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Do investors actually value sustainability indices? Replication, development, and new evidence on CSR visibility

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Abstract

***Research Summary*:** In this study, we replicate and expand Hawn et al.'s study (*Strategic Management Journal*, 2018, 39, 949–976) that used Dow Jones Sustainability World Index (DJSI) events to measure variations in firms' Corporate Social Responsibility (CSR)-activism and examined their effect on a firm's stock price. We use DJSI events to capture variations in firms' CSR *visibility*, holding CSR activism constant by restricting our analyses to CSR-equivalent firms. First, we find similar results on stock price (i.e., no impact) and on trading volumes. Second, because professional market participants pay more attention to CSR-oriented firms and use visible cues such as DJSI events, we study and find that additions to DJSI lead to more analysts following a firm, and that continuations on the DJSI lead to an increase in equity being held by long-term investors.

***Managerial Summary*:** We replicate and complement a recent study that showed that the events of a firm's addition, continuation, or deletion in a major sustainability index (DJSI) had little impact on stock market reactions (Hawn et al. *Strategic Management Journal*, 2018, 39, 949–976). We redefine the comparison set that was previously used and compare across observationally equivalent firms in terms of CSR orientation in order to isolate the visibility effect of DJSI events. We find that these events do not significantly impact stock price and trading volumes. However, we expand the analysis and find that sustainability events attract more attention from financial analysts and

lead to an increase in the percentage of shares held by long-term investors indicative of a trend that professional investors pay more attention to CSR-visible firms over time.

KEYWORDS

analyst coverage, CSR, long-term investors, replication, stock market returns, sustainability

1 | INTRODUCTION

A substantial literature has considered whether markets react to firms' Corporate Social Responsibility (CSR)-related activities, finding mixed results. A recent study (Hawn et al., 2018) that provided the most rigorous empirical approach to date by using an event study (instead of correlational associations) found at most limited stock market reaction to additions, continuation, or deletion from a high profile sustainability index, the Dow Jones Sustainability World Index (hereafter "DJSI"). Attention to several elements might be useful in testing the robustness of the study, including assumptions about relevant comparison groups, use of alternative analytic techniques, and considering possible outcomes beyond stock market price reactions. Our study offers a quasi-replication (Bettis, Helfat, & Shaver, 2016, fig. 3) and extends the study in order to examine the robustness of their results and whether additional insights can be drawn from this particular empirical setting (Ethiraj, Gambardella, & Helfat, 2016).[1]

The choice of a universe from which to draw and of criteria to match observationally equivalent firms (so-called placebos) is not theoretically neutral. Hawn et al. (2018) match firms on three criteria: industry (four-digit SIC), EBITDA, and total assets in the year of announcement. The rationale of such a matching strategy is to consider investments across all possible comparable competing firms in order to examine variations in CSR activism. While some investors (e.g., retail investors) may rely on these index-related events to assess CSR activism, evidence suggests that other categories of investors, in particular specialized and institutional investors (e.g., Ioannou & Serafeim, 2015) may not (see also Appendix A in File S1). In this study, we reason that investors increasingly consider CSR-oriented firms as suitable and distinct investments and that, therefore, DJSI events may influence such investors' investments as DJSI events affect the *visibility* of some firms' CSR versus others, among all CSR-oriented firms. According to Global Sustainable Investment Alliance (2014), sustainable investment funds managed $21.4 trillion worth of assets in 2014 (30.2% of assets managed globally) whereas in 2012, sustainable funds were managing "only" $13.3 trillion. These fund managers are *constrained* to invest on CSR-oriented firms (PIMCO, 2017). As a result, instead of comparing the effect of DJSI events across the total universe of firms in Compustat to examine variation in CSR activities, we compare treated firms (i.e., firms that enter, stay in, or exit the DJSI) with CSR observationally equivalent placebos, that is, firms with equivalent levels of CSR that could have been included in the DJSI but were not.[2]

[1]Replications of precursor works can lead to different conclusions—see Zhao and Murrell (2016), replicating Waddock and Graves (1997) or to corroborate and extend previous conclusions (this paper).

[2]Placebo firms are "placebo-event firms" because they are determined for each event that we study: addition, continuation, and deletion. To mark the difference in the matching universe vis-à-vis the original study, we refer to CSR-equivalent firms for our replication and to placebo firms when mentioning the original study.

It is important to examine the effects of variations in the visibility of CSR activities associated with DJSI events for the following reasons. First, large CSR-focused firms dedicate considerable resources to increase the saliency of their CSR activities and maximize their chances to be included in high profile sustainability indices. For instance, more and more firms set up information systems, issue CSR reports and pay external CSR assurance providers to audit reported CSR information (Ernst & Young and Global Reporting Initiative, 2014; KPMG, 2013; O'Dwyer, Owen, & Unerman, 2011; Simnett, Vanstraelen, & Chua, 2009). CSR raters use this information to assess firms' CSR activities (RobecoSAM, 2017). A natural question is, therefore, whether the considerable resources devoted to sustainability index inclusion yield positive market effects, on top of other benefits related to CSR activism. This study answers this precise question. Indeed, sustainability index inclusion may provide greater visibility to CSR activities, in particular for market participants that look for signals to discriminate between equivalently active CSR-engaged firms. Hence, DJSI-related events may or may not enhance the visibility of firms that fit analysts' and long-term investors' preference.

Second, our approach is relevant because the number and importance of sustainability indices has dramatically increased over time, which calls for an empirical examination of the effects of inclusion in these indices (controlling for confounding effects coming from CSR activism).[3]

The questions of interest thus become: Do these index events impact firms' market performance relative to CSR-equivalent firms? Do the results found by Hawn et al. (2018) hold when restricting the matching universe to CSR-oriented firms? Market participants' reactions are not necessarily limited to short-term market impact such as stock price and trading volumes. They include other outcomes associated with market attention related to CSR visibility for categories of investors that do not directly observe CSR activities, such as analysts following the stock and long-term investors' presence in a firm's capital. Hence, Beyond stock price and trading volumes, are there any other significant differences observed between treated and CSR-equivalent firms?

We examine firms included in the DJSI over the period 2005 to 2015.[4] We match DJSI-event firms using variables that influence decisions regarding inclusion in the DJSI, namely environmental performance, social performance, strength of corporate governance, economic performance and firm size, drawing on a pool of firms from the universe of firms that could be considered for addition to the DJSI (i.e., large firms by float-adjusted market capitalization from the S&P Global BMI Index). We examine the market impact of index-related events, that is, addition, continuation, and deletion in the DJSI, using the same time windows as in Hawn et al. (2018). Next, we use industry thresholds for inclusion in the DJSI to perform regression discontinuity design and assess the effect of DJSI events for CSR-oriented firms in the vicinity of minimum index inclusion rankings. Finally, we test the association between DJSI events and the change in the number of analysts following the firm, and also the percentage of equity held by long-term investors.

Our results are largely consistent with the earlier study in terms of both limited significance and materiality, considering both main effects and time trends. We find that firms added, continued or

[3]There are currently 11 sustainability indices in the DJSI S&P index family (S&P Dow Jones Indices and RobecoSAM, 2017) (there was only one in 1999) and 13 equity indices in the FTSE4Good Russel index family (there was only one in 2001). Other sustainability indices also exist such as the MSCI index family (e.g., KLD 400 Social Index, USA ESG Select Index, Japan ESG Select). In addition to this growing number of sustainability indices, many Exchange Traded Funds (ETFs) track the performance of sustainability indices (see Appendix B in File S1).

[4]Because we focus on CSR-oriented firms, we need to measure CSR performance. We obtain measures of CSR performance from Thomson Reuters Asset4 which are available since 2004. Therefore, our sample period covers the 2005–2015 period (as we match DJSI firms with CSR performance with 1 year lag). Due to data constraint related to RobecoSAM total sustainability percentile rankings, we focus on the period 2016–2018 in the regression discontinuity design analysis (see Section 3).

deleted from the DJSI exhibit no different cumulative abnormal returns and abnormal trading volumes relative to CSR-equivalent firms over the full time period under investigation (2005–2015). We find similar evidence of insignificant effects using the regression discontinuity design for a subset of DJSI events over the period 2016–2018.

However, we show increasing benefits over time for additions in terms of analyst coverage (up to five more analysts relative to CSR-equivalent firms and relative to deletion firms). We also find increasingly positive, yet economically small ($112 million of market value on average), benefits in terms of equity held by long-term investors for additions (relative to deletion firms), and continuations (relative to CSR-equivalent firms and to deletion firms) over time.

This study demonstrates robustness of prior work, while introducing a useful set of additional theory, methods, and outcomes to the general discussion of whether markets react to CSR index events. Hawn et al. (2018) show that there is not much of an effect when the DJSI serves as a measure of CSR *activism*; we show that there is not much of an effect on market activity (price and volume) when, given CSR-focus, the index is used as a measure of CSR *visibility*.

2 | RESEARCH QUESTIONS

Hawn et al. (2018) conducted one of the largest studies ever to analyze the impact on stock market performance of events related to the leading sustainability index: the DJSI. Their article covers 27 countries and 17 years, and all the corresponding events in the DJSI (addition, continuation, and deletion) for thousands of firms. Addressing many shortcomings noted in past research, including an excessive focus on regional firms due to data availability (leading to a predominance of US-based studies), short timeframes, and correlational methods, the analysis in Hawn et al. (2018) employs an event-based study that contrasts treated firms (firms that underwent an event) with comparable competing firms that did not undergo a similar event (placebo firms). They find the impact of addition, continuation, or deletion in the DJSI is barely distinguishable from the stock market reactions to these events.

All event studies contrasting treated and observationally equivalent nontreated firms have an underlying theory about what counterfactuality means. That is, which types of firms should comprise the pool of potential matched firms. In the case of Hawn et al. (2018), the assumption is that market participants compare treated CSR-oriented firms across the entire population of firms since all firms are comparable. Thus, they use the full universe of firms available in Compustat databases as the matching population to examine the impact of variations in CSR activities. Our underlying theory is different. We argue that CSR-oriented firms are compared primarily to other CSR-equivalent nontreated firms and that DJSI events influence the *visibility* of these firms.

Analysts and investors use frames and categories to first identify (screen) candidate firms for investment, and then evaluate these firms afterwards (Sharkey, 2014; Zuckerman, 2004). As CSR orientation becomes institutionalized and investors become more constrained (Hawn & Ioannou, 2016; Ioannou & Serafeim, 2015; see Appendix A in File S1 that provides evidence of the increasing attention from professional market participants to CSR-oriented firms), candidate firms' identification occurs more and more among equivalent peers.[5] That is, because investors compare CSR-oriented firms mainly to other similar CSR-oriented firms, they look for visible signals (cues) about CSR

[5]The growing interest among investors towards CSR-oriented firms is illustrated by the fact that Bloomberg recently added RobecoSAM sustainability rankings to its terminals. This addition reflects the growing demand for CSR information and the importance of CSR performance for professional market participants that use Bloomberg terminals, in contrast to retail investors who do not (Da, Engelberg, & Gao, 2011).

activism that provide some positive indication (in case of inclusion or maintenance in the index) or negative indication (in case of deletion from the index). While Hawn et al. (2018) consider DJSI events as revealing CSR activism, we consider these events as making firms more visible to professional market participants among all CSR-engaged firms. Hence, we seek to compare the market impact associated with changes in visibility due to addition, continuation, and deletion in the DJSI for treated firms relative to CSR-equivalent firms, rather than to the entire universe of nontreated firms.

Research Question 1 *Does this study produce the same findings on market reactions* (*stock price and trading volume*) *as in Hawn et al.* (2018) *when restricting the placebo firms to CSR-equivalent firms?*

It is also to be expected that the institutionalization of CSR entails different consequences for CSR-treated versus CSR-equivalent firms. Independently of any short-term market impact of DJSI events, it is likely that two candidates for addition to the index will be assessed differently when one gets in and not the other because addition increases the visibility and hence facilitates the identification (screening) of the index-added firm by market participants. Hence, we examine the consequences of DJSI events (addition, continuation, and deletion) for sell-side financial analyst following. Sell-side analysts' perception of CSR performance has evolved over time: not only do equity analysts view firms with higher CSR performance more positively (Ioannou & Serafeim, 2015), but analyst surveys indicate that CSR performance is becoming a more important factor in investment decisions. For instance, 78% of analysts take ESG performance into consideration for their investment decisions, according to CFA Institute (2017). A media analysis confirms the growing concern of analysts and investors for ESG and CSR criteria (see Appendix A in File S1). While Ioannou and Serafeim (2015) show that financial analysts value CSR activities more over time they do no investigate whether changes in firms' CSR visibility, holding CSR activities constant, influence analysts' decision to follow firms. We reason that the increased visibility given to a firm's CSR performance by its addition or continuation on the DJSI should lead more analysts to follow the firm, especially in the most recent period.

Likewise, being included in sustainability indices sends a signal to specific categories of investors.[6] Notably, long-term (vs. short-term) investors will see as more attractive firms that addition in DJSI renders more visible than CSR-equivalent firms not included in the index. Over time, long-term investors may view firms that are visibly recognized as strong CSR performers as more suitable for their investment strategy, because these firms seem a better match for their investment time horizon relative to CSR-equivalent firms that did not pass this stringent selection process (Amel-Zadeh & Serafeim, 2018; Bansal & Desjardine, 2014; Flammer & Bansal, 2017) (see also Media analysis in Appendix A in File S1). Again, the difficulty for these long-term investors consists in identifying among CSR-active firms those with a higher potential. Inclusion (and maintenance) in the DJSI is a visible signal of intrinsic quality differences vis-à-vis CSR-equivalent firms which helps long-term investors to identify such firms. Therefore:

[6]In January 2018, Laurence D. Fink, the CEO of the largest institutional asset managers in the world (BlackRock, 6 trillion of assets), wrote a letter to all CEOs of the firms in which BlackRock invests that CSR performance becomes crucial. See https://www.forbes.com/sites/hbsworkingknowledge/2018/02/03/how-to-heed-blackrocks-call-for-corporate-social-responsibility/#74600e31290a (Last accessed February 11, 2019). In 2011, BlackRock created a DJSI World Index Exchange Traded Fund (ETF): the iShares Dow Jones Global Sustainability Screened UCITS ETF.

Research Question 2 *Does the addition and continuation on the DJSI, by making treated firms more visible, increase financial analyst following and the proportion of long-term investor ownership for these firms versus CSR-equivalent firms?*

3 | DATA AND METHODS

The DJSI is the oldest and most respected sustainability index. RobecoSAM, an investment company specialized in Environment, Social, and Governance (ESG) investing, prepares CSR performance scores used in constructing the index and S&P Dow Jones is responsible for its operational management (construction, maintenance, and dissemination). The most selective sustainability stock index is the DJSI World, which consists of top environmental performers based on the top 10% industry performers. This creates a competitive environment among firms keen to be added to or continued on the index. RobecoSAM and DJSI announce changes to the DJSI in early September and execute those changes at the end of the same month.[7]

3.1 | Identification of CSR-equivalent firms

We obtain the list of constituents of the DJSI from 2005 to 2015 from the RobecoSAM website (www.robecosam.com).[8] We select potential control firms from firms included in the S&P Global BMI index, as listed in Datastream. Our treatment sample consists of DJSI-event firms: firms that underwent the events of addition, continuation, and deletion. One important feature of our empirical strategy consists in replicating the DJSI methodology (RobecoSAM, 2017; S&P Dow Jones Indices and RobecoSAM, 2017) to identify appropriate CSR-equivalent firms to isolate the effects of DJSI events within a group of CSR-oriented firms.

Hawn et al. (2018) rely on coarsened exact matching (CEM) to identify placebo-event firms based on industry, size, and profitability. CEM allows to reduce covariates imbalances between treated and control observations by coarsening control variables to create a set of homogeneous strata and then weight treated and control observations within the same strata (Iacus, King, & Porro, 2012). This approach allows identifying competitors to DJSI-event firms. Because we focus on CSR-oriented firms, our matching approach differs in two important ways.

First, we rely on propensity-score matching (PSM) within industry-year groups because PSM closely mimics the selection process of the DJSI: the Corporate Sustainability Assessment (CSA) conducted by RobecoSAM (2017). Indeed, PSM empirically assigns a score based on explicit CSR characteristics to potential control firms, which is precisely what the CSA does. Analysts from RobecoSAM assign an aggregate CSR score based on industry-specific weighs for multiple dimensions of CSR performance to identify candidates for addition in the DJSI. RobecoSAM indicates which CSR dimensions are taken into consideration in the CSA, and this facilitates the choice of appropriate covariates and is particularly well suited to our research objectives. Therefore, our identification of CSR-equivalent firms consists in finding propensity-score matched firms that have high

[7]S&P Dow Jones Indices and RobecoSAM (2017) explain that "the indices are governed by the DJSI Index Committee consisting of an equal number of S&P Dow Jones Indices and RobecoSAM representatives." Until 2011 effective changes were made on September 30, and since 2012 changes have been made from September 19 to 24.

[8]We restrict our sample to the 2005–2015 period because CSR performance variables are not available before 2004. For the regression discontinuity design we also collect DJSI constituents for the period 2016–2018.

CSR performance but no DJSI events.[9] Second, Hawn et al. (2018, p. 956) considered the full universe of firms available in Compustat. This procedure had the advantage of offering more candidates to identify competing firms, but is less appropriate to our objective because we seek to identify CSR-equivalent firms that could have been included in the DJSI. Some firms in Compustat may not be valid contenders for inclusion in the DJSI (e.g., firms below the minimum threshold of free-float-adjusted market capitalization, as explained below).

Therefore, to restrict the pool of potential observationally equivalent firms, we follow the selection criteria used by the DJSI (see Appendix C in File S1) and first screen potential control firms based on their float-adjusted market capitalization and inclusion in the S&P Global BMI Index. Appendix C in File S1 suggests that the top 35% of free-float-adjusted firms by market capitalization are concerned, so we deliberately chose a slightly larger pool of firms (the top 40% of free-float-adjusted market capitalizations each year) to avoid excessively restricting the pool of potentially invited firms. This gives a final population of over 25,000 potential CSR-equivalent firm-year observations about firms which, based on their free-float-adjusted market capitalization and the composition of the S&P BMI, are potential candidates for inclusion in the DJSI.

Next, we statistically replicate the selection methodology developed by RobecoSAM (2017). We propensity-score match firms at the industry-year level for three types of event: additions to the index (*DJSI_IN*), continuation in the index (*DJSI_STAY_IN*), and deletion from the index (*DJSI_OUT*). Following the CSA, we use the following factors to identify CSR-equivalent firms: social performance, environmental performance, strength of corporate governance, economic performance, and size (in assets). We measure top line and bottom line economic performance with sales growth (ΔREV) and return on assets (*ROA*), respectively. Environmental (*ENVSCORE*), social (*SOCSCORE*) and governance (*GOVSCORE*) performance scores are obtained from Thomson Reuters Asset4. We estimate the matching model by industry-year group (we use the same industry classification as the index provider, i.e., the Global Industry Classifications Standard)—see Appendix D in File S1 for definition of all variables and Appendix E in File S1 for the composition of the sample by country and by year.

The estimation results of our propensity score model indicate that most coefficients exhibit the expected positive signs (see Appendix F in File S1, Panel A). CSR performance dimensions are positively associated with DJSI events. The model correctly classifies 98.5% of additions, 90.8% of continuations, and 98.7% of deletions. We match 2,240 DJSI-event firms and identify 205 CSR-equivalent additions, 1,858 CSR-equivalent continuations, and 171 CSR-equivalent deletions.[10]

Panels B and C of Appendix F in File S1 present descriptive statistics for the main variables of matched DJSI-event firms (Panel B) and CSR-equivalent firms (Panel C). We find that DJSI-event firms and CSR-equivalent firms do not exhibit different sizes, and importantly, have similar levels for each of the CSR dimensions thus achieving our critical matching objective. Appendix G in File S1 presents correlation matrices between all variables.

[9]Although it offers valid statistical properties, CEM does not replicate the CSA conducted by RobecoSAM but relies on another matching algorithm. Note that we replicated our results using CEM and obtain similar findings as those obtained with PSM.

[10]We identify a slightly lower number of CSR-equivalent events (2,234 = 205 + 1,858 + 171) than the corresponding number of DJSI events due to missing stock price data for some CSR-equivalent firms (dropped from the sample).

3.2 | Impact on performance

As in Hawn et al. (2018), we use cumulative abnormal return (*CAR*) for firm *i* computed around several time windows surrounding the announcement of the revised DJSI on day *k* (early September). Abnormal returns ($AR_{i,k}$) are computed as the stock return of firm *i* in day *k* minus the return of the S&P 500 Index return in day *k*. We also extend Hawn et al. (2018) by examining the effect of DJSI events on abnormal trading volumes. Abnormal trading volume is often used to measure investors' attention to specific news (Dellavigna & Pollet, 2009; Fang & Peress, 2009). Abnormal trading volume for firm *i* is computed between day $k-1$ and day *k* (or day $k+1$) surrounding the announcement of the revised DJSI on day *k*. Daily abnormal trading volume for firm *i* on day *k* is computed as:

$$AbVOL_{i,k} = \log\left(VOL_{i,k}\right) - \left(\frac{\sum_{j=21}^{40} \log\left(VOL_{i,k-j}\right)}{20}\right)$$

(Boulland & Dessaint, 2017; Dellavigna & Pollet, 2009).

In event-studies results, we examine whether the effect of DJSI events on stock returns has changed across time windows, and over the more recent period, by dividing our sample period into two sub-periods: 2005–2009 and 2010–2015 as in Hawn et al. (2018). We also present regression analyses per event as in Hawn et al. (2018), the main independent variables of interest being *Event* which separates treated and CSR-equivalent firms, and an interaction with a period effect (i.e., *Trend* which is a linear time trend). In these multivariate analyses, we include the following control variables: firm beta (*BETA*), firm size (*SIZE*), growth options (market-to-book ratio, *MTB*), financial performance (*ROA*), and analyst following (*FOLLOWING*). We also include industry fixed effects (FE) and cluster standard errors by firm.

3.3 | Regression discontinuity design using RobecoSAM CSR percentile ranks

The approach of comparing outcome above or below a discontinuous threshold is known as regression discontinuity design in the economics, strategy or finance literature (e.g., Derrien & Dessaint, 2018; Flammer, 2015; Roberts & Whited, 2012). Firms included in the DJSI must exhibit a CSR performance in the top 10% of the sustainability performance provided by RobecoSAM for a given industry-year group (see Appendix C in File S1). Intuitively, there is no large CSR performance difference between firms slightly above or below the CSR performance threshold set by RobecoSAM to include firms in the DJSI. Since 2016, RobecoSAM provides CSR rankings (i.e., Total Sustainability Percentile Rank) of rated firms in Bloomberg terminals. We exploit this new dataset and collect September Total Sustainability Percentile Ranks for years 2016, 2017, and 2018 for firms composing the DJSI as well as for all other firms composing the S&P BMI with a non-missing CSR percentile ranking. Drawing on past studies (Derrien & Dessaint, 2018; Roberts & Whited, 2012), we estimate the following linear regression discontinuity model (for firm *i*, DJSI event day *t*, and industry-year group *g*):

$$\begin{aligned} CAR_{i,[k-1;k+1]} \text{ or } AbVOL_{i,[k-1;k+1]} = {} & b_0 + \beta_1 Event_{i,t} + b_2\left[RobSAMRank_{i,t} - Cut_{g,t}\right] \\ & + b_3 Event_{i,t} \times \left[RobSAMRank_{i,t} - Cut_{g,t}\right] + b_j \text{Controls} \\ & + \text{Year FE} + \text{Industry FE} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $Event_{i,t}$ is a dummy variable for DJSI event (addition, continuation, or deletion); $RobSAMRanks_{i,t}$ is the *Total Sustainability Percentile Rank* from RobecoSAM for firm i on day t; and $Cut_{g,t}$ is the cutoff percentile rank for inclusion in the DJSI index in industry g on day t, defined as the minimum value of $RobSAMRanks_{i,t}$ in industry g and day t.

In model (1), coefficient b_1 captures the treatment effect (i.e., the three DJSI events) around the cutoff RobecoSAM percentile rank for inclusion in the DJSI in a given industry-year group. Coefficient b_2 captures the association between RobecoSAM CSR ranks and the outcome variable and coefficient b_3 allows two different slopes below or above the cutoff rank. We also include the same control variables as above: *BETA*, *SIZE*, *MTB*, and *FOLLOWING*.

3.4 | Impacts on analyst following and capital structure (long-term investors)

As per Research Question 2, we expect to find that DJSI-event firms (in particular, continuation and addition event firms) attract more attention from professional market participants such as analysts and long-term investors. To examine the effects of DJSI events on financial analyst following and equity held by long-term investors, we estimate the following OLS models:

$$\begin{aligned}\Delta FOLLOWING_{i,[t-1,t+1]} = {} & b_0 + b_1 Event_{i,j} + b_2 Event_{i,t} \times Trend + b_3 Trend \\ & + b_k \text{Controls} + \text{Industry FE} + \varepsilon,\end{aligned} \tag{2}$$

$$\begin{aligned}PFHOLDING_{i,t+1} = {} & b_0 + b_1 Event_{i,t} + b_2 Event_{i,t} \times Trend + b_3 Trend \\ & + b_k \text{Controls} + \text{Industry FE} + \varepsilon,\end{aligned} \tag{3}$$

where $\Delta FOLLOWING_{i,t-1,t+1}$ is the percentage change in the number of financial analysts following the firm between the year before and the year after the change in the DJSI in year t. $PFHOLDING_{i,t+1}$ is the percentage of strategic shares held by pension funds or endowment funds (at least 5% of shares in the Datastream definition) for firm i in year $t + 1$.[11] *Event* coincides with the index-related events (i.e., addition, continuation, or deletion), and *Trend* is continuous time trend variable as above. We include the following control variables: firm size (*SIZE*), financial performance (*ROA*), growth options (*MTB*), leverage (*LEV*), revenue growth (ΔREV), stock returns (*RET*), stock volatility (*VOL*), capital intensity (*FIXEDASSETS*), foreign sales (*FORSALES*), and capital structure (*CLOSELYHELD*).

In OLS model (2), because the dependent variable is a change, we use changes for all the control variables, and include the number of financial analysts the year before DJSI events ($FOLLOWING_{t-1}$) to control for the base effect. In model (3), we include the same control variables as in model (2) except that we use levels and include a variable for the presence of pension funds or endowment funds in year $t - 1$ to control for any base effect.

[11]We use Datastream's percentage of strategic shares held by pension funds or endowment funds to measure equity held by long-term investors because pension and endowment funds have long time horizons (e.g., Cassandra, 1993; Mulvey, Simsek, & Zhuojuan, 2006). An alternative classification of institutional investors is based on Bushee (2001) and Bushee and Noe (2000) which classifies investors into transient, dedicated and quasi-indexers but which relies on SEC filings by institutional investors (form 13F) and only covers US-based institutional investors. Because there are important differences in CSR orientation across countries (Selmier, Newenham-Kahindi, & Chang, 2015) and that more than 80% of events concern non-US firms (see Appendix E in File S1), the US focus of this classification may bias statistical inferences. Conversely, Datastream includes institutional investors irrespective of their location.

4 | RESULTS

4.1 | Research Question 1: Replicating effects on financial performance

Table 1 presents the results of the impact of DJSI events for the matched sample, that is, DJSI-event versus CSR-equivalent firms.[12] We replicate Hawn et al. (2018) results (time windows, sub-periods) focusing on CSR-equivalent firms thus allowing to re-examine the importance of DJSI events from a different perspective, whether for investors focusing on CSR-oriented firms these events make the firms more visible (see Appendix I in File S1 for a detailed replication of Hawn et al. (2018) time windows). Panel A of Table 1 presents the results of differences in *CARs* between DJSI-event firms and CSR-equivalent firms. Panel B of Table 1 examines difference-in-differences (DiD) across the 2005–2009 and 2010–2015 periods for DJSI-event and CSR-equivalent firms.

Results in Panel A of Table 1 indicate no effect of additions, continuations, or deletions relative to CSR-equivalent firms over the full 2005–2015 time period (see insignificant effects for DJSI-event firms vs. CSR-equivalent firms over [−1; 0] or over [−1; +1] in Panel A).

Panel B of Table 1 shows tests of the difference between DJSI-event and CSR-equivalent firms in the differences between the sub-periods 2005–2009 and 2010–2015 to identify whether there is a shift in investors' perception in the more recent period. We find no clear statistical evidence of a more positive change in the impact of additions in the more recent period relative to the change for CSR-equivalent additions (DiD = +82 basis points over [−1; 0], $p = .055$, DiD = +81 basis points over [−1; +1], $p = .140$) and for continuations relative to CSR-equivalent continuations (DiD = +16 basis points over [−1; 0], $p = .303$, DiD = +30 basis points over [−1; +1], $p = .111$).

Table 2 presents a multivariate analysis on the CSR-matched sample that singles out the effect of each event and the period effect to corroborate univariate evidence of the event study (following Hawn et al., 2018, p. 909, Table 7). This allows us to control for the influence of other firm characteristics, test the impact on abnormal trading volumes (and adjust *p*-values for standard errors clustered by firms). We present these analyses for two time windows [−1; 0] and [−1; +1] surrounding DJSI events.[13]

Table 2 shows insignificant effect of addition, continuation or deletion events on *CARs* or abnormal trading volumes surrounding the announcement of these events and no different effect over time (see insignificant coefficients on *Event* and *Event* × *Trend*, respectively). Hence, our results indicate that after controlling for confounding effects related to firm characteristics and CSR performance, additions, continuations, and deletion have no effect on short-term stock returns and trading volume.

We also examine whether DJSI events have an impact on stock returns and trading volumes within CSR-equivalent firms using regression discontinuity design based on RobecoSAM Total Sustainability Percentile Rank. Table 3 presents the estimation results of model (1) using the

[12]Appendix H in File S1 presents an analysis of the effects on abnormal returns from DJSI events (additions, continuations, and deletions) for the full (unmatched) sample. This "naïve" analysis shows that addition to and continuation on the index elicit a positive market reaction over the 2010–2015 sub-period (+39 basis points over [−1; +1], $p = .022$, and +22 basis points over [−1; +1], $p = .000$, respectively) while additions and continuations were negatively associated with stock returns in the 2005–2009 sub-period (−86 basis points over [−1; +1], $p = .000$, and −82 basis points over [−1; +1], $p = .000$, respectively). The differences between the 2005–2009 and 2010–2015 periods are significant for addition and continuation events for both the [−1; 0] and [−1;+1] time windows (*p*-values between .000 and .002). This may indicate a shift in the perception of CSR leadership by investors over time (Ioannou & Serafeim, 2015) but could also be explained by unobserved characteristics related to CSR performance because these differences do not compare treated firms (i.e., DJSI event firms) to observationally equivalent firms (i.e., pseudo-event firms). Our analyses corroborate this alternative explanation.

[13]See Appendix J in File S1 for the full model including all the control variables.

TABLE 1 Event study: Stock market reaction to changes of the DJSI (matched sample). Panel A: Comparison between CAR surrounding DJSI events and CSR-equivalent events. Panel B: Difference-in-differences (DiD) between the change in CAR between the sub-period 2005–2009 and 2010–2015 for DJSI events and CSR-equivalent events

	Addition versus CSR-equivalent addition				**Continuation versus CSR-equivalent continuation**				**Deletion versus CSR-equivalent deletion**			
	N	**Mean**	**Median**	***p*-Value**	***N***	**Mean**	**Median**	***p*-Value**	***N***	**Mean**	**Median**	***p*-Value**
Panel A												
[−1; 0]	411	−0.0002	−0.0011	.9407	3,721	−0.0003	−0.0004	.6961	343	−0.0036	−0.0052	.1913
[−1; +1]	411	−0.0001	−0.0011	.9674	3,721	−0.0008	−0.0003	.3708	343	−0.0038	−0.0035	.2829
	Δ*CAR* for addition versus Δ*CAR* for CSR-equivalent addition				**Δ*CAR* for continuation versus Δ*CAR* for CSR-equivalent continuation**				**Δ*CAR* for deletion versus Δ*CAR* for CSR-equivalent deletion**			
DiD	***N***	**Mean**	**Median**	***p*-Value**	***N***	**Mean**	**Median**	***p*-Value**	***N***	**Mean**	**Median**	***p*-Value**
Panel B												
[−1; 0]	411	0.0082	0.0060	.055	3,721	0.0016	0.0019	.303	343	0.0014	−0.0053	.819
[−1; +1]	411	0.0081	0.0083	.140	3,721	0.0030	0.0026	.111	343	0.0019	0.0060	.811

p-Values are based on two-tailed *t* tests.

Panel A presents the differences between *CARs* (cumulative abnormal returns) for DJSI events and CSR-equivalent events for additions, continuations, and deletions over the period 2005–2015. Panel B presents the difference between DJSI-event firms and CSR-equivalent firms in the differences (DiD) between the following sub-periods: 2005–2009 and 2010–2015.

TABLE 2 Event studies surrounding DJSI events: Multivariate analysis (events vs. CSR-equivalent events)

Model	1a	1b	1c	1d	2a	2b	2c	2d	3a	3b	3c	3d
Dependent variable	*CAR*	*AbVol*	*CAR*	*AbVol*	*CAR*	*AbVol*	*CAR*	*AbVol*	*CAR*	*AbVol*	*CAR*	*AbVol*
Window	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]
	Addition	Addition	Addition	Addition	Continuation	Continuation	Continuation	Continuation	Deletion	Deletion	Deletion	Deletion
Constant	−0.0084	0.8843	0.0258	1.9703	−0.0102	0.4448	−0.0079	0.5218	0.0285	0.1911	0.0301	−0.4683
	(−0.64)	(1.10)	(1.25)	(1.72)	(−1.77)	(1.80)	(−1.08)	(1.50)	(1.51)	(0.28)	(1.26)	(−0.49)
	.521	.274	.211	.087	.077	.073	.282	.133	.132	.783	.210	.623
Event	−0.0047	0.0298	−0.0033	0.0302	−0.0009	−0.0335	−0.0039	−0.0116	−0.0053	0.1196	−0.0041	0.2596
	(−1.06)	(0.15)	(−0.53)	(0.11)	(−0.57)	(−0.48)	(−1.91)	(−0.12)	(−0.62)	(0.39)	(−0.40)	(0.64)
	.291	.878	.595	.915	.571	.634	.056	.906	.533	.700	.688	.526
Event × *Trend*	0.0009	−0.0169	0.0008	−0.0230	0.0001	0.0087	0.0005	0.0062	0.0001	0.0102	0.0000	0.0089
	(1.40)	(−0.64)	(0.91)	(−0.61)	(0.49)	(0.91)	(1.66)	(0.46)	(0.11)	(0.25)	(0.02)	(0.17)
	.163	.520	.362	.545	.624	.361	.098	.645	.914	.799	.982	.868
Trend	0.0006	0.0367	0.0013	0.0683	0.0009	0.0281	0.0009	0.0377	−0.0001	−0.0192	−0.0004	−0.0098
	(1.11)	(2.11)	(1.90)	(2.67)	(5.21)	(4.16)	(4.44)	(3.98)	(−0.08)	(−0.65)	(−0.46)	(−0.26)
	.270	.036	.059	.008	.000	.000	.000	.000	.938	.517	.644	.796
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No	No	No	No	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	387	381	387	381	3,586	3,520	3,586	3,520	323	314	323	314
Adjusted R^2	.0335	.0347	.0437	.0303	.0258	.0205	.0299	.0189	−.0087	.0282	.0307	.0286

t-Statistics are presented in parentheses and are based on standard errors clustered by firms. *p*-Values are presented below coefficients.

This table presents the impact of DJSI events on cumulative abnormal returns (*CAR*) and abnormal trading volume (*AbVOL*). See Appendix D in File S1 for definition of all variables. OLS model estimated on the CSR-performance matched sample.

TABLE 3 Regression discontinuity design using RobecoSAM CSR percentile ranks (2016–2018)

Model	1a	1b	1c	1d	2a	2b	2c	2d	3a	3b	3c	3d
Dependent variable	*CAR*	*AbVOL*	*CAR*	*AbVOL*	*CAR*	*AbVOL*	*CAR*	*AbVOL*	*CAR*	*AbVOL*	*CAR*	*AbVOL*
Window	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]	[−1; 0]	[−1; 0]	[−1; +1]	[−1; +1]
	Addition	Addition	Addition	Addition	Continuation	Continuation	Continuation	Continuation	Deletion	Deletion	Deletion	Deletion
Constant	−0.0006	0.5838	0.0091	0.4394	−0.0035	0.4652	0.0057	0.3251	−0.0137	−0.4119	−0.0089	−0.6202
	(−0.16)	(3.28)	(1.94)	(1.80)	(−0.94)	(2.86)	(1.28)	(1.45)	(−1.45)	(−1.10)	(−0.76)	(−1.12)
	.872	.001	.053	.071	.346	.004	.200	.148	.148	.270	.446	.262
Event	0.0035	0.0769	0.0055	0.1631	0.0014	0.0953	0.0006	0.0642	0.0001	−0.2433	−0.0045	−0.4570
	(1.38)	(0.86)	(1.81)	(1.25)	(1.07)	(1.77)	(0.39)	(0.85)	(0.02)	(−1.88)	(−1.03)	(−2.42)
	.166	.387	.071	.210	.286	.076	.697	.395	.981	.061	.302	.016
$RobSAM\_Rank_t - Cut_t$	−0.0045	−0.1245	−0.0036	−0.1522	−0.0047	−0.1306	−0.0038	−0.1552	0.0078	−0.6156	0.0137	−0.7858
	(−3.53)	(−2.18)	(−2.34)	(−1.98)	(−3.65)	(−2.30)	(−2.45)	(−2.03)	(0.85)	(−1.54)	(1.20)	(−1.41)
	.000	.029	.019	.048	.000	.022	.014	.043	.397	.125	.230	.159
$Event \times (RobSAM\_Rank_t - Cut_t)$	0.0053	−0.9591	0.0048	−2.0061	0.0112	−0.5646	0.0178	−0.7907	0.0047	−0.3831	−0.0311	−1.1361
	(0.27)	(−1.58)	(0.22)	(−2.11)	(1.27)	(−1.36)	(1.55)	(−1.38)	(0.30)	(−0.32)	(−0.73)	(−0.69)
	.788	.115	.827	.035	.204	.173	.122	.167	.768	.749	.465	.492
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,666	4,566	4,666	4,566	5,289	5,179	5,289	5,178	855	839	855	838
Adjusted R^2	.0415	.0165	.0533	.0116	.0372	.0152	.0515	.0122	.0148	−.0040	.0665	.0024

t-Statistics are presented in parentheses and are based on standard errors clustered by firms. *p*-Values are presented below coefficients.

OLS estimation result of model (1). The table presents the impact of DJSI events on cumulative abnormal returns (*CAR*) and abnormal trading volume (*AbVOL*) using regression discontinuity design. *RobSAMRank* is the RobecoSAM sustainability percentile rank. *Cut* is the cutoff percentile rank for inclusion in the DJSI index in a specific industry-year group. See Appendix D in File S1 for definition of all variables.

industry-year cutoffs for inclusion in the DJSI as a quasi-natural experiment. Firms slightly above or below the rank cutoffs are arguably equivalent in terms of CSR performance.

Table 3 shows insignificant effect of additions on *CARs* for the [−1; 0] window (see insignificant coefficient on *Event*, $p = .166$, in Column 1a) and a marginally significant positive effect of additions on *CARs* computed over the [−1; +1] window (see coefficient on *Event* = 0.0055, $p = .071$, in Column 1c). The economic significance of additions on *CARs* is small (i.e., +.55%). Table 3 also shows insignificant effect of continuations on *CARs* and marginally significant positive effect on *AbVOL* over the [−1; 0] window (see coefficient on *Event* = 0.0953, $p = .076$, Column 2b).[14]

Deletion events have no effect on *CARs* and elicit a marginally significant negative effect on trading volume over the [−1; 0] window and negative effect over the [−1; +1] window relative to continuation events (coefficient on *Event* = −0.2433, $p = .061$ for the [−1; 0] window, Column 3b, and coefficient on *Event* = −0.4570, $p = .016$ for the [−1; +1] window, in Column 3d). Because it facilitates causal interpretations, regression discontinuity analysis corroborates the evidence using the CSR-matched sample of essentially no significant effect of DJSI events on stock returns and trading volumes.

Overall, we view these findings—based on a different theory of comparison across CSR-active firms, with the additional consideration of trading volume, and with an alternative regression methodology (RDD)—as essentially consistent with Hawn et al. (2018).

4.2 | Research Question 2: Effects on analyst following and long-term investors

We turn to Research Question 2 and examine the effect of DJSI events on financial analysts and long-term investors, using the estimation results reported in Table 4 and keeping the same presentations as in Tables 2 and 3. Panel A presents the estimation results and Panel B presents differences in coefficients between different DJSI events.

We find an insignificant effect for additions on analyst following (see insignificant coefficient on *Event* in Column 7a). Yet, we find a more positive effect of additions on analyst following over time. Firms that are added to the DJSI have 4.47% more financial analysts per additional year elapsed relative to CSR-equivalent firms (see coefficient on *Event* × *Trend* = 0.0447, $p = .033$ in Column 7a). While in 2005, firms added to the DJSI had −15.23% financial analysts (equivalent to approximately −2.5 financial analysts) relative to CSR-equivalent firms, 11 years later, in 2015, firms added to the DJSI had on average 29.47% more additional analysts following them (equivalent to +4.9 financial analysts).[15] We find no main or time effect of additions on long-term investors (see insignificant coefficient on *Event* and *Event* × *Trend* in Column 7b).

For continuations, we find a marginally significant main effect (see coefficient on *Event* = 0.0771, $p = .058$, Column 8a) on analyst following, but no significant time effect (*Event* × *Trend*). We find neither any significant main effect of continuations on long-term investors (see *Event* in Column 8b). However, we find a statistically more positive effect of continuations on long-term investors over time (see positive coefficient on *Event* × *Trend* = 0.0005, $p = .015$ in Column 8b). In 2005, firms that continued in the DJSI had −0.09% (=−0.0014 + 0.0005 × 1) less equity held by long-term investors relative to CSR-equivalent firms. Eleven years later, in 2015, firms that continued in the DJSI had on average +0.41% (=−0.0014 + 0.0005 × 11) more equity held by long-term investors

[14]See Appendix K in File S1 for descriptive statistics and Appendix L in File S1 for the full models (including control variables) and graphical representations.

[15]−15.23% = −0.1970 + 0.0447 × 1 and −2.5 = −0.1523 × 16.6 average analysts for addition-event firms from Appendix F, Panel B of File S1. Likewise, 29.47% = −0.1970 + 0.0447 × 11 and 4.9 = 0.2947 × 16.6 average analysts.

TABLE 4 Effect of DJSI events on analyst following and percentage of equity held by long-term investors

Model	7a	7b	8a	8b	9a	9b
Panel A: Events versus CSR-equivalent events[a]						
Dependent variable	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$
	Addition	Addition	Continuation	Continuation	Deletion	Deletion
Constant	0.6188	−0.0169	0.5346	0.0086	0.4662	0.0127
	(4.19)	(−1.61)	(8.29)	(1.77)	(3.96)	(1.62)
	.000	.108	.000	.077	.000	.107
Event	−0.1970	0.0024	0.0771	−0.0014	−0.1233	0.0013
	(−1.39)	(0.81)	(1.90)	(−1.14)	(−0.98)	(0.29)
	.165	.416	.058	.255	.327	.770
Event × *Trend*	0.0447	0.0000	−0.0000	0.0005	0.0116	−0.0002
	(2.14)	(0.03)	(−0.00)	(2.44)	(0.74)	(−0.43)
	.033	.978	.998	.015	.462	.667
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	323	359	3,077	3,318	269	299
Adjusted R^2	.2163	.5836	.1552	.4238	.1802	.4371

TABLE 4 (Continued)

Model	10a	10b	11a	11b	12a	12b
Panel B: Comparison between DJSI events[b]						
Dependent variable	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$	$\Delta FOLLOW_{t-1;t+1}$	$PFHOLDING_{t+1}$
	Addition (vs. deletion)		Continuation (vs. deletion)		Addition (vs. continuation)	
Constant	0.6639	0.0038	0.7098	0.0102	0.7437	0.0011
	(3.73)	(0.37)	(5.57)	(1.49)	(6.45)	(0.17)
	.000	.715	.000	.136	.000	.868
Event	−0.1594	−0.0061	0.0102	−0.0060	−0.1802	0.0003
	(−1.42)	(−1.75)	(0.12)	(−2.06)	(−2.20)	(0.12)
	.158	.081	.905	.040	.028	.906
Event × *Trend*	0.0429	0.0010	0.0144	0.0010	0.0299	0.0000
	(2.22)	(1.98)	(1.33)	(2.49)	(1.86)	(0.09)
	.027	.049	.185	.013	.064	.931
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	310	336	1,734	1,824	1,756	1,852
Adjusted R^2	.1739	.5098	.1622	.5266	.1722	.5321

This table presents the impact of DJSI events on change in analyst following ($\Delta FOLLOW_{t-1;t+1}$) and percentage of equity held by long-term investors ($PFHOLDING_{t+1}$). See Appendix D in File S1 for definition of all variables. *t*-Statistics are presented in parentheses and are based on standard errors clustered by firms. *p*-Values are presented below coefficients.

[a]OLS model estimated on the CSR-performance matched sample.

[b]OLS model estimated on the sample of DJSI events.

relative to CSR-equivalent firms. This incremental effect of continuation is statistically significant and equivalent to $112 million of market value (=0.0041 × $27,325 million). Considering the growing number of sustainability equity indices (e.g., ESG indices in the Russel, MSCI and DJSI families), the frequency, and therefore the economic significance of these effects may be increasing and cumulative over time.[16]

We find no main or time effect for deletion from the DJSI on analyst following or long-term investors (see insignificant coefficient on *Event* and *Event* × *Trend* in Columns 9a and 9b).

Panel B of Table 4 presents differences across the three DJSI events for analyst following and equity held by long-term investors. First, for additions versus deletions we find no main effect of *Event* for analyst following (Column 10a) and a negative effect of *Event* on long-term investors, albeit marginally significant (coefficient on *Event* = −0.0061, $p = .081$, Column 10b). However, we find more positive effect over time for additions relative to deletions for both analyst following (coefficient on *Event* × *Trend* = 0.0429, $p = .027$, Column 10a) and equity held by long-term investors (coefficient on *Event* × *Trend* = 0.0010, $p = .049$, Column 10b). In 2005, firms added to the DJSI had on average 1.9 (=[−0.1594 + 0.0429 × 1] × 16.6) less financial analysts relative to firms deleted from the DJSI. In 2015, firms added to the DJSI had on average 5.2 (=[−0.1594 + 0.0429 × 11] × 16.6) additional financial analysts. The respective figures for the percentage of equity held by long-term investors for addition event firms relative to deletion event firms is −0.5% in 2005 and +0.5% in 2015. Again, the effect on long-term investors, while statistically significant, is economically small (about +1% in total over a decade).

We find no effect on analyst following of continuations relative to deletions (see insignificant coefficients on *Event* and *Event* × *Trend* in Column 11a). However, in Column 11b, we find a negative main effect of continuations relative to deletions (coefficient on *Event* = −0.0060, $p = .040$) and a larger positive effect of continuations relative to deletions over time (coefficient on *Event* × *Trend* = 0.0010, $p = .013$). The economic magnitude of these effects is again small and equivalent to the time differences between additions versus deletions (i.e., −0.5% in 2005 and +0.5% in 2015).

In Columns 12a and 12b, we compare additions and continuations. We find a main negative effect of additions relative to continuations in Column 12a (coefficient on *Event* = −0.1802, $p = .028$) and a more positive effect, although marginally significant, for additions relative to continuations over time (coefficient on *Event* × *Trend* = 0.0299, $p = .064$). We find no difference between additions and continuations regarding long-term investors (see Column 12b).

Overall, index-related events have been found to have limited impact on both analysts following and long-term holdings, although there is some evidence that analysts and long-term investors react more favorably to additions than deletions over time, while long-term investors respond more favorably to continuations than deletions over time.

5 | CONCLUSION

In this study, we replicate and expand Hawn et al. (2018) while using alternative matching assumptions, analytic techniques, and additional outcomes. We find similar results on market reactions: the DJSI events have at most limited impact, either as main effects or time trends. As was the case in the Hawn et al. (2018) study, while a few of the outcomes achieve statistical significance, the materiality tends to be low. The most conservative interpretation of the overall patterns is that the events do not

[16]To illustrate, considering a large firm present in say five ESG indices over the last 5 years, and assuming an equal impact for each index, the swing to long-term investors would represent .0041 × 5 indices × 5 years or about 10% of its market capitalization, which is not negligible.

harm stock market reactions (neither stock price nor volume of trade), while offering some visibility benefits: there is moderate evidence of increasing attention over time by market analysts and long-term investors to additions and continuations.

Because we found consistent results with the original study, one should not forget to pay attention to the underlying assumptions implied by the universe of firms used to identify placebos (What is the proper counterfactual?) and by the use of matching techniques (What is the matching algorithm that offers the best fit with the specific setting?). Debates abound about proper placebo pool selection and use of matching techniques, which can lead to controversies and justify the importance of replication in our field (see controversy on financial activism: Bebchuk, Brav, Jiang, & Keusch, 2017; Cremers, Giambona, Sepe, & Wang, 2018). Furthermore, quasi-replications as defined by Bettis et al. (2016) allow to go beyond statistical matching issues and confirmation tests by facilitating the analysis of different theories (e.g., CSR activism vs. CSR visibility).

The idea that index-related events bring visibility to firms (beyond information about CSR activism) has not found support for market reactions but growing although moderate evidence for market attention. These results are explained by the still noisy ESG information available to investors (Chatterji, Durand, Levine, & Touboul, 2016), the not-yet structured ESG investment industry, and the influence of non-ESG passive investing on financial markets.[17] In this context, the importance of sustainability indices to benchmark active ESG investments and to influence passive ESG investments may be far from its full potential. Confronted with the mounting demands of civil society and the daunting climate challenges, the impact of sustainability indices cannot but grow over time with the development and the structuring of the ESG investment industry and the questioning of non-ESG passive investing, especially among professional investors.

As the effects of sustainability strategy on market outcomes (stock price, but also analysts and capital structure) strengthen over time, it is likely that comparability across CSR engaged firm versus observationally equivalent firms will have to account more systematically for CSR matching criteria and not just industry and financial criteria. Another replication will be in order in a decade to observe whether the trends revealed in Hawn et al. (2018) and this study have become the norm. Furthermore, there is a limitation to keep in mind: we control for CSR activism in order to only examine the effect of variation in CSR visibility due to DJSI events. Despite our empirical efforts (CSR matching, RDD), it is difficult to rule out entirely that unobserved CSR characteristics associated with DJSI events could influence as well market participants.

The empirical and analytic extensions provide insights that are relevant for studies of stock market reactions to CSR activities. Overall, these results matter not only to scholars seeking to determine whether "CSR pays" but also to practitioners who are confronted with the multiplicity of indices and their validity (Chatterji et al., 2016) and conflicting expectations of shareholders and other stakeholders. This study contributes to building a more complete understanding of how CSR engagement, CSR visibility, and sustainability indices matter for firm strategy and for investors.

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[17]According to a recent study by MorningStar 45% of US market is passive investment in 2018 and still growing, which does not encourage firms to differentiate themselves since only their sheer size is included in passive investing. See https://www.institutionalinvestor.com/article/b189f5r8g9xvhc/passive-investing-rises-still-higher,-morningstar-says (accessed March 16, 2019).

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REFERENCES

Amel-Zadeh, A., & Serafeim, G. (2018). Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, *74*(3), 87–103.

Bansal, P., & Desjardine, M. (2014). Business sustainability: It is about time. *Strategic Organization*, *12*(1), 70–78.

Bebchuk, L. A., Brav, A., Jiang, W., & Keusch, T. (2017). Dancing with activists. Columbia Business School Research Paper No. 17–44. Harvard Law and Economics Discussion Paper No. 906, SSRN. Retrieved from: https://ssrn.com/abstract=2948869 or https://doi.org/10.2139/ssrn.2948869

Bettis, R. A., Helfat, C. E., & Shaver, J. M. (2016). The necessity, logic, and forms of replication. *Strategic Management Journal*, *37*(11), 2193–2203.

Boulland, R., & Dessaint, O. (2017). Announcing the announcement. *Journal of Banking & Finance*, *82*, 59–79.

Bushee, B. J. (2001). Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research*, *18*(2), 207–246.

Bushee, B. J., & Noe, C. F. (2000). Corporate disclosure practices, institutional investors, and stock return volatility. *Journal of Accounting Research*, *38*(3, Suppl.), 171–208.

Cassandra. (1993). Caveat emptor: Asset allocation. *Financial Analysts Journal*, *49*(4), 4.

CFA Institute. (2017). Environmental, social and governance (ESG) survey.

Chatterji, A. K., Durand, R., Levine, D. I., & Touboul, S. (2016). Do ratings of firms converge? Implications for managers, investors and strategy researchers. *Strategic Management Journal*, *37*(8), 1597–1614.

Cremers, M., Giambona, E., Sepe, S. M., & Wang, Y. (2018). Hedge fund activism, firm valuation and stock returns, SSRN. Retrieved from: https://ssrn.com/abstract=2693231 or https://doi.org/10.2139/ssrn.2693231

Da, Z., Engelberg, J., & Gao, P. (2011). In search of attention. *Journal of Finance*, *66*(5), 1461–1499.

Dellavigna, S., & Pollet, J. M. (2009). Investor inattention and Friday earnings announcements. *Journal of Finance*, *64*(2), 709–749.

Derrien, F., & Dessaint, O. (2018). The effects of investment bank rankings: Evidence from M&A league tables. *Review of Finance*, *22*(4), 1375–1411.

Ernst & Young and Global Reporting Initiative. (2014). Sustainability reporting—the time is now. EYGM Limited. Retrieved from https://www.ey.com/Publication/vwLUAssets/EY-Sustainability-reporting-the-time-is-now/$FILE/EY-Sustainability-reporting-the-time-is-now.pdf

Ethiraj, S. K., Gambardella, A., & Helfat, C. E. (2016). Replication in strategic management. *Strategic Management Journal*, *37*(11), 2191–2192.

Fang, L., & Peress, J. (2009). Media coverage and the cross-section of stock returns. *Journal of Finance*, *64*(5), 2023–2052.

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*, *61*(11), 2549–2568.

Flammer, C., & Bansal, P. (2017). Does a long-term orientation create value? Evidence from a regression discontinuity. *Strategic Management Journal*, *38*(9), 1827–1847.

Global Sustainable Investment Alliance. (2014). Global sustainable investment review, GSIA. Retrieved from http://www.gsi-alliance.org/wp-content/uploads/2015/02/GSIA_Review_download.pdf

Hawn, O., Chatterji, A. K., & Mitchell, W. (2018). Do investors actually value sustainability? New evidence from investor reactions to the Dow Jones sustainability index (DJSI). *Strategic Management Journal*, *39*(4), 949–976.

Hawn, O., & Ioannou, I. (2016). Mind the gap: The interplay between external and internal actions in the case of corporate social responsibility. *Strategic Management Journal*, *37*(13), 2569–2588.

Iacus, S. M., King, G., & Porro, G. (2012). Causal inference without balance checking: Coarsened exact matching. *Political Analysis*, *20*(1), 1–24.

Ioannou, I., & Serafeim, G. (2015). The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal*, *36*(7), 1053–1081.

KPMG. (2013). Corporate responsibility reporting survey. Retrieved from https://assets.kpmg/content/dam/kpmg/pdf/2015/08/kpmg-survey-of-corporate-responsibility-reporting-2013.pdf

Mulvey, J. M., Simsek, K. D., & Zhuojuan, Z. (2006). Improving investment performance for pension plans. *Journal of Asset Management*, *7*(2), 93–108.

O'Dwyer, B., Owen, D., & Unerman, J. (2011). Seeking legitimacy for new assurance forms: The case of assurance on sustainability reporting. *Accounting, Organizations and Society*, *36*(1), 31–52.

PIMCO. (2017). 10 reasons ESG investing is growing. Retrieved from https://europe.pimco.com/en-eu/insights/blog/10-reasons-esg-investing-is-growing

RobecoSAM. (2017). Measuring intangibles RobecoSAM's corporate sustainability assessment methodology, RobecoSAM AG.

Roberts, M. R., & Whited, T. M. (2012). Endogeneity in empirical corporate finance, Unpublished working paper, Mimeo, University of Pennsylvania, University of Michigan.

S&P Dow Jones Indices and RobecoSAM. (2017). Dow Jones sustainability indices methodology.

Selmier, W. T., II, Newenham-Kahindi, A., & Chang, H. O. (2015). 'Understanding the words of relationships': Language as an essential tool to manage CSR in communities of place. *Journal of International Business Studies*, *46*(2), 153–179.

Sharkey, A. J. (2014). Categories and organizational status: The role of industry status in the response to organizational deviance. *American Journal of Sociology*, *119*(5), 1380–1433.

Simnett, R., Vanstraelen, A., & Chua, W. F. (2009). Assurance on sustainability reports: An international comparison. *The Accounting Review*, *84*(3), 937–967.

Waddock, S. A., & Graves, S. B. (1997). The corporate social performance–financial performance link. *Strategic Management Journal*, *18*(4), 303–319.

Zhao, X., & Murrell, A. J. (2016). Revisiting the corporate social performance–financial performance link: A replication of Waddock and Graves. *Strategic Management Journal*, *37*(11), 2378–2388.

Zuckerman, E. W. (2004). Towards the social reconstruction of an interdisciplinary turf war. *American Sociological Review*, *69*(3), 458–465.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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