Sustainability stock exchange indexes and investor expectations: Multivariate evidence from DJSI-Stoxx[*]

Índices bursátiles socialmente responsables y expectativas del inversor: evidencia multivariante del DJSI-Stoxx

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ABSTRACT This research sets out to assess the market reaction to events related to inclusion in and exclusion from the Dow Jones Sustainability Stoxx Index, which are associated with good and bad levels of Corporate Social Performance. The present work introduces a new effect —non-exclusion of the index— which reflects a corporate effort on maintaining higher levels of sustainability. An event study approach is applied with the aim of assessing market reactions to the announcement of changes in the index composition and the effective release to the market of the new sustainable equity index for an annual period. A novelty of this research is the use of a Multivariate Regression Model, with the purpose of mitigating some limitations identified in previous studies when «event clustering» is observed. The empirical analysis is focused on five years sliding window (2003-2007), a period with a relevant increase of the Socially Responsible Investment worldwide.

KEYWORDS Ethical investment; Corporate social performance; Corporate Social Responsibility; Sustainable stock exchange indexes; Stakeholder Theory.

RESUMEN El presente trabajo analiza la reacción del mercado ante la aparición de eventos relacionados con la inclusión y exclusión de empresas del índice bursátil Dow Jones Sustainability Stoxx Index. Estos se asocian con la obtención de niveles satisfactorios y deficientes de desempeño social. Se introduce el evento de no exclusión de las empresas del índice y se ha aplicado un estudio de eventos para medir la respuesta del mercado ante los cambios en la composición del índice. Una de las novedades de la presente investigación reside en el uso de un modelo de regresión multivariante, con el objetivo de mitigar las limitaciones identificadas en trabajos similares y, en especial, cuando aparece el efecto 'clusterización de eventos'. El análisis empírico ha sido aplicado sobre un periodo temporal de cinco años (2003-2007), durante el cual se produjo el mayor incremento global de la Inversión Socialmente Responsable.

PALABRAS CLAVE Inversión ética; Performance social empresarial; Responsabilidad Social Corporativa; Índices bursátiles socialmente responsables; Teoría del Stakeholder.

1. INTRODUCTION

Socially Responsible Investment (SRI), also known as «ethical investment» and «sustainable investment» (Renneboog *et al.*, 2008), considers factors such as environmental preservation, respect for human rights and other social issues. SRI refers to a strategy where investors make investment decisions based on their social and ethical principles. This investment model, focused on SRI funds or SRI equity indexes and assets, gives investors the opportunity to match their investment policy with their own values and principles (Domini, 2001). The development of SRI provides the market a new investment model, which is not exclusively based on economic-financial criteria. The growth of SRI at both global and European levels has been significant during the last decade. A recent study by Eurosif (2010) shows that the SRI market has almost doubled, with total European SRI Assets under Management (AuM) now reaching approximately €5 trillion at the end of 2009, whereas they were only €2.7 trillion in 2007.

The relevance of the SRI is linked to the emergence of socially responsible stock exchange indexes (e. g. Dow Jones Sustainability Indexes, FTSE4GOOD Indexes, Domini 400, etc.), that carry out a selection of companies based on economic, social and environmental performance criteria (Consolandi *et al.*, 2009). From the business perspective, a firm listed on any socially responsible equity index can obtain alternative funds from non-conventional investors concerned about sustainable development and social well-being (Curran and Moran, 2007). In this context, companies have available incentives to incorporate Corporate Social Responsibility (CSR) criteria into their strategic management.

The present paper sets out to assess the market reaction to events related to inclusion in and exclusion from a SRI equity index, which are associated with the firms obtaining good and bad levels of Corporate Social Performance (CSP). Empirical analysis is supported by an event study of the changes in composition of the Dow Jones Sustainability Stoxx Index (DJSI-Stoxx). One of the contributions of this paper is the analysis of stock market reactions to the fact that firms listed on the DJSI-Stoxx were non-excluded in the different annual review processes. This effect has been partially considered by the literature, but from a different perspective. Thus, Becchetti, *et al.* (2008) measures the Corporate Financial Performance (CFP) construct by financial ratios instead of the market-based measures proposed in this research. Our research allows us to assess whether the efforts of different firms to continue being sustainability leaders in their industries are rewarded by the stock market. This is very important for companies because a positive market valuation could lead to an increase in their reputational levels (Fombrun and Shanley, 1990; Fombrun, 2001; Fischer and Reuber, 2007; Puncheva, 2008), which can be a source of competitive advantage and might improve the firms' financial performance both at the sort and long-term (Barringer and Harrison, 2000; Ruf *et al.*, 2001; Lorca and García-Díez, 2004). To that aim, and in line with prior research in the field (Becchetti *et al.*, 2008), non-exclusion from the DJSI-Stoxx is associated with a firm effort to «maintain» a high firm commitment with the sustainable development principles, social justice and environmental

preservation. Another relevant issue is the consideration of a five-year sliding window (2003-2007), which is a period with a high increase of SRI at a global level, and when the investors reached a significant knowledge about SRI equity indexes. This matter has not been reflected in current literature and will turn the estimates more robust than the obtained in other similar works (Curran and Moran, 2007). One novelty of this research consists on conducting an event study that uses a Multivariate Regression Model (MVRM), and so overcomes some limitations identified in similar works (Curran and Moran, 2007; Consolandi *et al.*, 2009), which are frequently based on the traditional «market model», also known as the «FFJR» model, proposed by Fama *et al.* (1969).

The rest of the paper is structured as follows. In the next section, the theoretical framework is analysed and the research hypotheses are proposed. The third section introduces the sample, as well as the methodology applied to the empirical model. The fourth section contains the main results and discussion. Finally, the conclusions of the study are put forward in the last section.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. CSP AND CFP: THEORETICAL ISSUES

Neoclassical Economic Theory principles state that in the absence of externalities and monopolies (and when all goods are priced), social welfare is maximized when each firm in an economy maximizes its total market value (Jensen, 2002). According to this approach, managers are concerned to maximize profits in accordance with the law (Friedman, 1962). Under this scheme, the manager's responsibility refers to conduct the business considering the shareholders demands to make as much money as possible (Friedman, 1970). This business approach assumes that the corporate social and economic objectives are opposite, so that social spending comes at the expense of its economic results. Nowadays, these ideas have been hardly questioned in managerial literature. Thus, Kramer and Porter (2006) state that the distinction between corporations' social and economic objectives may be a false dichotomy, because it represents an obsolete perspective in an open world of knowledge-based competition.

Freeman (1984) established the groundwork for developing a new managerial model based on the stakeholder approach, which incorporated the demands from agents, hitherto ignored, into the heart of corporate strategic management. These are employees, the institutions, the environment, customers and suppliers, among others. This theoretical approach considers that a firm cannot maximize value if it ignores the interest of its stakeholders (Jensen, 2002). Stakeholder Theory began to offer specifics about to whom a company should be responsible and about what specific interests and rights were at risk (Freeman, 1984; Mitchell *et al.*, 1997). As recently indicated by Freeman (2008), the purpose of the corporation might not be linked to maximize profits, given that they are an outcome of a well-managed company. Moreover, Wood (2008, p. 161) states that «corporations that cannot earn profits legally, ethically and responsibly do not deserve to survive, nor can our planet afford for businesses to continue to treat their stakeholders as just another environ-

mental factor to be managed». However, Jensen (2002) noted that because the advocates of Stakeholder Theory refuse to specify how to make the necessary tradeoffs among these competing interests, they leave managers with a framework that hinders them to make useful decisions. Thus, with no way to keep score, this theory performs managers unaccountable for their actions (Jensen, 2002).

Arising from analyses based on Stakeholder Theory, the concept of CSP appears, which is defined in the literature as a way of organizing the inputs, throughputs, outputs and outcomes of the corporate activity, so that stakeholders might achieve the transparency and assurance of goal attainment that is required for their legitimate interests to be met (Carroll, 1979; Wartick and Cochran, 1985; Wood, 1991). The CSP construct consists of three dimensions: policies, programs and observable outcomes linked to the firm's relationship with society (Wood, 1991). Outcomes are divided into three types: the social impact of corporate behaviour, regardless of the motivation for this behaviour or the process by which it occurs; the programs to implement responsibility; and the policies developed by companies to handle social issues and stakeholder interests.

Much of the research into Stakeholder Theory has intended to link the level of CSP to the success of the company, measured by financial indicators. There is currently a plethora of academic papers focused on testing whether there is any relationship between CSP and CFP (see Roman *et al.*, 1999; Margolis and Walsh, 2003; Orlitzky *et al.*, 2003; Wu, 2006; Van Beurden and Gössling, 2008). Most of them argue that a firm's success is associated with adopting management principles, based on the idea that stakeholders have moral claims which should be recognized. In other words, the companies may increase their total value carrying out several actions that are expected to affect positively an identifiable social stakeholder's welfare. The present work uses the Stakeholder Theory proposals to justify the research hypotheses and when discussing the obtained results. This research seeks to add more debate to the idea that maximising profits or the shareholders' value is a consequence of a well-managed company (Freeman, 2008), and this involves to take into account the different stakeholders' claims.

2.2. CSP AND CFP: PREVIOUS FINDINGS AND THE MISSING LINKS

Research about the possible link between CSP and CFP theoretical constructs dates back from the second half of the 20th century. However, it was during the 90s when the scientific works about that topic reached a very significant quote in managerial research field (see Table I). A detailed analysis of the results obtained by each one of these studies has been addressed by some the meta-analysis (Roman *et al.*, 1999; Margolis and Walsh, 2003; Orlitzky *et al.*, 2003; Wu, 2006; Van Beurden and Gössling, 2008). The meta-analysis carried out by Roman *et al.* (1999), concludes that 63.5% of previous research about the CSP and CFP relationship provides a positive sign, about 27% shows a neutral link, and the rest 9.5% indicates that these theoretical constructs are negatively linked. More recent meta-analyses evidence a predominant positive relationship between CSP and CFP concepts (Margolis and Walsh, 2003; Wu, 2006; Van Beurden and Gössling, 2008).

Positive Link	Neutral Link	Negative Link
Hart and Ahuja, 1996	Arlow and Ackelsberg, 1991	Boyle *et al.*, 1997
Klassen and McLaughlin, 1996	Hamilton *et al.*, 1993	Brammer *et al.*, 2006
Pava and Krausz, 1996	Guerard, 1997	Lee *et al.*, 2007
Preston and O'Bannon, 1997	Balabanis *et al.*, 1998	Olsson, 2007
Russo and Fouts, 1997	McWilliams and Siegel, 2000	
Waddock and Graves, 1997	Moore, 2001	
Brown, 1998	Seifert *et al.*, 2003	
Judge and Douglas, 1998	Seifert *et al.*, 2004	
Stanwick and Stanwick, 1998	Van de Velde *et al.*, 2005	
Graves and Waddock, 1999		
Carter *et al.*, 2000		
Dowell *et al.*, 2000		
Ruf *et al.*, 2001		
Kumar *et al.*, 2002		
Goll and Rasheed, 2004		
Schnietz and Epstein, 2005		
Barnett and Salomon, 2006		
Luo and Battacharya, 2006		
Peinado-Vara, 2006		
He *et al.*, 2007		

However, the shadow of obtaining non-homogeneous results in the analysis of the CSP and CFP relationship is still present today (Freeman *et al.*, 2010). This situation has been traditionally been related to the use of heterogeneous samples, methodologies, proxies of CSP and CFP, and time periods (Orlitzky *et al.*, 2003). Additionally, Wood and Jones (1995) add the problem of the stakeholder mismatching effect, which appears when dependent and independent variables relating to different stakeholders are linked.

Specially, the disagreement about how to measure the CSP and CFP constructs has been one of the reasons in obtaining mixed results (Ullman, 1985; Belkaoui and Karpik, 1989; Donaldson, 1999; Jones and Wicks, 1999). For instance, Griffin and Mahon (1997) identified more than 80 different measures of CFP used in empirical research examining the CSP-CFP link. Also, CSP has been measured by a variety of proxies (Griffin and Mahon, 1997). Herremans *et al.* (1993) identified three dimensions for measuring the CSP construct: the extent of corporate disclosure on social and environmental matters and impacts; specific corporate actions, such as philanthropy, social programs and pollution control; and corporate reputation ratings, such as KLD and Fortune. Likewise, Orlitzky *et al.* (2003) observed that the CSP construct had been measured by CSP disclosures; CSP reputation rankings; social audits; CSP processes and observable outcomes; and, lastly, by managerial CSP principles and values. More recently, Wu (2006) identified different CSP proxies: annual report disclosures; pollution ratings; Moskowitz's ratings; KLD ratings; Fortune ratings; Business Ethics 100; corporate philanthropy; compliance; and responsive behaviour. Finally, a recent meta-analysis on the topic (van Beurder and Gössling, 2008) identifies similar measurements for CSP to those in Orlitzky *et al.* (2003) and Wu (2006). Under this scheme, in which a multitude of models appeared to measure the CSP and CFP constructs,

it should not be surprising that the results obtained by prior research in the field have been inconclusive and contradictory.

In this work, we follow the recommendations of Orlitzky *et al.* (2003) on modelling CSP, which considers reputational rankings and ratings screened on a CSR basis as a proxy of CSP. This approach provides a better view of CSP for a range of corporations, given that those reputational ranking and ratings consider the perceptions of the different stakeholders about the performance obtained by the companies in the social, environmental and economic dimensions (Fombrun, 1998), thus, reinforcing the «triple bottom line» approach of society development appointed by Elkington (1997). The choice of this CSP measure is in line with the approaches used in other recent works (Curran and Moran, 2007; Consolandi *et al.*, 2009), which indicate that being listed on reputable rankings or indexes (in this case the DJSI-Stoxx) is associated to good levels of CSP.

This research proposes another event to be analysed, which is related to the investor reaction to non-exclusion announcements from companies belonging to the DJSI-Stoxx. According to previous literature, the non-exclusion events are linked with companies obtaining superior corporate behaviour in terms of social welfare (Becchetti *et al.*, 2008). The study of this event is relevant because if the expected reduction of companies' negative externalities is accompanied by a creation of aggregate economic value (and not merely shareholder return) equal or superior to that of non-socially responsible firms, they have incentives to adopt a socially responsible behaviour. In fact, this is why the evaluation of the effects of CSP on CFP have been a relevant topic in the managerial literature. Becchetti *et al.* (2008) analysed the non-exclusion event, but from a different point of view, being non-comparable with the objective proposed in the present paper. That work evaluates the financial impact of non-exclusions of companies belonging to the Domini Social Index, thus focused on other sample. The CFP construct is measured by financial ratios, such as, total sales per employees, research and development per worker, Return on Investment (ROI), Return on Equity (ROE), and Return on Capital Employed (ROCE). These CFP measures being accounting-based approaches do not match up with the model proposed by this research, focused on market based returns as the proxy of CFP. Although it is noted that both models for measuring CFP have their own benefits (van Beurden and Gössling, 2008), accounting-based measures reflect the organization's internal efficiency, while market-based measures indicate the investor's expectation about the future financial development of the companies.

Another gap identified in researches on the topic refers to the limitations of their methodological standings. Different studies, as Curran and Moran (2007) and Consolandi *et al.* (2009), base their empirical analysis on the application of the FFJR model defined by the next equation:

$$r_{i,t} = \alpha_i + \beta_i * r_{m,t} + \mu_t \qquad (1)$$

Abnormal (or unexpected) returns are computed as the difference between the real and expected returns or through the residuals of the FFJR model (μ_t). This model presents two main limitations. Firstly, the FFJR model assumes that the equations' residuals are

independent and equally distributed between the different firms in the sample (Brown and Warner, 1985). This principle is not satisfied when similar events to the ones here are analysed, given that the dates of the announcements of inclusion in, exclusion and non-exclusion from the SRI equity indexes are the same for all firms, thereby creating the «event clustering effect» (Henderson, 1990). This issue leads to the appearance of contemporary correlation problems (Henderson, 1990; Salinger, 1992; Binder, 1998). Thus, the statistical tests to determine the significance of the estimates could present inconsistencies or lead to biased results, which could, in turn, produce mistakes in the acceptance or the rejection of the working hypotheses. Secondly, another point that could lead to obtain questionable conclusions refers to the computation of the average abnormal returns when the abnormal returns present a different sign among firms. Thereby, a non-significant cumulative average abnormal return may be obtained as a consequence of compensation for significant abnormal positive or negative returns. Thus, this model could generate identification problems whenever the sign of the abnormal returns differs between the firms under analysis (Binder, 1998).

This research overcomes these limitations proposing an application of a MVRM, which presents some advantages. Firstly, the abnormal returns are directly estimated in each equation. Secondly, the model incorporates heteroskedasticity and contemporaneous correlation between equations when testing the proposed hypotheses. These issues enable us to mitigate the event clustering problems. Finally, the problems arising from differences in the sign of the abnormal returns of the different equations are eliminated.

2.3. Hypotheses

This paper proposes some hypotheses to be empirically tested, which are closely linked to the principles established by the Stakeholder Theory proposals (Freeman, 1984; Agle *et al.*, 2008; Freeman, 2010). According with that literature, incorporating/avoiding the multiple stakeholders' interests, when establishing the corporate strategic management policies, could enhance/damage their levels of CFP. Stakeholder Theory considers that there are different factors to explain why stakeholder management should be associated with higher financial performance (Jones 1995; Freeman, 2010). For instance, mutually beneficial stakeholder relationships can enhance the wealth-generation capacity of the corporation (Post *et al.*, 2002). On the other hand, the lack of establish, and, more important, to «maintain» productive stakeholder's relationships is a failure to effectively manage the organization's capacity to generate future wealth (Post *et al.*, 2002). On the basis of all of these considerations, the paper hypotheses are introduced:

Null Hypothesis related to H1, H2 and H3: «The stock price of the firms did not incorporate the information relating to the events under analysis, whether on inclusion (H1), exclusion (H2) or non-exclusion (H3) from DJSI-Stoxx».

H1: «Announcements of the inclusion of a firm on the DJSI-Stoxx will lead to a significant increase in its market value».

H2: «Announcements of the exclusion of a firm from the DJSI-Stoxx will lead to a significant decrease in its market value».

H3: «Announcements of the non-exclusion of a firm from the DJSI-Stoxx will lead to a significant increase in its market value».

Non-rejection of H1 would imply a positive market reaction to the inclusion of firms on the DJSI-Stoxx (an effect related with obtaining good levels of CSP). On the other hand, non-rejection of H2 means that the market penalized firms that were excluded from the DJSI-Stoxx (an event linked with firms achieving poor levels of CSP). Non-rejection of H3 would show that the effect of non-exclusion (associated with companies that show good levels of CSP) was significantly incorporated into the stock prices positively of the non-excluded firms. However, for the three hypotheses proposed, non-rejection of the null hypothesis would mean that the market did not react to the event under analysis (inclusion «H1», exclusion «H2», or non-exclusion «H3» from DJSI-Stoxx).

3. SAMPLE AND METHODOLOGY

The existing literature on the relationship between CSP and CFP is usually focused on North American firms (McGuire *et al.*, 1988; Herremans *et al.*, 1993; Vasanthakumar, 1999). The present paper contributes analysing the European context and, more specifically, firms included on the DJSI-Stoxx, which comprises the leading European listed companies in terms of sustainability. This index comprises firms ranked by market capitalisation, selected from a panel of companies that have been screened in their environmental and social dimensions. Dow Jones Sustainability Indexes (DJSI) were the first global indexes tracking the financial performance of leading sustainability-driven companies worldwide. Based on the cooperation between the Dow Jones Indexes, STOXX Limited and Sustainable Asset Management (SAM), they give asset managers reliable and objective benchmarks with which to manage sustainability oriented portfolios (DJSI, 1999a). Since their creation in 1999, the DJSI proposed a new investment model that has been progressively considered by the emerging SRI, mainly by institutional investment, based on mutual and pension funds focused on investors with a specific profile.

The empirical analysis has been applied to a five-year sliding window, i.e. over the period 2003 to 2007 (see Table II), which adds greater consistency to the results. During this period, the market was aware of the existence, operation and objectives of the DJSI family, a point that has not been reflected in earlier papers (Curran and Moran, 2007). Table II shows the changes in the composition of the DJSI-Stoxx over the period analysed, which is the sample for the empirical analysis.

TABLE II
COMPOSITION OF DJSI-Stoxx (2003-2007)

	2003	2004	2005	2006	2007
Total firms	178	172	169	180	175
Included firms (related to H1)	25	26	25	26	17
Excluded firms (related to H2)	26	32	28	15	22
Non-excluded firms (related to H3)	153	146	144	154	158

Source: Own elaboration based on data from DJSI Annual Reviews 2003-2007 (DJSI, 2003-2007).

Successive searches were conducted on the database for contemporary news supplied by the Lexis-Nexis Group, with the aim of mitigating the impact of other events (i.e. dividend payout or earnings announcements) on the stock prices of the different firms during the periods analysed. None of the firms of the sample presented other events of interest to investors, which took place in or around the month of publication of the different annual DJSI-Stoxx reviews. This process guarantees the absence of any other events arising from contemporary news that may affect the different stock prices, thereby ensuring that the estimations are not biased.

An event study is applied in order to test the impact on the companies market value of the three events considered. We have identified two dates on which the different events took place for each year; firstly, the publication of the annual index review (DJSI-Stoxx); and, secondly, the date on which the new index is effectively released to the market. Considering these two dates, we refer to the interest in analysing when the market incorporated, or not, the information related to the different events. However, it is expected that the market will react, if so, in the first date (publication date of the annual DJSI-Stoxx review). In each review of the index, three events are analysed: inclusion in, exclusion and non-exclusion of firms from the DJSI-Stoxx. Thus, three different sub-samples have to be set for each year of the study, in order to test the three proposed hypotheses. Table III shows the information about the different sub-samples considered, as well as the dates when the three events under study took place (publication date of the annual reviews and effective release of the new composition of the DJSI-Stoxx).

<div align="center">

TABLE **III**

EVENTS AND SUB-SAMPLES ANALYZED

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Sub-sample	Event	Publication date	Release of the new index
1	Non-excluded Companies-2003 review	04/09/2003	22/09/2003
2	Included companies-2003 review	04/09/2003	22/09/2003
3	Excluded companies-2003 review	04/09/2003	22/09/2003
4	Non-excluded companies-2004 review	02/09/2004	20/09/2004
5	Included companies-2004 review	02/09/2004	20/09/2004
6	Excluded companies-2004 review	02/09/2004	20/09/2004
7	Non-excluded companies-2005 review	07/09/2005	19/09/2005
8	Included companies-2005 review	07/09/2005	19/09/2005
9	Excluded companies-2005 review	07/09/2005	19/09/2005
10	Non-excluded companies-2006 review	06/09/2006	18/09/2006
11	Included companies-2006 review	06/09/2006	18/09/2006
12	Excluded companies-2006 review	06/09/2006	18/09/2006
13	Non-excluded companies-2007 review	06/09/2007	24/09/2007
14	Included companies-2007 review	06/09/2007	24/09/2007
15	Excluded companies-2007 review	06/09/2007	24/09/2007

Having defined the sub-samples and the dates of the events, it is necessary to establish the different event windows. With the aim of assuring the robustness of the estimations, a sufficiently large event window was established for each sub-sample. Table IV shows the different event windows for all sub-samples analyzed. Differences in the length of the event windows are due to the different dates in which the events took place in each period.

<center>TABLE IV</center>
<center>EVENT WINDOWS SHAPE</center>

Sub-samples	Initial date	Last date
(1 to 3)	31/07/2002	22/10/2003
(4 to 6)	30/07/2003	20/10/2004
(7 to 9)	03/08/2004	19/10/2005
(10 to 12)	02/08/2005	18/10/2006
(13 to 15)	02/08/2006	24/10/2007

After the delimitation of the dates of the events and their different event windows, we define the econometric model to test the proposed hypotheses. This research bases its analysis on a Multivariate Regression Model, first suggested by Gibbons (1980) and further improved by Shipper and Thompson (1983), Binder (1985a; 1985b) and Malatesta (1986):

$$R_{1t} = \alpha_1 + \beta_1 R_{mt} + \lambda_{11}\zeta_{1t} + \lambda_{12}\zeta_{2t} + \delta_1 IGR + \phi_1 CI + \mu_{1t}$$

$$R_{2t} = \alpha_2 + \beta_2 R_{mt} + \lambda_{12}\zeta_{1t} + \lambda_{22}\zeta_{2t} + \delta_2 IGR + \phi_2 CI + \mu_{2t}$$

$$...$$

$$R_{nt} = \alpha_n + \beta_n R_{mt} + \lambda_{1n}\zeta_{1t} + \lambda_{2n}\zeta_{2t} + \delta_n IGR + \phi_n CI + \mu_{nt}$$

(2)

where R_{it} represents the continuous return obtained by firm i on day t; α_i refers to the estimated return on share i non-explicated by the evolution of the market index (the DJSI-Stoxx); β_i covers the non-diversifiable systematic risk of share i; R_{mt} represents the continuous return of the DJSI-Stoxx on day t; ζ_{1t} is a dummy variable that assumes a value of either 1 on the day on which the different DJSI-Stoxx annual reviews are made public, or 0 otherwise; ζ_{2t} refers to a second dummy variable that assumes a value of either 1 on the day on which the changes to the DJSI-Stoxx are made effective (the effective release of the DJSI-Stoxx for an annual period) or 0 otherwise; IGR refers to the Industry Growth Rate of firm i; CI refers to Capital Intensity of firm i; and, finally, μ_{nt} represents the non-systematic risk of share i (i.e. the equation's residual). IGR, computed as the annual increase of sales during the years of analysis, and CI, calculated as the ratio of assets to sales, have been included into the model in order to control the industry effect. These control variables have a significant impact on the goodness of fit of the model, and their removal could provide incomprehensive results. No additional variable

has been included for controlling the country effect, because all the stocks quote in the same SRI equity index. Furthermore, the inclusion of that parameter could lead to over-parameterize the model. This model identified by equation 2 is estimated with the Generalized Least Squares (GLS) method.

The continuous returns, both for the firms and the DJSI-Stoxx, were computed as shown in equation 3 (Belkaoui, 1976; Murray *et al.*, 2006):

$$r_{i,t} = \ln(P_{i,t} / P_{i,t-1}) \tag{3}$$

where $r_{i,t}$ represents the continuous return of share i on day t; $P_{i,t}$ is the closing price adjusted for dividends and capital increases for share i on day t; and $P_{i,t-1}$ refers to the closing price adjusted for dividends and capital increases for share i on the preceding day.

The decision to use continuous returns, instead of normal returns, is motivated by three factors: the distribution of relative frequencies of the continuous return presents a lower level of outliers; the statistics show higher statistical robustness; and, lastly, the distribution of relative frequencies is more symmetrical than the asymmetrical and leptokurtical distribution shown by normal returns (Fama *et al.*, 1969). However, the choice of continuous returns instead of normal returns does not affect the reliability of the results when estimating the MVRM (Elton and Gruber, 1974). Although the event window in year t covers the events of year $t-1$, this fact does not bias the estimates, given that the continuous returns of firms computed as shown in equation 3 follows random walk processes, so that there are no problems of autocorrelation or long memory effects.

The Average Abnormal Returns (AAR_e) are computed with the aim of understanding whether the stock price of the different firms includes the information arising from the events under analysis. They are calculated as the average of the different abnormal returns obtained for each firm in each sub-sample (see equations 4 and 5). In this context, two Average Abnormal Returns (AAR_e) are computed for each sub-sample: one for the date of publication of the different DJSI-Stoxx reviews ($AAR_{e,1}$), and another for the date of the release of the new index to the market ($AAR_{e,2}$), where e represents the sample in which the coefficient is estimated:

$$AAR_{e,1} = (\sum_{i=1}^{n} \lambda_{1n}) / n \tag{4}$$

$$AAR_{e,2} = (\sum_{i=1}^{n} \lambda_{2n}) / n \tag{5}$$

where λ_{1n} and λ_{2n} refers to the abnormal returns estimated by the equation 2 for every firm analysed «i», and n being the total firms of the sample. Additionally, the MVRM enables us to test the joint significance of some related event dates. This is of great interest in this paper since the two dates identified in each event (the date of publication of DJSI-Stoxx annual reviews and the date in which the new index is released for an annual period) could be jointly tested in order to identify their significance. To do this, the Cumulative Average Abnormal Returns ($CAAR_e$) need to be computed by the next expression:

$$CAAR_e = AAR_{e,1} + AAR_{e,2} \tag{5}$$

With the aim of testing the significance of the estimated parameters ($AAR_{e,1}$, $AAR_{e,2}$ and $CAAR_e$), the corresponding F-tests were calculated. The null hypothesis of the different F-tests establishes the non-significance of the estimated parameters ($AAR_{e,1} = 0$, $AAR_{e,2} = 0$ or $CAAR_e = 0$). Rejection of the null hypothesis would show that the market efficiently incorporated the information that was supplied about the events under analysis.

4. RESULTS AND DISCUSSION

4.1. MARKET REACTION TO INCLUSION AND EXCLUSION ANNOUNCEMENTS

The results of the application of the MVRM (see Table V) show that the market did not react in a significant and positive way to the firms that were included in the DJSI-Stoxx (sub-samples 2, 5, 8, 11 and 14). The same effect (see Table VI) is obtained when testing the market reaction to firm exclusions from the index (sub-samples 3, 6, 9, 12 and 15).

TABLE V

ESTIMATES RELATED TO HYPOTHESIS 1

Sub-sample	Parameter	Value	Ho: $AAR_{e,i} = 0$, $\forall_i = \{1,2\}$; $CAAR_e = 0$	
			F-value	Sig.
2	$AAR_{2,1}$	0.2132%	0.80	0.7002
	$AAR_{2,2}$	0.2064%	0.75	0.7577
	$CAAR_2$	0.4196%	0.79	0.7954
5	$AAR_{5,1}$	0.2765%	0.56	0.9425
	$AAR_{5,2}$	0.2010%	0.23	0.9999
	$CAAR_5$	0.4775%	0.41	0.9996
8	$AAR_{8,1}$	-0.1054%	0.71	0.8293
	$AAR_{8,2}$	-0.0499%	0.91	0.5819
	$CAAR_8$	-0.1553%	0.83	0.7704
11	$AAR_{11,1}$	-0.0999%	0.67	0.8850
	$AAR_{11,2}$	-0.0989%	0.33	0.9992
	$CAAR_{11}$	-0.1988%	0.52	0.9970
14	$AAR_{14,1}$	0.2006%	0.85	0.6067
	$AAR_{14,2}$	0.2004%	0.40	0.9693
	$CAAR_{14}$	0.4010%	0.65	0.9104

$AAR_{e,1}$: Average Abnormal Return of review publication date of sub-sample e (see equation 4).
$AAR_{e,2}$: Average Abnormal Return of DJSI-Stoxx annual release date of sub-sample e (see equation 5).
$CAAR_e$: Cumulative Average Abnormal Return of sub-sample e (combined effect of $AAR_{e,1}$ & $AAR_{e,2}$, see equation 6).
*** Significant at 99% level; ** Significant at 95% level; * Significant at 90% level.

The results show that the market made some small return adjustments during the different events windows considered. This could be due to speculation about which companies were likely to be included in the index and which ones not (Curran and Moran, 2007). These adjustments are, in general, positive in the inclusions events and negative in the exclusions events. However, they do not turn significantly different from zero. Thus, the market did not significantly incorporate the events information on stock prices of the different firms, which reflects a neutral market position to announcements about the inclusion and exclusion of firms in the DJSI-Stoxx. These results are similar to those obtained in other recent studies about FTSE4Good indexes (Curran and Moran, 2007), in which only one inclusion event from the four analysed was significant.

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TABLE VI

ESTIMATES RELATED TO HYPOTHESIS 2

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Sub-sample	Parameter	Value	$H_o: AAR_{e,i} = 0, \forall_i = \{1,2\}; CAAR_e = 0$	
			F-value	Sig.
3	$AAR_{3,1}$	-0.3061%	1.10	0.3539
	$AAR_{3,2}$	-0.1632%	1.30	0.1952
	$CAAR_3$	-0.4693%	1.22	0.1985
6	$AAR_{6,1}$	0.0011%	0.99	0.4740
	$AAR_{6,2}$	0.0002%	0.51	0.9619
	$CAAR_6$	0.0013%	0.77	0.8415
9	$AAR_{9,1}$	-0.0013%	0.85	0.6615
	$AAR_{9,2}$	-0.0004%	1.30	0.1683
	$CAAR_9$	-0.0017%	1.09	0.3231
12	$AAR_{12,1}$	0.1020%	0.23	0.9968
	$AAR_{12,2}$	0.0877%	0.65	0.7985
	$CAAR_{12}$	0.1897%	0.46	0.9873
15	$AAR_{15,1}$	-0.0991%	1.23	0.2237
	$AAR_{15,2}$	-0.0021%	1.11	0.3357
	$CAAR_{15}$	-0.1012%	1.19	0.2055

$AAR_{e,1}$: Average Abnormal Return of review publication date of sub-sample e (see equation 4).
$AAR_{e,2}$: Average Abnormal Return of DJSI-Stoxx annual release date of sub-sample e (see equation 5).
$CAAR_e$: Cumulative Average Abnormal Return of sub-sample e (combined effect of $AAR_{e,1}$ & $AAR_{e,2}$, see equation 6).
[***] Significant at 99% level; [**] Significant at 95% level; [*] Significant at 90% level.

Moving deep down in the results obtained by every event, it seems that the firms stock prices included in the DJSI-Stoxx, in all the sub-samples analysed, showed a non-significant variation both on the date of the announcement of the annual review ($AAR_{e,1}$) and on the date that the changes in the composition of the index were made effective ($AAR_{e,2}$). Likewise, the joint event related to Hypothesis 1 ($CAAR_e$) was non-significant in all the sub-

samples considered ($AAR_{e,1}$; $AAR_{e,2}$; $CAAR_e$; $\forall e = 2, 5, 8, 11, 14$). These considerations lead us to reject Hypothesis 1 for the entire sliding window analysed.

Concerning the exclusion effect, and in all the considered sub-samples, the events turned out to be non-significant (see Table VI). This result shows that the market did not penalize immediately the firms excluded from the index in the reviews considered. It seems that investors do not link the exclusions events with the firms obtaining lower level of CSP in future periods. Thus, we are able to reject Hypothesis 2 in all the periods analysed. These results are also in line with those obtained in previous research on the topic (Curran and Moran, 2007; Becchetti *et al.*, 2008; Consolandi *et al.*, 2009). Additionally, the estimates seem not to confirm some past voices indicating that it would be possible that the market positive/negative adjustments related to the inclusion/exclusion events will turn significant in future periods (Curran and Moran, 2007). This indicates that the increasing of the recognition or popularity about SRI equity indexes in the market do not have an impact on the significance of the inclusion/exclusion events. Thus, we can state that the market not rewarded/penalized those firms that were included/removed from the DJSI-Stoxx.

4.2. Market reaction to non-exclusion announcements

The estimates obtained show a different pattern to the results obtained for the first two hypotheses (see Table VII). Firms that were non-excluded from the DJSI-Stoxx in the 2004, 2005, 2006 and 2007 annual reviews were rewarded by investors through significant increases in their stock prices.

This result offers important differences for each of the periods under analysis. During 2003 (sub-sample 1) the estimates were non-significant which could be due to the emergence of SRI equity indexes (in this case the DJSI-Stoxx) in this period. For the remaining periods considered, 2004 (sub-sample 4), 2005 (sub-sample 7), 2006 (sub-sample 10) and 2007 (sub-sample 13), the market reacted in a significant, positive way to the announcement of non-exclusions from the DJSI-Stoxx in the date in which the information is firstly launched to the market ($AAR_{e,1}$ *** $\forall e = 4, 7, 10, 13$).

However, the results indicate that the market did not incorporate the information related to the event analysed (non-exclusion) in the date in which the DJSI-Stoxx was effective release for an annual period ($AAR_{e,2}$ $\forall e = 4, 7, 10, 13$). The joint event was also non-significant ($CAAR_e$ $\forall e = 4, 7, 10, 13$). In fact, it seems that the investors react to non-exclusion announcements quickly. This consideration matches up with the idea that the market discounts the information available into the stock prices quickly, and the event analysed seems not to be an exception. However, the magnitude to which the companies were rewarded during the sliding window presents many differences. For instance, the market premium to non-excluded companies increases along the period ($AAR_{13,1} > AAR_{10,1} > AAR_{7,1} > AAR_{4,1}$). This effect could be due to the investor's expectations about future returns of sustainability leaders companies that are higher in recent periods. Accordingly, Hypothesis 3 could not be rejected in four of the five periods under analysis (2004, 2005, 2006 and 2007). In accordance to Becchetti *et al.* (2008), who associate the non-exclusion event with companies

acquiring and «maintaining» satisfactory levels of CSP and economic success, the results of our research supports the idea that the market rewards the non-excluded firms (i.e. those that continued being the sustainability leaders in their industry).

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TABLE VII

ESTIMATES RELATED TO HYPOTHESIS 3

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Sub-sample	Parameter	Value	Ho: $AAR_{e,i} = 0, \forall_i = \{1,2\}; CAAR_e = 0$	
			F-value	Sig.
1	$AAR_{1,1}$	-0.0020%	0.88	0.7887
	$AAR_{1,2}$	-0.0005%	0.65	0.9964
	$CAAR_1$	-0.0025%	0.78	0.9743
4	$AAR_{4,1}$	0.0190%	1.43	0.0089[***]
	$AAR_{4,2}$	0.0023%	0.99	0.5157
	$CAAR_4$	0.0213%	1.23	0.0465
7	$AAR_{7,1}$	0.0822%	1.50	0.0040[***]
	$AAR_{7,2}$	0.0091%	0.78	0.9333
	$CAAR_7$	0.0913%	1.16	0.1172
10	$AAR_{10,1}$	0.1011%	1.44	0.0058[***]
	$AAR_{10,2}$	0.0133%	0.81	0.9146
	$CAAR_{10}$	0.1144%	1.14	0.1281
13	$AAR_{13,1}$	0.2101%	1.55	0.0013[***]
	$AAR_{13,2}$	0.0355%	0.74	0.9732
	$CAAR_{13}$	0.2456%	1.16	0.1016

$AAR_{e,1}$: Average Abnormal Return of review publication date of sub-sample e (see equation 4).
$AAR_{e,2}$: Average Abnormal Return of DJSI-Stoxx annual release date of sub-sample e (see equation 5).
$CAAR_e$: Cumulative Average Abnormal Return of sub-sample e (combined effect of $AAR_{e,1}$ & $AAR_{e,2}$, see equation 6).
[***] Significant at 99% level; [**] Significant at 95% level; [*] Significant at 90% level.

5.   CONCLUSIONS

The aim of this research is to evaluate empirically the possible link between the level of CSP of European companies and their market value. The theoretical assumptions are related with the Stakeholder Theory proposed by Freeman (1984), and recently discussed by Agle *et al.* (2008) and Freeman *et al.* (2010). More specifically, this paper seeks to seed light upon how investors react to the sustainable policies that corporations include in their

strategic management processes. For instance, this paper aims to add more debate about how the market evaluates the firms' efforts to redirect the focus of their corporate activity: from the maximization of shareholders to stakeholders' interests.

In this paper, the CSP levels have been measured by the changes in the composition of the DJSI-Stoxx (Curran and Moran, 2007; Becchetti *et al.*, 2008; Consolandi *et al.*, 2009). The results indicate that the events information related to firm's inclusions/exclusions are not incorporated significantly into their stock prices. This indicates us that the market disregard these events, which partially coincides with the results obtained by previous academic research in this field (Curran and Moran, 2007; Becchetti *et al.*, 2008; Consolandi *et al.*, 2009). Even so, there are slight differences as a consequence of the different sliding window considered, the sample and the methodology applied. According with these studies, the inclusion/exclusion events could be appreciated by the market as not merely associated to firms obtaining good/bad levels of CSP. This fact can be supported by the idea that stakeholder engagement represents a «long-term process» in which the companies need to establish many multilateral contracts over the long run with their stakeholders (Freeman and Evan, 1990). As these authors indicate, an effective stakeholder engagement lets firms to a stronger position in order to adapt to external demands and give the companies more ability, not only to create and satisfy individual contracts, but also to coordinate multiple contracts simultaneously. However, as demonstrated by previous research (Harrison and John, 1998; Post *et al.*, 2002), the long-term survival and financial success of a firm is determined by its ability to establish and, also more important, to «maintain» satisfactory relationships within its entire network of stakeholders. Thus, it seems that the market appreciates the inclusion/exclusion events as probably ephemerals and not linked to firms «maintaining» or «not» successful relationship with their stakeholder and so on being sustainability leaders/lagers among the future periods.

These considerations acquire more relevance when analysing the results obtained for the non-exclusion events. In fact, one of the most relevant results of the present paper is that the market usually reacts in a positive way when different firms in the DJSI-Stoxx are non-excluded in the annual reviews analysed (H3 can only be rejected in 2003). Thus, the companies' stock prices grew significantly more than it had been expected from its historical stock price during most of the DJSI-Stoxx annual reviews. This effect highlights the interest embraced by the market in investing in companies that «maintain» a close strategic relationship with their stakeholders. This result is highly relevant because, in addition to obtain a market premium, those firms with successful stakeholder engagement may reduce expenses as well as the risks associated with variations in returns (Spicer, 1978; Shane and Spicer, 1983; Cornell and Shapiro, 1987; Steadman *et al.*, 1995). For instance, that risk reduction enhances the value of a firm because the market considers both future cash flows and risk simultaneously, when evaluating the firm's value (Fama, 1970; Graves and Waddock, 1990). These considerations indicate that under similar corporate activities, stakeholders prefer to conduct business with stable organizations (Freeman, 2010). Thus, the corporations have incentives to follow a strategic model that acts trustworthy with their stakeholders, rather than just the shareholders, because it could enhance their levels of CSP and CFP in the long-term.

One limitation of this research, also present in previous literature (Curran and Moran, 2007; Becchetti *et al.*, 2008; Consolandi *et al.*, 2009), refers to that companies can be included/excluded from the index due to changes in their market capitalisation or other financial issues. Additionally, companies can be included/excluded from the index although their social and environmental performance may be good/bad, but they are included in a low/high competitive DJSI sector. Given this limitation, it would be highly interesting that the DJSI assessment board discloses, in future periods, why companies are included/excluded from the DJSI-Stoxx index. However, the results obtained in this research support that the market agents are concerned about these considerations. This is because they only give a return premium to companies which are non-excluded from the SRI equity index analysed. This remarks that investors identify those non-excluded companies as more probably to carry out a successful stakeholder engagement, achieving good levels of CSP and CFP and, finally, guaranteeing their survival in the long term.

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