significant as it casts doubts upon the concept that simple passive SRI-oriented strategies can provide valid hedge to systemic economic shocks affecting global financial markets (Lins, Servaes, and Tamayo [2017]). Furthermore, this result tests within an international framework the Pastor, Stambaugh and Taylor (2020) model, according to which, In equilibrium, green assets have low expected returns because investors enjoy holding them and because green assets hedge climate risk

Our paper contributes to the literature in various ways. First, to the best of our knowledge, we are the first study analyzing the *global* universe of SRI-oriented ETFs, rather than a country specific sample, and extensively examining their performance and sensitivity to climate-change related events. This analysis is particularly important for unsophisticated investors, who often rely upon ETF to implement thematic investment strategies. Indeed, ETFs provides investors with highly trading flexibility (i.e. allowing investors to enter and exit very quickly from an investment thematic strategy. See Sherrill, et al. [2017]), have lower fees than mutual funds and are preferred vehicles for investors with high liquidity and trading needs and/or higher marginal taxes (Agapova, 2011). Documenting the overall performance of these funds and, in particular, their sensitivity to climate related events is, thus, extremely important to assess whether the proposed investments strategies allow economic agents to achieve the desired exposure to this specific source of risk.

Second, recent studies document that corporate engagements in ESG-related activities result in widely heterogeneous financial consequences across countries (Liang and Renneboog [2016], Lopez-de-Silanes, McCahery, Pudschedl [2020]). Reassessing the relationship between SRI-strategies and stock market performance over time through the lenses of a global investment strategy is, thus, crucial to establish whether global portfolios are able to capture the positive features that extant literature associates to SRI investing

Third, we contribute to the vast literature analyzing firms' performance sensitivity to ESG ratings. Our ESG rating providers bias free estimates document that SRI strategies are historically associated to a superior financial performance; however, we show that this overperformance is concentrated in periods in which investors have high exposure to the occurrence of climate change related events, rather than being generalizable towards the whole studied time-window. Indeed, we document that ESG-oriented ETFs are more sensitive to these non-economic shocks than non-SRI ETFs, suggesting that the growth of these funds might be at least partially explained by investors' increasing awareness and positive attitude towards non-necessarily financial oriented goals. Indeed, we further corroborate these findings by documenting that during the periods of economic downturn – namely the great financial crisis – investors' propensity to invest in sustainability themes declines. This result is consistent with the prediction that in periods of financial stress investors might become more focused on their personal goals rather than environmental issues (Lean and Nguyen [2014]).[8]

The remainder of the paper is organized as follows. Section 2 reports and discusses the summary statistics for the variables included in our sample. Section 3 presents the financial performance of

[8] A similar time-series dynamic is identified in Bialkowski and Sarks (2016), but limitedly to US mutual funds. Similarly, Choi, Gao, and Jiang (2020) show that low-carbon stocks outperform during periods featuring abnormally high temperature. However, this study focuses on (1) a single country – the US – and (2) on environmental considerations – exclusively.

SRI and non-SRI passive strategies over the studied period. Section IV assesses the sensitivity of SRI ETFs' returns to climate-related shocks, while Section V analyzes whether the documented relations are climate- and business cycle- dependent. Finally, Section V concludes the paper.

3. Data and Variables

2.1 Measuring sustainability within a ESG ratings provider bias free framework

Since their first emergence in the early 1980s, ESG ratings have evolved from being highly specialized agencies catering to specifics clientele such as faith-based and mission-based organizations to become crucial economic institutions serving a wide market base including both institutional and retail investors (Berg, Koelbel, and Rigobon [2020] and Eccles and Stroehle [2018]). Today, more than 1,500 asset management firms have indeed adopted the Principles for Responsible Investing, committing the allocation of over $80 trillion to SRI oriented strategies (PRI [2018]).

The consequent increasing dependence of large institutional investors upon the analyses reported by ESG ratings providers such as KLD (MSCI Stats), Sustainalytics, Vigeo Eiris (Moody's), RobecoSAM (S&P Global), Asset4 (Refinitiv), and MSCI has been carefully scrutinized by the growing academic literature assessing the existence of an eventual statistical association between these ESG scores and firms' financial and accounting performance. Yet, as we discuss in the previous section, extant studies report mixed evidence. Reconciling these conflicting results is particularly complicated in lights of recent studies documenting that existing ESG measures disagree substantially and suffer from material economic and statistical problems likely resulting in a ESG ratings providers bias arising from the following several four considerations. First, existing ESG ratings display very low correlations between each other, incorporating different information content and socially responsible dimensions (Berg, Koelbel, and Rigobon [2020], Christensen, Serafeim, and Sikochi [2019], and Escrig-Olmedo et al. [2019]).

The selection of a specific ratings provider might, thus, result in materially different estimates for the association between corporate social responsibility engagements and stock market performance. Second, recent studies document that Existing ESG scores systematically fail at predicting firms' future environmental (and, broadly speaking, social) performance, thus, raising questions concerning the actual economic interpretability of available ESG scores (Lattanzio and Litov [2020], Chatterji, Levine, and Toffel [2009]).[9] Third, the ESG ratings market has gone through substantial transformations over the last 4 decades, with many early ESG rating providers being acquired by large financial data providers.[10] This market consolidations were not economically irrelevant, as it often resulted in material methodological variations in the way ESG ratings are computed, thus, complicating their time-series interpretability (Lattanzio and Litov [2020], Eccles and Stroehle [2018]). Third, Berg, Fabisk, and Sauter (2020) document across two downloads in 2018 and 2020 widespread changes to the historical ratings of Refinitiv ESG (ASSET4) and they show that these variations are partially related to firm characteristics. These " rewritings" are problematic, as they introduce potentially lethal forward-looking bias in estimates based upon ASSET4 based metrics. Fourth, different ESG ratings providers focus on different samples and cover different time windows, thus, introducing a further dimension of heterogeneity which might affect estimates based upon these measures.

Due to these recently discovered methodological issues, imposing the burden of selecting a single ESG ratings provider on researchers to test their hypothesis, has contributed to the emergence of contrasting results concerning the marginal effects of corporate ESG engagements

[9] Recent studies have improved upon commonly used scores by providing adjusted version of existing ESG ratings displaying significantly more reliable economic and statistical properties (see, i.e., the materiality score proposed in Khan, Serafeim, and Yoon [2016] and the relative social responsibility score discussed in Lattanzio and Litov [2020]). However, these scores still suffer from the reliance upon a single, pre-selected ratings provider.

[10] E.g., MSCI bought KLD in 2010; Morningstar bought Sustainalytics in 2010. For an extensive discussion on the consolidation of the ESG ratings industry, see Eccles and Stroehle, (2018).

on stock market performance, thus limiting our understanding of this complexed phenomenon (Berg et al., 2019). In a nutshell, this a distortion represents what we define as *ESG ratings provider specific bias*.

To overcome these limitations, we use an alternative data driven procedure to identify ESG-oriented portfolios, rather than actively creating them based upon scores provided by selected ESG ratings providers. In particular, we focus on passively managed ETFs to identify SRI-oriented strategies and follow their performance over time as compared to similar non-SRI oriented ETFs. Indeed, this approach provides us with four critical advantages. First, even though ETFs might use ESG ratings to develop their selected benchmarks, this is a *ratings provider specific bias* approach in the sense that it lets the market select ESG ratings providers for us, rather than imposing on us the burden of such a crucial decision. Furthermore, such an approach (1) allows for the importance of each data provider (i.e., its market share) and their used methodology to change over time, whereas alternative methodologies are unable to incorporate these crucial changes (Lattanzio and Litov [2020], Eccles et al. [2013]), and (2) is immune from the possibility that retroactive changes might be applied to these scores, as documented in Berg, Fabisik, and Sautner (2020) for the Refinitiv database.

Second, our focus on ETFs allows us to produce estimates that are independent from eventual firm-specific idiosyncratic features which might correlate with specific ESG ratings, ultimately resulting in endogeneity concerns (Hong, Kubik, and Scheinkman [2012], Lys, Naughton, and Wang [2015]). In a similar fashion, our focus on *passively* managed ETFs, rather than on the whole spectrum of mutual funds (Hartzmark and Sussman [2019], Starks, Venkat, and Zhu [2018], Białkowski and Starks [2015], among others), allow us to disentangle our results from considerations related to managerial ability (Muñoz, Vargas, and Marco [2014]), managerial

incentives to generate alpha (Del Guercio and Reuter [2013]), and eventual time-varying idiosyncrasies which might result in spurious correlations.

Third, by studying the global universe of SRI-oriented ETF investment strategies, we do not provide country-specific (in particular, U.S.- specific) evidence, but rather international estimates better capturing the association between corporate ESG investments and stock market performance beyond the eventual effects of country-specific institutional factors.

Finally, our focus on passively managed ETFs allows us to identify SRI-oriented strategies independently from ESG ratings providers specific considerations. Indeed, we define as ESG-oriented ETFs by applying the following two complementary criteria. First, the ETF name contains either "ESG" or "SRI". Second, the ETF asset manager self-declare its strategy as "sustainability oriented" in its fact sheet. Our focus on ETFs' names is justified by transparency requirements characterizing most countries' approach towards regulating the wealth management industry. For instance, the SEC generally requires that any mutual fund or ETF with a name suggesting that it focuses on a particular strategy *must* invest consistently at least 80% of its assets. Similarly, the United Kingdom Financial Conduct Authority (UK FCA), under the OEIC Regulation 15(9), sections 243(8) and 261D(10), require that "an authorized fund's name must not be undesirable or misleading".[11] To the best of our knowledge, this is the first time that this approach is used to identify SRI oriented ETFs.[12]

[11] https://www.handbook.fca.org.uk/handbook/COLL/6/9.html

[12] A possible concern related to our strategy emerges from the possibility that SRI-oriented ETFs might hold portfolios featuring a high exposure to those industries that have achieved a particularly positive stock market performance over the last 2 decades. However, with respect to this matter, two important considerations should be taken into account. First, to the extent that such an industry-tilt is crucial for the implementation of SRI strategies, its consequences should not be ignored in evaluating the performance of these investment strategies. Second, our empirical approach will partially mitigate these concerns through the use of high dimensional fixed effects, as discussed in the following sections.

Yet, we recognize that focusing exclusively on funds' name might lead to possible misclassification issues – i.e., greenwashing (Edmans, 2022). To mitigate this issue, we further strengthen our approach by executing two additional verification tests. First, we check the asset allocation objectives of the underlying investment strategies as stated each the ETF fact sheets included in our sample. We then proceed to reclassify any ETFs assigned to the wrong category. Importantly, this manual test confirms the validity of our approach and the overall consistency of an ETF name and its underlying investment strategy. Second, we empirically assess whether the ETFs flagged as SRI-oriented track closely major global ESG and SRI indexes. That is, we test for the existence of material style drift concerns (Sha, 2020; Cao et al., 2017; Wahal and Yavuz, 2013, Sheng et al., 2014). Systematic deviation from well-established and explicitly designated benchmarks would indeed severely call into question the validity of the proposed identification strategy.[13]

In order to operationalize this analysis, we follow recent developments in the mutual fund literature (Sha, 2020; Wahal and Yavuz, 2013; Cao et al., 2017, Sheng et al., 2014; Herell et al., 2010) and run a Sharpe (1992) style analysis to evaluate whether the identified SRI-oriented ETFs adhere to the declared strategy. That is, we test if their performance tracks closely that of globally accepted ESG and SRI benchmarks – the MSCI World ESG Focus for equity oriented ETFs and the MSCI Global Corporate SRI Index for fixed income ETFs.[14] In line with extant literature (Sha, 2020; Swinkels and Van Der Sluis, 2006), the style-based analysis is performed with monthly returns over a 36 months estimation rolling-window. Style drift concerns arise if systematic and large

[13] Style drift may result in litigation when uniformed investors are misled by the asset management company (Swinkels and Sluis, 2006). The relevance of the last issue has probably become less significant given the growing regulation aimed at containing deviations from the declared benchmark, by the asset manager.

[14] The core strategy is benchmark against the MSCI World index for equity type ETFs and the Bloomberg Global Aggregate benchmark is selected for fixed income type ETFs. Notably, all selected indexes track global portfolios to reflect the international nature of the studied investment vehicles.

deviations from the relevant global benchmark are identified. Our findings are reported in Figure 1 and Figure 2.

Figure 1 and Figure 2 about here

The horizontal axis indicates the single estimation period, while the vertical axis reports one-period deviation from the relevant benchmark. Figure 1 shows the results for our sample of SRI-oriented Equity type ETFs. We do not observe any major performance deviation from a well-established global index. The average style drift from the MSCI World ESG Focus benchmark is indeed as low as 2.39% and features no violent and sudden spikes. These evidences indicate that, on average, the identified SRI-oriented ETF sample does not display material evidence of deviation from the declared strategy, ultimately validating our selection model. Similar conclusions are reached when studying fixed income based SRI-oriented EFTs, for which the average style drift is still relatively contained with an average value of 4.93% (Figure 2).[15]

All in all, we can conclude that our selection model successfully identifies SRI-oriented ETFs for which no – or limited - style drift concerns can be identified.

As the validity of our classification strategy appears to be robust, we next proceed to form a control group by building a sample including all worldwide non SRI-oriented ETFs matching the identified SRI-oriented ETFs on currency of denomination (British Pound, Canadian Dollar, Euro, Japanese Yen, Korean (South) Won, New Zealand Dollar, Swiss Franc and US Dollar), and, whenever possible, country of domicile (Canada, France, Ireland, Japan, Luxembourg, New Zealand, South Korea, Switzerland and United States).[16] The resulting sample includes 127 ESG-oriented ETFs, 63 of which includes "ESG" in the name, 35 featuring "SRI" in the name, and 29

[15] Fixed income ETFs represents less than 1% of our sample. As such, larger – albeit limited - deviations from the declared strategy are unlikely to undermine the validity of our empirical analyses.
[16] To ease comparability, we focus on equity ESG-oriented ETFs, exclusively. However, unreported results show that similar conclusions can be reached for bond ESG-oriented ETFs.

self-defining as ESG-oriented ETFs. These funds incorporate $12 billion in aggregate assets under management as at the end of 2018, representing about 90% of the global universe of ESG-oriented ETFs ($13.5 billion in asset under management). [17] The control sample includes 991 matched non-ESG-oriented ETFs, representing $1.7 trillion in asset under management as at the end of 2018. As documented in Appendix A.I, the geographical distribution of the selected funds' holdings is global, providing us with an international coverage of the evolution of both SRI and non-SRI oriented passive investment strategies for the period from January 2009 and December 2018.[18]

Following extant literature, ETF returns are collected from Thomson Reuters Datastream and they are computed as log-differences in monthly returns. We complete our dataset by including information on funds' size, measured as the natural logarithm of their market value, age – number of months since inception, and dividend yield. Detailed variable definitions are provided in Table 1. Table 2 reports summary statistics.

Insert Table 1 and Table 2 about here

SRI oriented ETFs are, on average, significantly younger and smaller than their peers following traditional strategies, and their average stock market monthly performance – both in terms of returns and liquidity - has been superior, independently from whether measured in terms of raw returns, country of domicile-adjusted performance, strategy-adjusted performance, or market-adjusted performance. To provide the reader with a better understanding of the economic relevance of these differences, the delta in annualized compounded returns between the two ETF categories is 1.73%, providing initial support for the hypothesis that SRI oriented ETFs do outperform non-SRI vehicles. However, as shown in Figure 3, such an outperformance appears to

[17] https://www.pionline.com/interactive/esg-etf-assets-surge-2019.

[18] As reported in Appendix A.I, Panel A, even though most ETFs are domiciliated in Luxembourg, Ireland, and in the United States, a large majority of them follow international-oriented allocation strategies, thus substantiating our claim regarding the international orientation of the selected sample.

be concentrated in recent years, and, in particularly, over the post-Paris Climate agreement period (2015). This time-series consideration provides us with initial support for the hypothesis that investors react to non-pecuniary shocks and, namely, to the increasing degree of societal environmental and social awareness by increasing the weights assigned to SRI oriented investments vehicles within their portfolio.

Figure 3 about here

2.2 Measuring natural disaster

We complete our sample by gathering data concerning large natural disasters such as droughts, earthquakes, extreme temperatures, floods, landslides, mass movements, storms, volcanic activities and wildfires from the "Emergency Events Database" (www.emdat.be) managed by the Centre for Research on the Epidemiology of Disasters of the Université Catholique de Louvain (Belgium). This dataset contains core data on both the occurrence and the consequences of worldwide mass disasters from 1900, including nearly 7,000 events. The database incorporates data from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies. In particular, the Emergency Events Database includes data relatively to the total direct damages caused by each natural disaster. We use this information to construct a yearly-specific measure of climate change intensity – labeled Total Damage – by following a simple three-steps procedure. First, we aggregate damages at the country-year level. Second, we scale the computed country-specific total damage by the country GDP level. This scaling procedure aims at controlling for both (1) the relative severity of the studied event and (2) eventual media coverage bias towards these events – namely, rich countries

might receive a more extensive media coverage. Finally, we aggregate this measure at the calendar year level, ultimately obtaining a year-specific measure of climate change intensity.[19]

As discussed in Table 1, we follow a similar approach to compute year-specific measures capturing the (1) total number of deaths and (2) the number of people affected by the studied natural disasters. Summary statistics are reported in Table 2, Panel B.

4. Assessing differences in performance between SRI and non-SRI passive strategies

Our empirical strategy allows us to isolate the effects of corporate ESG engagements by exploiting a portfolio, rather than a single firm approach limiting the need to control for a company-specific bias such as Fama-French factors. By comparing the average performance of SRI and non-SRI funds over the last decade, we can indeed capture whether investors' orientation towards these strategies has delivered positive financial outcomes beyond what might be due to firm-specific, country-specific and ESG ratings provider-specific idiosyncratic factors. In particular, we begin our analysis by estimating a simple linear regression model projecting ETF monthly stock market returns on a dummy identifying SRI oriented strategies and on a set of fund level characteristics which might directly correlate with funds' inflows and overall performance – namely, fund age, size and dividend yield. To further capture eventual year-specific, fund-family level and regulatory differences (country of domicile - specific), from which confounding effects might arise, we augment our model with a set of high-dimensional fixed effects absorbing (1) managerial ability (Muñoz, Vargas, and Marco [2014]), (2) managerial incentives to generate alpha (Del Guercio and Reuter [2013]), (3) legal considerations (Liang and Renneboog [2016]), and (4) eventual time trends in investors' preferences towards SRI considerations (by conditioning our empirical results to time windows over Paris Agreement). Finally, from an identification

[19] Untabulated tests confirm that all our results are robust to the use of an alternative weighting scheme based on market capitalization rather than GDP.

perspective, funds' SRI orientation is not time-varying, that is, each ETF does not shift strategy over time. While this feature prevents us from using ETF level fixed effects, it also significantly mitigates eventual endogeneity concerns beyond an asset management firm' strategic decision about the timing to launch – or withdraw – a SRI-oriented ETF. To address this potential issue, we will replicate our baseline results by using a subsample of funds which are observable over the whole studied window and for which their commitment towards implementing an SRI passive strategy is completely predetermined.

This approach results in the following estimation model:

$$Y_{\phi,f,c,t+1} = \alpha + \beta_1 SUST_f + \gamma X_{f,t-1} + \delta_\phi + \delta_c + \delta_t + \varepsilon_{f\phi,f,c,t} \quad (1)$$

where estimates are conducted at the ETF level, *f*. The dependent variable (Y) is monthly returns as observed in month *t* for fund *f*; SUST is a dummy set equal to one if ETF *f* is SRI-oriented, 0 otherwise. $X_{f,t-1}$ is a matrix including the previously discussed fund-level controls as observed at the end of the previous month. δ_ϕ, δ_c, and δ_t represent asset-management firm, country of domicile, and month fixed effects. Standard errors are clustered at the asset management firm level. Table 3 column (1) reports the estimated coefficients.

Table 3 about here

Column (1) show a strong, positive association between the adoption of SRI-oriented strategies and an ETF's stock market performance, suggesting that, on average, these strategies have delivered 0.19% higher monthly returns than comparable standard index-investing strategies.

While this preliminary assessment suggests that portfolios capturing ESG-related considerations might indeed deliver value to shareholders (i.e., it provides support for the doing-well-by-doing-good hypothesis), several additional considerations should be taken into account before adventuring in drawing economic conclusions. First, as previously discuss, an important

source of endogeneity relates to the possibility that asset management firms launch SRI-oriented ETFs in specific period of time in which catering towards a clientele willing to pay a premium to gain access to this thematic strategy delivers particularly high returns. If this is the case, the identified outperforms would then not be attributable directly to the SRI passive strategies alone, but rather a catering effect (Jun, Li, Yugang [2017], Harris et al. [2015]). As previously anticipated, we address this issue by re-estimating equation (1) over a sample including ETFs active for the whole studied period, exclusively. Our estimates, reported in Table 3, Column (2), mitigate this concern. The identified average overperformance remains statistically significant (p-value of 1.1%) and the economic difference in returns inflates to 0.23% on a monthly basis.

A second source of concerns relate to the possibility that SRI strategies are inherently more risky than non-SRI strategies. While we recognize that this is unlikely given the nature of the studied economic dimension, we replicate our baseline model by substituting raw returns with (1) market adjusted, (2) ETF strategy-adjusted (capturing eventual industry specificities),[20] and (3) country of domicile adjusted returns as the dependent variable in equation (1). As reported in Table 3, Column (3), Column (4), and Column (5), the identified overperformance appears to be robust, retaining a similar economic magnitude with respect to the one estimated in the baseline model.

Finally, an alternative concern is that SRI-ETFs are less liquid due to the possibility that they might be catering towards clienteles with a longer average investment horizon (Starks, Venkat, and Zhu [2018], and Cella, Ellul, and Giannetti [2013]). If this is the case, liquidity risk might explain the previously identified average outperformance displayed by SRI-oriented strategies. To test for this hypothesis, we replicate our baseline analysis using monthly trading volumes instead of stock market returns as the main dependent variable. However, Table 4, column

[20] ETFs strategies are defined using the Lipper Global Classification Scheme reported in Refinitiv.

(1) provides no support for the liquidity risk hypothesis, rather documenting that SRI-oriented ETFs are associated with marginally higher monthly trading volumes. As documented in Column (2) to Column (5), these findings are indeed robust to controlling for market-timing and catering considerations, as well as to the use market adjusted, strategy adjusted, and country of domicile adjusted proxies of stock market liquidity.

Table 4 about here

5. Do passive SRI strategies provide investors with greater sensitivity to climate-change related shocks?

Taken at the face value, our preliminary results provide support for that portfolios built upon corporate ESG considerations yield superior performance, ultimately suggesting that a positive relationship between CRS and stock market returns exists beyond what subsumed by individual ESG ratings. In this section, we expand our analyses by exploiting our portfolio approach and the global nature of our sample to carefully investigate the time-series dynamics of such a relationship and, in particular, whether these popular passive SRI strategies deliver on the promise of providing investors (especially retail investors) with the desired exposure to this specific economic dimension. To the best of our knowledge, this is the first study assessing such a relationship for the universe of passively managed SRI-oriented ETFs.

In this section, we focus on the differential sensitivity of SRI and non-SRI oriented ETFs to the occurrence of large climate-change related events. While we do recognize that ESG and SRI strategies embrace a much broader spectrum of societal issues than climate change related considerations, exclusively, (i.e., social, human rights, community, governance, and employees), our focus on environmental considerations is rooted upon recent development in the ESG empirical literature. First, following the elector result of the 2020 U.S. Presidential election, climate change

risk and environmental concerns are likely to become central elements of both the U.S. and the international political debate.[21] Second, environmental issues have been shown to be of particular significance to socially responsible institutional investors (Starks [2009]). Third, as previously discussed, recent studies document that existing environmental CSR scores display low correlation levels and fail at predicting future corporate environmental performance (Lattanzio and Litov [2020], Berg, Koelbel, and Rigobon [2020], Christensen et al. [2019], Dimson et al. [2019], Chatterji et al. [2009]). Consequently, overcoming the limitations of environmental ratings is particularly crucial in lights of the contrasting results reported in the literature. Fourth, the spirit of this study is to minimize our results' dependence upon specific ESG ratings providers analyses.

Our focus on climate change related events allow us to employ independent, factual observations concerning the actual occurrence and severity of material events, thus allowing us to test our hypothesis in an ESG ratings providers bias free framework. In particular, as discussed in Section 2, we construct a measure of total damages from climate change related events by using the Emergency Events Database. Using this novel globally aggregated measure, we can explicitly test for whether the time-varying intensity of extreme climatic events directly affects SRI funds returns and stock market liquidity through both a direct effect (i.e., high ESG corporations included in the portfolios of SRI-oriented ETFs might display greater resiliency to natural disaster, as documented for the case of the United States in Flammer [2013]) and indirect effect (i.e., clientele effects might result in higher demand pressure for sustainability financial instruments).

We begin by augmenting equation (1) with the Total Damage variable and its interaction with the indicator identifying SRI oriented ETFs. This simple setting allows us to directly assess the actual sensitivity of these strategies to this growing source of risk, thus shedding lights on whether

[21] See, i.e., "What Biden's Win Means for the Paris Climate Agreement", The Washington Post, November 10, 2020.

SRI-oriented ETFs are providing retail and institutional investors with actual material exposure to the investigated economic dimension. Our estimates are reported in Table 5, Column (1).

Table 5 about here

Consistent with our expectations, the intensity of global natural disasters is positively associated with higher stock market returns for SRI-oriented investments, suggesting that this passive strategy do provide positive exposure to climate-related events as compared to other traditional index-based strategies. Importantly, as documented in Column (2), this result is robust to the use of a constant sample and it is thus not an artifact of market entry (exit) around major climatic events.

A second crucial result emerges from our investigation. We observe that the estimated coefficient for the SRI dummy switches negative if we introduce a control for climate change intensity and its interaction with the dummy identifying SRI oriented funds. This novel evidence emphasize that the superior performance of these funds is concentrated around periods in which climate change related issues are particularly prominent, while it reverts in period of low climate-related activity. That is, consistent with previous U.S. specific findings, our estimates confirm that investors might be reacting to non-pecuniary shocks by increasing the weight of SRI investment vehicles in their portfolio (Pastor et al. [2020], Hartzmark and Sussman [2019], Białkowski and Starks [2015]).[22] However, further tests are needed to establish this economic interpretation of the documented association.

First, we begin by replicating our interaction analyses by using trading volumes as the dependent variable in our linear regression model. This investigation can provide us with complementary evidence to support the hypothesis that trading volumes concentrate around major

[22] Importantly, since this finding is robust to the use of a constant sample excluding ETFs entering or exiting the sample at a given point of time, we must conclude that this estimate is not an artifact of asset managers firms catering towards specific clientele, but rather an explicit behavior displayed by investors in response to environmental global shocks.

climate change related events, thus supporting our interpretation. We find this to be the case. Similarly to the case of stock market returns, Table 5 Column (3) and Column (4) document that the previously identified marginally higher stock market liquidity is concentrated in period of high climate change intensity, whereas the effect reverse in period of low climatic activity. This finding thus supports our hypothesis that investors react materially to non-pecuniary shocks by flying to SRI-oriented investments vehicle.

Second, we recognize that our measure of climate change intensity might incorporate non-random measurement error, thus potentially inducing spurious correlation between funds' performance and their eventual SRI orientation. We deal with this potential issue by offering two alternative, arguably exogenous measures of climate change intensity. As discussed in Section 2 and in Table 1, the first alternative proxy captures the global, year-specific adjusted number of death due to the occurrence of climate change related catastrophic events. We label this variable, Casualties. The second measure, Injured, represents the global, year-specific adjusted number of people affected by climate change related events. These two economic variables are positively correlated with Total Damage, yet the pairwise correlation factor is always below 60%, thus confirming that these proxies are capturing a different information content than our main measure of climate change intensity. We use these alternative proxies in two alternative ways. First, we use them as substitutes for Total Damage to re-estimate the models reported in Table 5. As reported in Table 6, Panel A and Panel B, both proxies provide robust evidence for both stock market returns and liquidity. These reassuring results mitigate concerns that the previously reported associations were driven by measurement error induced spurious correlations.

Table 6 about here

Second, we use these alternative proxies to instrument Total Damage within a 2-stage-least-squares framework. To provide support for the validity of these potential instruments, Table 7, Panel A reports a wide-array of statistical tests while documenting the estimates of the identified first-stage models. In particular, we report the Cragg and Donald (1993) test of relevance for the selected instruments; the Sargan (1958) over identification test, assessing the exogeneity of the instrumental variables; and the Stock and Yogo minimum eigenvalue statistic to test for underidentification. All the diagnostics reported in Table 7 confirms the validity of the selected instruments, allowing us to estimate the second stage to further assess the robustness of the identified coefficients.

As reported in Table 7, Column 2 and Column 4, these instrumented estimates corroborate our initial findings, thus providing further evidence supporting the hypotheses that (1) passive SRI strategies do provide investors with positive exposure to climate change related risks and (2) that investors display a tendency to react to non-monetary shocks by increasing their portfolio weights in SRI oriented vehicles, while reversing their positions when the economic and societal relevance of these events decline.

Table 7 about here

6. Robustness tests: investors' orientation towards SRI passive strategy in response to monetary and non-monetary shocks

In this section, we further test whether investors react to non-pecuniary shocks by increasing the weight of SRI ETFs in their portfolio by studying funds' performance and stock market liquidity around two major events: (1) the signing of the Paris Climate Agreement in 2015 and (2) the global propagation of the global financial crisis over the period 2009-2012. The underlying economic reasons for these tests are based upon the idea that if the identified results are caused by

investors' sensitivity to the occurrence of non-pecuniary shocks (namely, climate related shocks), then the identified effects should be the strongest in time when the media attention towards climate change is the highest, whereas it should vanish (or reverse) in time in which pecuniary considerations become crucial (i.e., during an economic downturn).

Table 8, Panel A, reports our tests for the consequences of the Paris Climate Agreement on SRI ETFs returns and stock market liquidity. In particular, we execute these tests by augmenting the model estimated in Table 5 and in Table 6 with a dummy set equal to one for the post signing period (2015-2019), 0 otherwise, interacted with our SRI indicator, Total Damage, and their interaction term. Consistent with our prior, we document that SRI-funds' overperformance and higher stock market liquidity, as well as sensitivity to climate-related shocks, are concentrated over the post-Paris Climate Agreement period. Furthermore, we confirm the usual sign reversal over the earlier part of our estimation window.

All in all, these results shed lights on investors increasing propensity to purchase SRI-oriented passive strategies over time, providing support for (1) the rapid process of democratization of socially oriented investment strategies, whose popularity among retail investors keep increasing (Eccles and Stroehle [2018]), and (2) for the hypothesis that investors respond to non-pecuniary shocks by increasing their reliance upon SRI-oriented investments vehicles. Importantly, the consistency of these findings to the use of different proxies of climate change intensity and awareness while avoiding to depend upon a single ESG rating providers is particularly reassuring, as it provides us with strong support for the economic and financial soundness of these passive SRI-oriented strategies.

Table 8 about here

Finally, we replicate the tests reported in Table 8, Panel A, by focusing on the consequences of

the global financial crisis (2009-2012) to assess whether the increased important of financial considerations reduce investors' propensity to take into account non-pecuniary shocks. As documented in Table 8, Panel B, we find this to be the case. SRI-oriented funds' sensitivity to climate related events disappears during period of financial turmoil. Furthermore, no difference in performance and in stock market liquidity between SRI and non-SRI oriented ETFs can be statistically identified during the global financial crisis. These results lead us to two important considerations. First, our findings provide strong support for that investors' propensity to incorporate non-pecuniary considerations in their investment decisions is pro-cyclical. Second, the lack of outperformance of passive SRI strategies during period of financial distress calls into questions whether ESG portfolio can provide an effective hedge against systemic shocks in global markets (Lins et al. [2017]).

7. E(nvironment), S(ocial), or G(overnance)?

Section 6 and Section 7 provide time-series evidence supporting the hypothesis that SRI oriented ETFs offer investors with adequate exposure to climate change and environmental risk. However, it is important to recognize that these funds' strategies are often built upon multiple socially oriented dimensions, calling for further careful examinations of the actual source of the previously identified superior financial yield. In order to shed light on this important question, we thus focus on cross-sectional characteristics which may help explaining the differential performance observed for SRI and non-SRI oriented ETFs. In particular, we test whether SRI-oriented ETFs superior yield is driven by their sensitivity to (1) Environmental, (2) Social, and (3) Governance factors. In order to do so, we build value weighted portfolios based on the MSCI World Index, where weights are assigned based on individual firms' Environmental, Social, and

Governance performance.[23] We then re-estimate our baseline regressions after including an interaction terms between the SRI orientation dummy (*Sust*) and each social index, as reported below:

$$Y_{\phi,f,c,t+1} = \alpha + \beta_{1\,x}\, SUST_f + \beta_2\, SUST_f \text{ x Env. Index}_t + \beta_3\, SUST_f \text{ x Soc. Index}_t + \beta_4 \quad (2)$$
$$SUST_f \text{ x Gov. Index}_t + \gamma X_{f,t-1} + \delta_\phi + \delta_c + \delta_t + \varepsilon_{f\phi,f,c,t}$$

A statistically significant β_2, β_3, and (or) β_4 would indicate that the assessed SRI outperformance is at least partially explained by the studied factor. Based on the previously discussed results, the environmental dimension should be strongly significant. Yet, it is unclear whether the other two considerations – social and governance – provide support to the performance of SRI oriented ETFs. Table 9 reports our findings.

Table 9 about here

As expected, the Environmental component represents a major driver of the identified outperformance. Indeed, as shown in Column (3), Column (4), and Column (5) the Environmental and Social components of the studied SRI strategies fully explain their overall outperformance - once returns are properly adjusted. That is, overweighting stocks displaying superior Environmental and Social provides SRI oriented ETFs with a superior risk-reward profile, ultimately representing the central ingredient of their recent super performance.

Conversely, SRI-oriented strategies appear to feature a comparable exposure to Governance considerations as non-SRI-oriented funds, which thus does not contribute to explain the identified performance difference.

8. Conclusion

[23] Performance is measured following the Refinitiv ESG scores. Eventual measurement errors would bias us towards finding no results. As such, our estimates should be interpreted as the lower bound effect of each component to differential performance of SRI and non-SRI oriented ETFs.

Recent studies shed lights on several economic and statistical problems undermining the validity of commonly used ESG ratings as proxies for corporates' social performance. The opaqueness and low informativeness of these ratings have indeed been indicated as a major cause for extant literature inconclusiveness with respect to explaining the eventual association between corporate social engagements and stock market performance. In this study, we react to this novel evidence by re-examining this association within a novel framework allowing us not to impose upon researchers the burden of selecting a single ESG ratings provider to base their results on. In particular, for the first time we analyze a large global sample of passively managed SRI-oriented ETFs and we compare the performance of these predetermined and pre-committed strategies with those, achieved by more traditional funds benchmarking against major indexes. This approach allows us to overcome several important limitations characterizing existing studies based on firm-level or actively managed mutual funds. First, it lets us objectively identify funds following SRI strategies by classifying them based upon their name and declared strategies, rather than being forced to actively select criteria to build SRI oriented portfolios. Second, this approach lets the market select ESG ratings providers for us, thus allowing for (1) the importance of each data provider (i.e., its market share) and (2) their used methodology to change over time. Third, by focusing on passively managed ETFs, we mitigate endogeneity concerns by isolating ourselves from firm-specific idiosyncratic features which might correlate with specific ESG ratings. Furthermore, by focusing on passively managed ETFs, rather than on the whole spectrum of mutual funds, we can disentangle our findings from considerations related to managerial ability (Muñoz, Vargas, and Marco [2014]), managerial incentives to generate alpha (Del Guercio and Reuter [2013]), and eventual time-varying idiosyncrasies which might result in spurious

correlations. Fourth, the global orientation of SRI-oriented ETF investment strategies allows us to take an international rather than country-specific perspective.

Our approach allows us to document that passive SRI-oriented strategies have achieved a significantly higher average performance and stock market liquidity over the period 2008-2019, as compared to similar non-SRI oriented passive ETFs. However, the identified overperformance is concentrated in months following large, climate change related events receiving global media coverage, consistent with investors reacting to non-pecuniary and informational shocks by increasing the weight of SRI investment vehicles in their portfolio (Pastor et al. [2020], Hartzmark and Sussman [2019], Białkowski and Starks [2015]). Furthermore, this effect disappears during the periods of economic and financial distress, confirms that economic considerations dominate non-pecuniary assessments during the periods of crisis.

All in all, we provide first-hand evidence documenting that passive SRI-oriented investment strategies have thus far overperformed alternative standard index- or benchmark-based strategies. The identified overperformance is, however, concentrated in periods of high attention towards climate-change related policies and issues, while it completely disappears during the periods of economic downturn. This finding is particular significant as it casts doubts upon the concept that simple passive SRI-oriented strategies can provide valid hedge to systemic economic shocks affecting global financial markets (Lins, Servaes, and Tamayo [2017]). Furthermore, this result tests within an international framework the Pastor, Stambaugh and Taylor (2020) model by providing empirical support for the hypothesis, where green assets have low expected returns, because they provide a theoretical hedge against climate risk and green assets do outperform standard investments strategies when an ESG-related shock (e.g., a natural disaster) occurs, as it affects investors' taste for SRI strategies.

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Appendix A.I.
Geographical and Strategic Distribution of the ETFs included in the selected sample.

Lipper Classification Scheme	SRI	NON-SRI
Equity US	28	351
Equity Europe	13	78
Equity Emerging Markets Global	11	111
Equity Global excluding US	3	148
Equity Global	28	110
Equity Sector Energy	12	90
Equity Sector Utilities	2	20
Equity Euro Zone	2	14
Equity Sector Industrials	1	40
Equity Korea	6	4
Equity Japan	11	25
Equity Switzerland	1	0
Equity UK	1	0
Equity US Small & Mid Cap	5	0
Equity Asia Pacific	1	0
Total	125	991

Table 1: Variable Definitions

Variable Name	Definition and calculation methodology	Source
ETF Age	Number of months since the first appearance of the fund in our sample.	Thomson Reuters
Total Damages	Weighted Average of damages caused by natural disasters globally in a given calendar year. Weights are assigned based on the GDP of the country hit by the natural disaster. The value is measured in thousands of U.S. dollar.	EM-DA database
Casualties	Weighted Average of the number of casualties caused by natural disasters globally in a given calendar year. Weights are assigned based on the total population of the country hit by the natural disaster.	EM-DA database
Dividend Yield	An ETF's dividend yield returns, as measured in Datastream.	Thomson Reuters
Monthly Returns	The log difference in price between two consecutive months for a given ETF.	Thomson Reuters
SRI	A dummy variable taking the value of 1 if an ETF name contains either "ESG" or "SRI" and/or the ETF asset manager self-declare its strategy as "sustainability oriented" in its fact sheet.	Thomson Reuters
Liquidity	Total monthly trading volumes for a given ETF.	Thomson Reuters
Injured	Weighted Average of the number of injured people caused by natural disasters globally in a given calendar year. Weights are assigned based on the total population of the country hit by the natural disaster.	EM-DA database
Fund Size	Total market value of the ETF as observed at the end of month t.	Thomson Reuters
Market Adjusted Returns	The difference between a fund's raw returns and the returns of the MSCI Word Index.	Thomson Reuters
Country of Domicile Adjusted Returns	The difference between a fund's raw returns and the returns of a portfolio including all ETFs in our sample domiciled in the same country.	Thomson Reuters
Strategy Adjusted Returns	The difference between a fund's raw returns and the returns of a portfolio including all ETFs in our sample following the same investment strategy of the considered ETF. Investment strategies are defined following the Lipper Classification Scheme.	Thomson Reuters

Market Adjusted Returns	The difference between a fund's volumes and the average volumes of all ETFs included in our sample.	Thomson Reuters
Country of Domicile Adjusted Returns	The difference between a fund's volumes and the average volumes of all ETFs in our sample domiciled in the same country.	Thomson Reuters
Strategy Adjusted Liquidity	The difference between a fund's volumes and the average volumes of all ETFs in our sample following the same investment strategy of the considered ETF. Investment strategies are defined following the Lipper Classification Scheme.	Thomson Reuters

Table 2: Summary Statistic

This table reports summary statistics for the sub-samples including SRI- and non-SRI-oriented ETFs. Variables Definitions are provided in Table 1. The covered period ranges between January 2009 and December 2018. All variables are winsorized at the 1st and 99th percentiles. Delta reports the difference in means for each variable, while the reported p-value is the statistical level at which the null hypothesis stating that the difference between the two groups is zero can be rejected. All values are rounded to the third decimal unit.

	SRI		Non-SRI			
	Mean	St. dev	Mean	St. dev	Delta	p-value
Panel A: Fund-level variables						
Returns indicators						
Annualized Compounded Returns	7.084	0.948	5.347	0.204	1.737	0.001
Monthly Returns	0.572	0.079	0.435	0.017	0.136	0.116
Country of Domicile Adjusted Returns	0.180	0.049	-0.007	0.022	0.187	0.001
Strategy Adjusted Returns	0.162	0.050	-0.007	0.011	0.168	0.002
Market Adjusted Returns	0.323	0.104	-0.197	0.022	0.520	0.000
Liquidity indicators						
Liquidity	1.659	0.050	1.457	0.008	0.202	0.000
Country of Domicile Adjusted Liquidity	0.078	0.047	-0.004	0.008	0.082	0.033
Strategy Adjusted Liquidity	0.122	0.043	-0.005	0.008	0.127	0.001
Market Adjusted Liquidity	0.181	0.049	-0.008	0.190	0.189	0.000
Fund Controls						
Fund Size	3.851	0.034	4.635	2.183	-0.785	0.000
ETF Age	29.265	0.348	61.594	0.112	-0.398	0.000
Dividend Yield	1.115	0.007	2.037	0.007	-0.922	0.000
Sustainable Investments	1.000	0.000	0.000	0.000	1.000	.
Panel B: Climate-related variables						
Total Damages	10.286	0.021	10.286	0.007	0.000	0.999
Casualties	12.695	0.100	12.695	0.298	0.000	0.999
Injured	269,947.700	2,785.910	269,947.600	8,309.080	0.100	0.999

Table 3: SRI Vs Non-SRI ETFs Stock Market Performance

This table reports linear regression models estimated via OLS projecting monthly ETF returns on the SRI indicator and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month (Time) FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample. *,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Entry-free sample	Full Sample		
	Raw Returns		Market Adj. Returns	Strategy Adj. Returns	Domicile Adj. Returns
SRI	0.197***	0.238**	0.176**	0.168***	0.192***
	(0.071)	(0.093)	(0.070)	(0.060)	(0.066)
Fund Size	-0.040***	-0.024	-0.017**	-0.007	-0.018**
	(0.009)	(0.017)	(0.009)	(0.008)	(0.008)
ETF Age	0.002***		0.001	0.000	0.001*
	(0.001)		(0.001)	(0.001)	(0.001)
Dividend Yield	-0.045***	0.033*	-0.072***	-0.066***	-0.074***
	(0.011)	(0.019)	(0.010)	(0.009)	(0.009)
Fixed Effects	Asset Management Firm, Country, and Month				
Adj. R2	0.012	0.010	0.011	0.006	0.006
N	72,735	32,587	72,735	72,735	72,735

Table 4: SRI vs Non-SRI ETFs Stock Market Liquidity

This table reports linear regression models estimated via OLS projecting monthly ETF stock market volumes on the SRI indicator and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample.*,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Entry-free sample	Full Sample		
	Liquidity		Market Adj. Liquidity	Strategy Adj. Liquidity	Domicile Adj. Liquidity
SRI	0.071	0.178**	0.067*	0.042*	0.061
	(0.068)	(0.080)	(0.038)	(0.023)	(0.037)
Fund Size	-0.020*	-0.015	-0.022**	-0.020*	-0.022**
	(0.010)	(0.014)	(0.010)	(0.011)	(0.010)
ETF Age	0.000		0.001	0.001*	0.001
	(0.001)		(0.001)	(0.001)	(0.001)
Dividend Yield	-0.002	0.026*	-0.003	-0.005	-0.002
	(0.007)	(0.014)	(0.007)	(0.007)	(0.007)
Fixed Effects	Asset Management Firm, Country, and Month				
Adj. R2	0.028	0.023	0.029	0.030	0.017
N	42,270	19,077	42,270	42,270	42,270

Table 5: SRI vs Non-SRI: Sensitivity to the Climate Cycle

This table reports linear regression models estimated via OLS projecting monthly ETF stock market returns (Column 1 for the full sample, and Column 2 for the sample of ETFs for which complete information are available for the studied period) or volumes (Column 3 for the full sample, and Column 4 for the sample of ETFs for which complete information are available for the studied period on the SRI indicator, the Total Damage variable, their interaction, and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample.*,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Full Sample	Entry-free sample	Full Sample	Entry-free sample
	Raw Returns		Liquidity	
SRI	-0.643**	-0.3532**	-0.342**	-0.353**
	(0.269)	(0.1399)	(0.170)	(0.139)
Total Damage	0.134***	-0.0046	-0.001	-0.004
	(0.005)	(0.0048)	(0.003)	(0.004)
SRI x Total Damage	0.082***	0.0171*	0.040**	0.017*
	(0.026)	(0.052)	(0.017)	(0.089)
Fund Size	-0.040***	-0.0149	-0.020*	-0.014
	(0.009)	(0.0145)	(0.010)	(0.014)
ETF Age	0.002***		0.001	
	(0.001)		(0.001)	
Dividend Yield	-0.048***	0.0261*	-0.001	0.026*
	(0.010)	(0.013)	(0.007)	(0.013)
Fixed Effects	Asset Management Firm, Country, and Month			
Adj. R2	0.011	0.011	0.022	0.021
N	72,735	32,587	42,270	19,077

Table 6: SRI vs Non-SRI: Alternative Proxy for the Climate Cycle

This table reports linear regression models estimated via OLS projecting monthly ETF stock market returns (Column 1 for the full sample, and Column 2 for the sample of ETFs for which complete information are available for the studied period) or volumes (Column 3 for the full sample, and Column 4 for the sample of ETFs for which complete information are available for the studied period) on the SRI indicator, the Casualties variable (in Panel A) or the Injured variable (Panel B), their interaction, and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample.*,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Alternative Proxy – Casualties

	(1)	(2)	(3)	(4)
	Full Sample	Entry-free sample	Full Sample	Entry-free sample
	Raw Returns		Liquidity	
SRI	-0.135*	-0.187**	0.051	-0.188**
	(0.072)	(0.080)	(0.065)	(0.080)
Casualties	0.096***	0.001	0.010**	0.001
	(0.006)	(0.005)	(0.004)	(0.005)
SRI x Casualties	0.081**	0.012**	0.025*	0.012**
	(0.035)	(0.006)	(0.022)	(0.006)
Fund Size	-0.041***	-0.014	-0.020*	-0.014
	(0.009)	(0.014)	(0.010)	(0.014)
ETF Age	0.002***		0.001	
	(0.001)		(0.000)	
Dividend Yield	-0.046***	0.026*	-0.002	0.026*
	(0.010)	(0.013)	(0.007)	(0.013)
Fixed Effects	Asset Management Firm, Country, and Month			
Adj. R2	0.012	0.012	0.032	0.024
N	72,735	32,587	42,270	19,077

Panel B: Alternative Proxy – Injured				
	(1)	(2)	(3)	(4)
	Full Sample	Entry-free sample	Full Sample	Entry-free sample
	Raw Returns		Liquidity	
SRI	-0.368*	-0.166*	-0.029	-0.166
	(0.149)	(0.061)	(0.158)	(0.101)
Injured	-0.009**	0.004	0.006**	0.004
	(0.004)	(0.004)	(0.003)	(0.004)
SRI x Injured	0.061**	0.007*	0.005	-0.001
	(0.028)	(0.002)	(0.016)	(0.007)
Fund Size	-0.040***	-0.015	-0.020*	-0.015
	(0.009)	(0.014)	(0.010)	(0.014)
ETF Age	0.002***		0.001	
	(0.001)		(0.001)	
Dividend Yield	-0.045***	0.026*	-0.001	0.026*
	(0.010)	(0.013)	(0.007)	(0.013)
Fixed Effects	Asset Management Firm, Country, and Month			
Adj. R2	0.012	0.012	0.032	0.024
N	72,735	32,587	42,270	19,077

Table 7: SRI vs Non-SRI: 2-Stage Least Squares Approach

This table reports 2 stage least square regressions projecting monthly ETF stock market returns (Column 2) or volumes (Column 4) on the SRI indicator, the Total Damage variable, their interaction, and on a set of control variables including Fund Size, ETF Age, and Dividend yield. Column (1) and Column (3) reports the first stage of the model. p-values for the Cragg and Donald (1993) test of relevance for the selected instruments; the Sargan (1958) over identification test; and the Stock and Yogo minimum eigenvalue statistic to test for underidentification are available upon request. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample.*,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
	First Stage	Second Stage	First Stage	Second Stage
	Total Damage	Raw Returns	Total Damage	Raw Returns
Casualties	0.427***		0.435***	
	(0.001)		(0.002)	
Injured	-0.024***		-0.013***	
	(0.002)		(0.002)	
Casualties x SRI	-0.008		-0.015**	
	(0.006)		(0.006)	
Injured x SRI	0.028***		0.008	
	(0.008)		(0.009)	
SRI	-0.246**	-2.77*	-0.066	-0.752**
	(0.070)	(1.570)	(0.086)	(0.327)
Total Damage		0.258***		0.025**
		(0.01)		(0.011)
SRI x Total Damage		0.199*		0.055**
		(0.107)		(0.016)
Fund Size	0.0065***	-0.043***	0.005***	-0.020
	(0.001)	(0.009)	(0.001)	(0.010)
ETF Age	-0.001***	0.002***	-0.001***	0.001
	(0.000)	(0.001)	(0.000)	(0.001)
Dividend Yield	-0.006***	-0.044***	-0.006***	-0.002
	(0.001)	(0.011)	(0.001)	(0.007)
Fixed Effects	Asset Management Firm, Country, and Month			
R2	0.032	0.012	0.031	0.024
Number of Observations	72,735	72,735	42,270	42,270

Table 8: SRI vs Non-SRI: Sensitivity to the Climate Cycle

This table reports linear regression models estimated via OLS projecting monthly ETF stock market returns (Column 1 for the full sample, and Column 2 for the sample of ETFs for which complete information are available for the studied period) or volumes (Column 3 for the full sample, and Column 4 for the sample of ETFs for which complete information are available for the studied period on the SRI indicator, the Total Damage variable, their interaction, and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample.*,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Climate-related non-pecuniary shock: the 2015 Paris Climate Agreement

	(1)	(2)	(3)	(4)
	Full Sample	Entry-free sample	Full Sample	Entry-free sample
	Raw Returns		Liquidity	
SRI	0.054	-0.461***	-0.383**	-0.461***
	(0.397)	(0.146)	(0.148)	(0.146)
Total Damage	0.040***	-0.017***	-0.025***	-0.017***
	(0.007)	(0.006)	(0.005)	(0.006)
SRI x Total Damage	-0.005	0.028**	0.037**	0.0281**
	(0.032)	(0.013)	(0.018)	(0.013)
SRI X Post Paris Agreement	0.706*	0.196**	0.069	0.196**
	(0.293)	(0.094)	(0.289)	(0.094)
Total Damage X Post Paris Agreement	0.159***	0.026***	0.037***	0.026***
	(0.008)	(0.008)	(0.007)	(0.008)
SRI x Total Damage x Post Paris Agreement	0.100**	0.020**	0.005	-0.020**
	(0.044)	(0.008)	(0.030)	(0.008)
Additional Controls	Yes	Yes	Yes	Yes
Fixed Effects	Asset Management Firm, Country, and Month			
Adj. R2	0.012	0.012	0.031	0.027
N	72,735	32,587	42,270	19,077

Panel B: Business Cycle shock: The Global Financial Crisis (2009-2012)				
	(1)	(2)	(3)	(4)
	Full Sample	Entry-free sample	Full Sample	Entry-free sample
	Raw Returns		Liquidity	
SRI	0.582*	0.296*	0.382*	0.296*
	(0.299)	(0.159)	(0.209)	(0.159)
Total Damage	0.185***	-0.001	0.003	-0.001
	(0.005)	(0.006)	(0.004)	(0.001)
SRI x Total Damage	0.094***	0.009	0.049**	0.009
	(0.030)	(0.013)	(0.020)	(0.013)
SRI X Crisis	0.385	-0.147	0.177	-0.147
	(0.551)	(0.102)	(0.230)	(0.102)
Total Damage X Crisis	-0.188***	-0.011	-0.021***	-0.011
	(0.010)	(0.009)	(0.007)	(0.009)
SRI x Total Damage x Crisis	-0.112*	0.019**	-0.038*	0.019**
	(0.058)	(0.009)	(0.022)	(0.009)
Additional Controls	Yes	Yes	Yes	Yes
Fixed Effects	Asset Management Firm, Country, and Month			
Adj. R2	0.013	0.013	0.034	0.032
N	72,735	32,587	42,270	19,077

Table 9: SRI Vs Non-SRI ETFs Performance: E, S, or G?

This table reports linear regression models estimated via OLS projecting monthly ETF returns on the SRI indicator and on a set of control variables including Fund Size, ETF Age, and Dividend yield. All control variables are lagged 1 period with respect to the dependent variable. All models include Asset Management Firm FE, Country of Domicile FE, and Month FE. Variable's definitions are provided in Table 1. Standard errors are clustered at the asset management firm level, and all numbers are rounded to the 3rd decimal digit. Singletons are dropped from the sample. *,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)
	Full Sample	Entry-free sample	Full Sample		
	Raw Returns		Market Adj. Returns	Strategy Adj. Returns	Domicile Adj. Returns
SRI	0.091***	0.148***	0.012	0.071	0.099
	(0.078)	(0.301)	(0.086)	(0.064)	(0.073)
SRI x Env. Index	0.644***	0.412**	1.313***	0.147***	-0.168**
	(0.148)	(0.200)	(0.242)	(0.014)	(0.065)
SRI x Soc. Index	0.350**	0.187	1.039***	0.415***	0.376***
	(0.161)	`(0.296)	(0.186)	(0.135)	(0.146)
SRI x Gov. Index	-0.205	-0.535	-0.326	-0.079	-0.070
	(0.135)	(0.131)	(0.274)	(0.113)	(0.116)
Additional Controls	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Asset Management Firm, Country, and Month				
Adj. R2	0.012	0.012	0.013	0.009	0.009
N	72,735	32,587	72,735	72,735	72,735

Figure 1

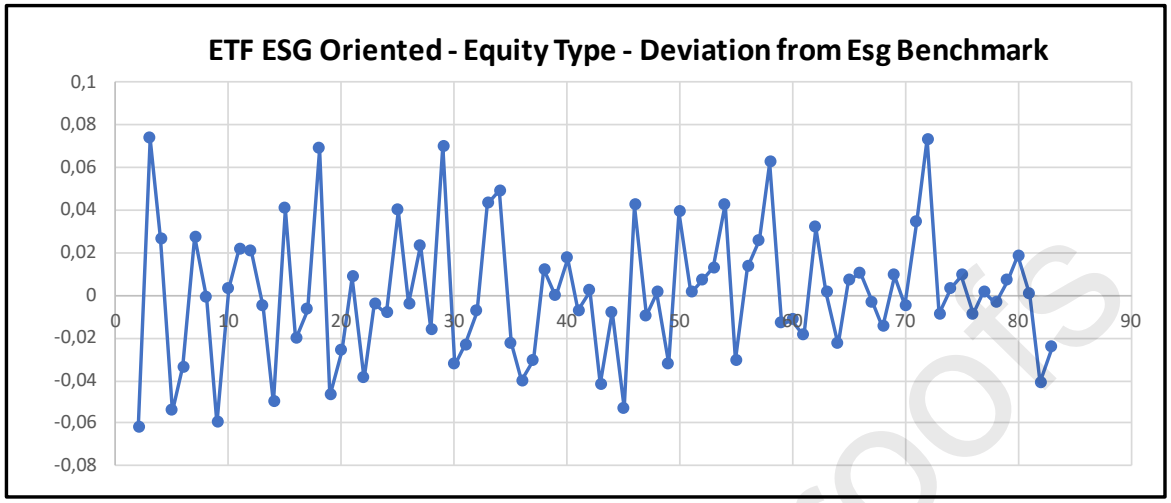

Figure 1 reports deviations from stated equity ESG Benchmark (Benchmark MSCI World ESG Focus), based on a Sharpe (1992) style base analysis executed over a 36 months rolling window.

Figure 2

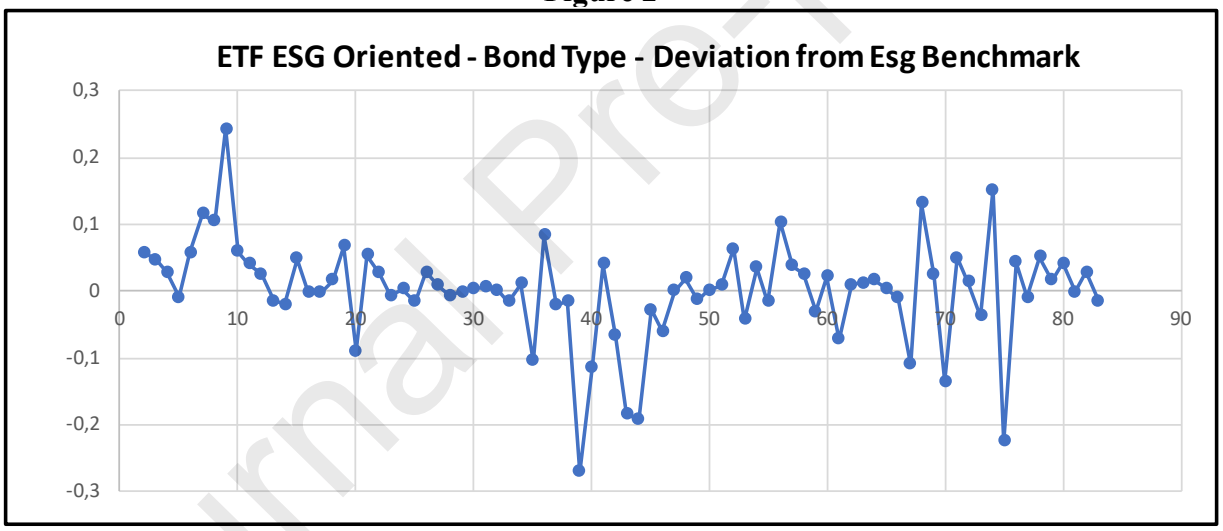

Figure 2 reports deviations from stated fixed income ESG Benchmark (Bloomberg MSCI Global Corporate SRI Index), based on a Sharpe (1992) style base analysis executed over a 36 months rolling window.

Figure 3

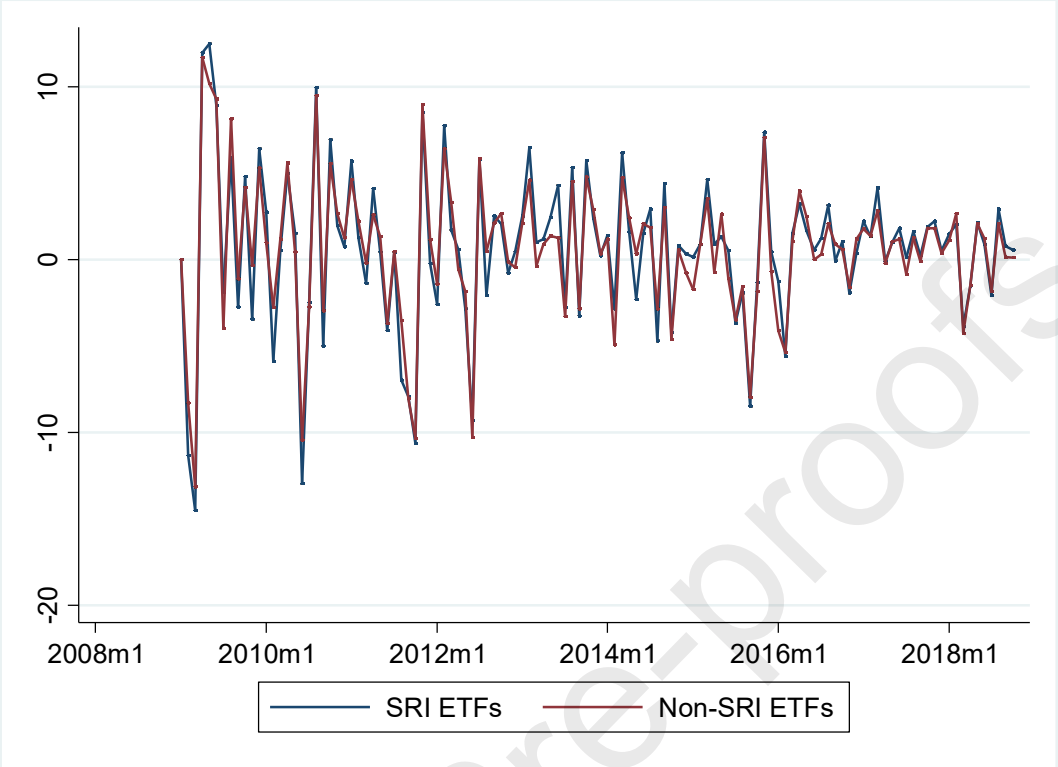

Figure 3 reports monthly raw returns for SRI and Non-SRI ETFs over the period 2009-2019.

Authors Statement

The authors equally contributed to developing this study. Gabriele Lattanzio is the corresponding author.

Highlights

- ESG ratings feature problems undermining their validity as proxies for social performance.
- We revisit the association between social and financial performance within a *ratings providers specific bias* free framework.
- Socially responsible (SRI) strategies outperform traditional strategies.
- The effect is concentrated in months of extreme attention towards climate change.
- Investors react to non-pecuniary shocks by increasing the weights assigned to SRI
- investments.