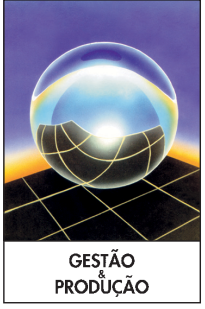
Gest. Prod., São Carlos, v. 25, n. 3, p. 531-544, 2018
https://doi.org/10.1590/0104-530X2958-16



ISSN 0104-530X (Print)
ISSN 1806-9649 (Online)

Corporate sustainability and value creation: the case of the "Dow Jones Sustainability Index"

Sustentabilidade corporativa e criação de valor: o caso "Dow Jones Sustainability Index"

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Abstract: Choosing an enterprise that will be part of Dow Jones Sustainability Index (DJSI) raises some expectations concerning this conquest benefits. We hope that the investment on sustainable development and the inclusion of the company in this select group bring economic and strategic benefits that can reflect in the company market valorization. However, the correlation between social, environmental and financial development is quite complex. In this context, this paper aims to verify whether the inclusion of an enterprise in DSJI list, which presupposes a high social and environmental performance, provides it with greater financial return. We use the case study method in order to investigate the existence of abnormal returns when disclosing the information of the company inclusion in the list, as well to analyze the hypothesis that market has positive expectations concerning to DSJI participation. This study included one hundred and fifty-four companies listed in DSJI that trade their shares on the New York Stock. The results show no effect and do not confirm the greater return hypothesis, but neither do they indicate a reduction in financial performance associated do this fact.

Keywords: Dow Jones Sustainability Index; Corporate sustainability; Financial performance.

Resumo: *A escolha de uma empresa para fazer parte da listagem do DJSI gera uma série de expectativas quanto aos benefícios advindos dessa conquista. Espera-se que o investimento no desenvolvimento sustentável e a consequente inclusão da empresa nesse seleto grupo traga benefícios econômicos e estratégicos refletidos na valorização da empresa no mercado. Entretanto, a relação entre desempenho socioambiental e desempenho financeiro é bastante complexa. Nesse contexto, o objetivo deste estudo é verificar se a inclusão de uma empresa na listagem do DJSI, o que pressupõe alta performance socioambiental, proporciona maior retorno financeiro para ela. O estudo de evento é utilizado como metodologia para investigar a existência de retornos anormais quando a informação sobre a inclusão da empresa na listagem é divulgada, analisando-se a hipótese de que o mercado tem expectativas positivas quanto à participação no DJSI. Participaram do estudo 123 empresas que constam na listagem do DJSI, edição 2013/2014, e comercializam suas ações na Bolsa de Valores de Nova York. Os resultados alcançados apontam para um efeito nulo, não se confirmando a hipótese de maior retorno devido à inclusão no DJSI, mas também não indicando uma redução no desempenho financeiro associada a esse fato.*

Palavras-chave: *DJSI; Sustentabilidade corporativa; Desempenho financeiro.*

1 Introduction

Managing a company in a global turbulent scenario in which all of them are equal in various production aspects requires a policymaking and adopting strategies that can result in other factors unrelated to the product and its price, showing a potential for differentiation and competitive advantage (Porter,

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Received July 06, 2017 - Accepted Feb. 23, 2018

Financial support: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

1991). Changing demands new cost and benefits measurement in investments that involve other non-economic and intangible gains and long-term benefits (Toffler, 1995; Roy et al., 2001; Goyal et al., 2013; Hsu et al., 2016).

In this context, long-term sustainability and perpetuity of enterprises became targets in the same order of importance than the short-term profit. Collins & Porras (1995) affirm that companies "built to last" keep values and ideologies that privilege being reasons other than economic results and they have more profits than others. In order to understand this approach named corporate sustainability, it is necessary to know in advance the sustainable development concept. The concept of Corporate Sustainability presupposes that the company grow, be profitable and generate economic results, but also contributes to the development of society and to the preservation of the planet.

However, studies are controversial and opinions about the relationship between sustainable investments and economic results are not consensual. When researching the literature, one would identify positive, negative or even null results. Klassen & McLaughlin (1996), Sharma & Vredenburg (1998), Edwards (1998), Karagozoglu & Lindell (2000), Álvarez-Gil et al. (2001), Ann et al. (2006), Montabon et al. (2007), Wahba (2008), Galdeano-Gómez et al. (2008), Llach et al. (2013), Leonidou et al. (2013), and Pereira Moliner et al. (2015) have identified positive relationship between environmental management practices and financial performance. Nonetheless, Cañón & Garcés (2006) identified a negative relationship between sustainable practices and financial performance for smaller companies. Khanna & Damon (1999) identified a negative relationship between rentability and environmental management practices on short term, as opposed to a positive relationship on long term. González-Benito & González-Benito (2005) have found that environmental management can bring competitive opportunities for companies, although some environmental practices may produce negative effects. Menguc & Ozanne (2005) identifies a positive relationship between environmental practices and profit after taxes and marketshare, but a negative relationship for sales increase. Studies of Gilley et al. (2000), Watson et al. (2004), Zhu et al. (2007) have found null effects for the relationship between environmental actions and financial performance, while Zhu et al. (2013) only identified indirect effects.

However, those who argue that companies take their environmental responsibility now can celebrate some practical results). An example is Dow Jones Sustainability Index (DJSI), created in 1999 by the Swiss Dow Jones and the Sustainable Asset Management (SAM) company, which is a financial resources manager specialized in enterprises with social and environmental responsibility. It was the first sustainability index and it is considered the main tool for choosing the stocks of social and environmental responsibility companies (Kraemer, 2003; Fowler & Hope, 2007).

The *DJSI* measures the performance of the world leaders in sustainability through economic, environmental, and social criteria by using a "best-in-class" approach in order to select sustainability leaders. In other words, only the most sustainable companies, in industries that fualfill minimum sustainability requirements, are selected to the index DJSI.

Although sustainability indexes do not replace official policies related to social and environmental aspects, they are valuable to investors who are concerned to allocate their resources ethically. They help placing corporate responsibility and sustainability at the center of concerns in a growing number of companies(Makipere & Yip, 2008; Robinson et al., 2011).

In a general way, sustainability indexes as well as other corporate governance ones aim to provide greater transparence to capital market and thus attract more investors, increasing the traded stock volume, particularly to firms that adapt themselves to the new rules. We hope that the enterprises that adhere to these new DSJI demands or criteria have better prices for their stocks and, as a consequence, higher return on equity and, in the long term, lower capital costs.

Procianoy & Verdi (2009) believe the participation of companies in special segments is motivated by the need of investments and growth, trading in other markets, capital structure, and ownership concentration. They claim that participation of companies in these segments is rewarded with higher levels of liquidity, that is, a larger volume of trading of its shares and debt securities.

The lack of consensus about the correlation between environmental and financial performance, and the previously described scenario along with the assumption that the inclusion of a company in the DJSI may be understood as a measure of superior environmental capacity and, due to its reflection to the company's image, lead to financial performance improvement, motivated the formulation of the theme on the influence of environmental sustainability on business success and competitiveness. So that, we aimed to answer the question: *Does being part of DSJI generate return to the company?*

We aim to answer this question by analyzing companies that were included in DSJI. Two variables were analyzed concerning the impact of adopting DSJI on the company value in market: volume

and price of traded shares. Two hypothesis were considered: Hypothesis 1 - The price of share traded has significantly undergone positive changes after disclosure of the DJSI list; Hypothesis 2 - The share traded volume has significantly undergone positive changes after disclosure of the DJSI list.

This study aims to verify, by an event study, whether including a firm in DSJI brings economic benefits reflected on the price and the volume of share traded in Stock Exchange, thus accomplishing the investor expectations.

This research presents contribution to the literature. First, it represents an attempt to test the market reaction to a measure integrated to sustainability in a worldwide scenario. The DJSI rates a wide range of corporative sustainable practices, not restricted to single aspect of sustainability, such as corporate governance or economic and environmental policies. Second, it examines the international variation in market performance appraisal of the company in relation to sustainability. More than worrying with social and environmental issues, companies are glimpsing long term, seeking for competitive beneffits acquired from managing environmental risks. The adherence to the principles of corporate sustainability, from which a company should mature, be rentable, generate economic results, and at the same time contribute for the development of society and the preservation of the planet (Elkington, 2001), is a way for companies to see changes beforehand and earn superior status when compared to other companies.

The study is structured as follows. The next section provides a review of literature about corporate sustainability, while section 3 debates the contribution of the literature about environmental and financial performance. Section 4 presents the methodological aspects of the research, including the universe, sample, gathering and processing of data. In section 5, the research results are described and, in section 6, they are stated as final considerations of the work.

2 Corporate sustainability

World movement towards rescuing values such as ethic, solidarity and trust leaded some Non Governmental Organizations, the civil society, the investors, financiers, insurance companies and the press to intervene in the company traditional structure and to require them to take into account the impact of their activities throughout their surroundings (González-Benito & González-Benito, 2006; Hofmann et al., 2012).

On one hand, communities, governments, NGO, insurance companies and investors demand clean processes and, on the other hand, more conscientious costumers select products and/or processes that generate low negative impacts to the society. Nevertheless, environmental conditions result in pressure over every operation and product, establishing conflicts between distinct visions and values: short versus long term; shareholders versus stakeholders; profit maximization versus corporate name; competition versus cooperation; reactive versus proactive; economic sustainability versus environmental sustainability.

In recent decades, many authors have analyzed changes of posture in business regarding environmental and social matters (Luchs et al., 2010; Tomas & Hult, 2011; Kotler, 2011; Lannelongue & González-Benito, 2012; Leonidou et al., 2013). According with these authors, in a general way, business posture undergoes a reactive stage, which solely aims obedience to legal demands, then, through a proactive stage, in which perspectives go beyond legal conformity, and, finally, through a stage of proactive, anticipative, innovative, and leadership character.

Once the last stage is achieved, the company is supposed to grow, be rentable, and generate economic results, but also contribute to the advancement of society and the preservation of the planet. It is the concept of Triple Bottom Line, developed by Elkington (2001). The theory of the three pillars defines that society depends on the economy and the economy depends on the ecosystem, whose health represents the ultimate pillar, the three of which can be represented by overlapping plates, interfering to one another. Faced with this vision, a company can be considered sustainable if it manages and gets good results on economic, environmental, and social areas altogether.

There are several definitions regarding sustainability and sustainable development in the literature. In fact, sustainability is a relatively new concept, having a multidisciplinary character and involving different interpretations that reflect differences of value, localized circumstances and contexts. Furthermore, the concept is eventually incorporated in several issues, such as definition of government policies, regional public administration, business management, and even personal life style (Pedroso & Zwicker, 2007).

In academic debates and business environments, hundreds of concepts and definitions have been proposed, referring to a more humane, more ethical and more transparent way of doing business (Zamcopé et al., 2012). According to the author, the concept of corporate sustainability encompasses the meeting of the needs of stakeholders directly or indirectly, without compromising its ability to meet the needs of future stakeholders. He argues that corporate sustainability and corporate social responsibility concepts can often be fused. Corporate social responsibility, according to Carroll (1979), is usually performed seeking to improve

an important society, community or non-governmental and nonprofits organizations relation aspect. Thus, corporate sustainability is considered the ultimate goal while corporate social responsibility is an intermediate stage in which firms try to balance the triple bottom line of economic responsibility, social responsibility and environmental responsibility. Corporate social responsibility is related to transparency phenomena, dialogue with stakeholders and sustainability reports, while corporate sustainability focuses on value creation, environmental management, cleaner production systems, and human capital management (Zamcopé et al., 2012).

3 Environmental and financial performance

According to Porter & Linde (1995), the environmental issue may be seen on different perspectives. Under the orthodox economy point of view, preservation and rational use of natural resources counteracts to the economic development and profitability of the company, once environmental protection generates costs and affects competitiveness. The second point of view states that environmental protection is good for business, and the third believes renouncing to protect the environment generates costs.

The debate, meaning to compare profitability and environmental responsibility, gave birth to several studies that seek to verify if environmentally responsible companies are more profitable as well. Measuring the environmental performance of companies has revealed to be a great challenge for academic research due to complexity and conceptual imprecision. Despite that, empiric studies that relate environmental and financial corporate performance have been constantly evolving. The great majority of studies intended to test the correlation between corporate social and financial performances, identifying positive, negative or null interaction (Molina-Azorín et al., 2009).

Horváthová (2010), through a meta-analysis, discovered that roughly 15% of studies find negative effect of environmental performance over financial performance; nearly 30% do not find any effect, and approximately 55% of studies find positive effect. The author, however, states that the method used on researches may interfere with its results. Thus, it was observed that: (1) the probability of finding a negative connection between environmental and financial performance significantly increases when simple correlation coefficients are used instead of more advanced econometric analysis; (2) portfolio studies tend to report negative connection between environmental and financial performance; (3) positive relation is more frequently found on countries of common rights as opposed to countries of civil rights; (4) right riming is important in order to establish positive relation between environmental and financial performance. Besides, in order to accurately identify the effect of environmental performance over financial performance, the measure used for the first variable is of crucial importance (Horváthová, 2012).

Wood & Jones (1995) mention the event studies as a logical fashion to verify the impact of environmental performance over financial performance, through returns from stock market. Through the same path, Frooman (1997), by analyzing 27 event studies, verified that irresponsible or illegal social behavior results on the decrease shareholders' wealth.

Chart 1 synthesizes some of the empirical studies that address variables in question during the last decade.

Researches stated above present contradictory results, diverging through positive, negative, and, in some cases, null connections. Conflict between corporate profit maximization and the search for other goals still persists, despite over three decades of study, and there is no consensus on the matter (Horváthová, 2012).

Other than the lack of consensus about whether or not to create value for the company through responsible environmental actions, there is also the analysis associated to short and long term. Horváthová (2012), by examining time effects of environmental performance on financial performance, suggests that improvements of environmental performances are associated to additional costs for companies on short term (more specifically, with a one-year gap) and exhibits positive effect over financial performance on long term (two-year gap). Hart & Ahuja (1996), Molloy et al. (2002), and Khanna & Damon (1999) have no identified positive relationship between profitability and environmental management practices on short term either, however this relationship was positive on long term. Molloy et al. (2002) concludes that on short term investors apprehend environmental improvements as expensive, unless investments are made in response to environmental regulations and to avoid penalties. Rassier & Earnhart (2011) conclude that lower emission of pollutants improve financial performance, both on short and long term, with stronger effect on long term.

Considering the temporal aspect, Elkington (2001) believes proactive companies glimpse long term and seek for competitive benefits coming from managing environmental issues, anticipating transformation and differentiating from other companies.

Chart 1. Studies that relate environmental performance to financial performance.

STUDY	VARIABLES OF ENVIRONMENTAL PERFORMANCE	MAIN ANALYSIS	MAIN RESULTS
Link & Naveh (2006)	Emissions, use of recycled materials and other environmental aspects	Regression analysis	The greater the standardization in managing organization environmental issues – ISO 14001 – the greater to environmental performance Environmental performance does not influence business performance
Aragón-Correa & Rubio-López (2007)	Emissions of organic carbon	Correlation analysis	Environmental progress is not related to financial performance
Nakao et al. (2007)	Environmental management performance index (Nikkei Environmental Management Survey)	Regression analysis	Environmental performance of a company has positive impact over its financial performance and vice-versa
Yang et al. (2011)	Environmental Performance (measures of perception – improvement over the past three years and in comparison to its competitors)	Modeling of structural equations	Lean production is positively related to environmental management practices, which are negatively related to the market and to financial performance Better environmental performance substantially reduces negative impact of environmental management practices to the marketplace and to financial performance
Iwata & Okada (2011)	Waste issue and greenhouse gas emissions	Panel analysis	Emission of residues, in general, has no meaningful effects on financial performance The reduction of greenhouse gases results on significant increase of financial performance in unclean industries
Horváthová (2012)	93 air, water, and soil pollutants	Econometric analysis	The effect of environmental performance over financial performance is negative for the first one-year lag but becomes positive after 2 years

4 Methodology

According to Marconi & Lakatos (2003), this research may be characterized as a quantitative and descriptive one. In order to analyse the price of shares and traded volume, a traditional study of event methodology is applied.

The study of event is used to identify whether there are or not significant alterations in price and volume of traded shares when the information on the inclusion in DSJI is disclosed, analyzing the hypothesis that market has positive expectations on investing in environmental questions.

Hamilton (1995) points that the event study in stock market supposes implicitly that this market operates effectively in order to reflect the expectations of current information. It assumes the hypothesis that a particular fact or event affects the company value and this value change is shown by an abnormal return in company stock.

MacKinlay (1997) affirms that the abnormal return is the difference between the observed and the normal return, defined as the expected one by means of some asset-pricing model.

There is a considerable number of approaches to calculate the abnormal return of a given asset, but the models may be grouped into two categories: the economical and the statistical ones MacKinlay (1997). Concerning to the statistical models, the abnormal return calculation may be approached in three basic ways: the average adjusted return, the market adjusted income and, finally, the risk and market adjusted one, which is used in this study.

The risk and market adjusted return assumes that abnormal stock incomes are observed by the divergence among the individual effectively occurred results related to the market portfolio which is calculated using a simple factor model. This model is estimated by estimation window data and a linear regression using ordinary least squares, according to Equation 1:

$$\mathbf{ARi,t = Ri,t - \alpha i - \beta iRMi} \quad (1)$$

where: ARi,t = abnormal return of i stock in t period; Ri,t = rate of return observed for the i active in t period; Rmi = rate of the expected return of the market portfolio

in t period; αi and βi are the estimated coefficients for the period by the Ordinary Least Squares – OLS, i.e., the parameters of linear regression involving the stock returns and market one.

Daily returns are obtained using daily closing prices of the stocks in the sample, calculated by Equation 2:

$$\mathbf{Rit} = \mathbf{ln}(\mathbf{Pit}) - \mathbf{ln}(\mathbf{Pit-1}) \quad (2)$$

where: Rit = return of stock 1 on t date; Pit = stock 1 closing price on t date.

Despite the abnormal returns calculation form, we estimate the abnormal average incomes that must be added to the time, using the CAR (*Cumulative Average Abnormal Return*) technique. According to Brown & Warner (1980, p. 227), CAR is a method often used to investigate abnormal performance, when the information on when the event occurred is incomplete.

As stated by MacKinlay (1997), CAR has Student t-distribution and, for big estimation windows, CAR distribution may be approximated satisfactorily by normal distribution. Thus *t*-CAR obtained values may be compared to the critical ones of Student *t*-distribution.

Marcon (2002) states that the steps to be followed in conducting an event study are the following ones: event definition, period definition (also known as interest window), determining selection criterion to include a given company in the study either by data availability, either by specific characteristics, and abnormal return calculation. Such steps are addressed in the next section.

4.1 Universe, sample, data collection

The first step in an event study is to define the interest event. In this case,inclusion in the DSJI list. From this event, this study population was selected based on 2013-2014 Dow Jones Sustainability Index – DJSI list. In this edition, 333 companies from 25 countries compose the Index.

The DJSI was the first global index for monitoring financial performance of companies oriented to worldwide sustainability. Dow Jones Indexes and Sustainable Asset Management (SAM) launched the indexes in 1999. The DJSI measures the performance of world leaders in sustainability in terms of economic, environmental, and social criteria, providing objective benchmark to investors for management of sustainability investment portfolios. The DJSI handles a "best-in-class" approach to select leaders in sustainability, meaning only the more sustainable companies, in industries that fulfill minimum sustainable requirements, are selected are selected to the index. Parameters of reference DJSI are made of three geographic aggregates: DJSI World, DJSI Regions, and DJSI Countries. The DJSI World is specifically used in this study.

The key factor for selecting companies that make up the DJSI is the Total Sustainability Score (TSS) index, which represents the total score of the company, figured according to the RobecoSAM's annual Corporate Sustainability Assessment (CSA) evaluation. The first step in the process of CSA is the definition of companies that ought to be invited to participate the selection, denominated the Invited Universe. The Invited Universe varies between different subfamilies of the DJSI (DJSI World, DJSI Emerging Markets, etc.). Companies in each Invited Universe are requested to answer an extensive questionnaire specific to each sector. The CSA invitations are sent every march of the year and the listing is disclosed September of the same year.

Not all companies of an Invited Universe choose to answer the questionnaire. When companies refuse to do so but still fulfill certain size criteria, RobecoSAM completes questionnaire, as well as possible, based on publicly available information to ensure that minimum representativeness requirements are met. In the 2013-2014 DJSI listing, from the 2.500 companies that composed the Invited Universe, 1.831 companies were analyzed; 818 companies answered the questionnaire; 1.013 companies had their evaluation completed based exclusively on public information; and 333 companies from 25 countries were selected to make up the index. That is, there is no publicly sent invitation and only 12,52% of the invited companies were included in the final DJSI World listing that year, which demonstrates the absence of a possible effect of anticipating the market. Besides that, only the first year in which companies were included in the DJSI listing is object of this study, allowing the elimination of the anticipation-of-the-market effect concerning expectation of permanence of the company in the index. In order to eliminate the anticipation effect only the first inclusion year of the company was analyzed, not its continuity.

The second step to an event study, according to Marcon (2002), is to define the period when stock prices and volume will be analyzed. We sought the dates when the DSJI list was disclosed from 1999 to 2013. This data was considered the starting point of the event study.

We collected data referring to the variables to be analyzed in two moments: one period prior the company classification by the DJSI and one period after this event (60 daily quotations before and 30 ones after that event). The period corresponds to about two months before and one month after the indication to DJSI, because the quotations occur only in business days. We understand that using too long

lead could affect the analysis, because the longer the duration the greater the influence of other variables and greater the difficulty to isolate the event and its reflections on stock price and volume traded by the companies in that period.

Once defined the period for data collection, we established the estimation window (period used to estimate parameters for the employed models) and the event window (period for testing the event). In this study, the estimation window was formed by 55 daily observations in the quotations, the trades volume or stock return and the event window was defined in 5 observations before and 30 after the event date.

Marcon (2002) points out that the third step in an event study is to determine the sample. We adopted Dow Jones (DJ) as the unique index for estimating the market portfolio return calculated by New York Stock Exchange (NYSE), in order to calculate the expected stock returns. So that, among the 333 observations in the search universe, we selected those that belonged to companies that had stocks traded on NYSE.

We collected data (closing stock prices and trading volumes) in Yahoo Finance (2006) website. It was not possible to collect data from six companies (they had histories with dates later than their DJSI). Therefore, the non-random sample is made of 123 observations.

4.2 Data treatment

The fourth step in an event study, according to Marcon (2002), is to calculate abnormal returns. For calculating stock daily returns we used the continuous compounding system, extracting the difference between the natural logarithm (nl) from Pi(t) and from Pi(t-1) (Equation 2). We did the same to calculate the daily returns from DJ Index. We extracted the difference between the natural logarithm (nl) from DJ*t* and from DJ(t-1) (DJT is equal to the index points in DJ on *t* date). The stock expected returns were calculated following the statistical model proposed by MacKinlay (1997) (Equation 1). Thus, we estimated the model parameters using simple linear regression based on a 55-dayestimation window.

For the regressions, we kept the prices the day before the sessions when there was no negotiation. We used the DJ Index (price index from NYSE) as a return estimation of the market portfolio return. The estimation window was a parameter for comparing the returns before and after the event window as well as the returns in the event window. We obtained abnormal return by the difference between the observed returns in the enterprise, in the event window and the expected ones. From the abnormal returns of each stock, we calculated the average and its standard deviation. Moreover, we used CAR technique - *Cumulative Average Abnormal Return.*

Since the aim of the investigation is to compare two periods, one before and another after DJSI implementation, and since the two samples were collected in the same group of firms, we have to choose a test that consists to this goal. So that, in order to determine the statistical significance of AR and CAR results, each day, following the procedure described and used by Brown & Warner (1980, p. 7-8) and Docking & Dowen (1999, p. 154-155), we used Student *t* test. The null hypothesis in this test considers that average abnormal return in a given period is not different from zero. We reject this null hypothesis if *t* is greater that the critical value at the desired significance level, in module.

5 Results

Table 1 presents the results we got in an aggregate way in the event study. This Table shows the following structure: the first column corresponds to the event window period (from -5 to +30); the three further columns show the daily average abnormal return (AR), the average standard deviation, and the t-Student statistic, respectively; the three last columns have the same structure, but they show daily cumulative data (CAR – Cumulative Abnormal Return).

Results presented on Table 1 show a negative average abnormal return on 17 from the 35 days observed in the event window. CAR showed a negative cumulative result of (0.2196%) (see the last cell in the fourth column). This result indicates that, on average, the companies listed in DJSI presented results below the expected ones in the analyzed period. However, concerning to statistical significance of these results, the coefficients were not significant to the 10% level (in module, all the results of *t* Student test are lower than 1.645). Thus, according to *t* Student test, we accepted the null hypothesis that the average abnormal return in this period is not different from zero. So that, the statistical results do not confirm the hypothesis that the market reacts positively to the news of a company entering the DSJI group. In this case, the positive results may be caused by factors other than the disclosure of the DJSI list. The negative results, in this manner, can be motivated by factors other than the disclosure of the DJSI list. Another aspect that reinforces to strengthening the non-existence of positive impact on stock prices as the announcement of the DJSI is the average negative abnormal return of 0.2259% observed on the day of the event (D_0).

In our sample we identified companies that belonged to twenty-two economy sectors according to DJSI classification. Table 2 summarizes the event study results when we considered the activity sectors.

Table 1. Event study aggregate results (Abnormal Return).

Days	*AR* Average*	Standard Deviation *AR**	*t AR**	*CAR** Average*	*CAR** Deviation*	*t CAR***
-5	-0.3120%	2.1280%	-0.1466	-0.3120%	2.1280%	-0.1466
-4	0.1138%	1.8447%	0.0617	-0.1982%	3.9727%	-0.0499
-3	-0.1798%	1.9308%	-0.0931	-0.3781%	5.9035%	-0.0640
-2	0.1543%	1.8246%	0.0846	-0.2238%	7.7281%	-0.0290
-1	0.4173%	2.0941%	0.1993	0.1935%	9.8222%	0.0197
0	-0.2259%	1.8324%	-0.1233	-0.0324%	11.6546%	-0.0028
1	0.1275%	1.8630%	0.0684	0.0951%	13.5176%	0.0070
2	-0.0648%	2.0515%	-0.0316	0.0303%	15.5690%	0.0019
3	-0.2459%	2.2292%	-0.1103	-0.2156%	17.7983%	-0.0121
4	0.1570%	2.0494%	0.0766	-0.0586%	19.8476%	-0.0030
5	0.0918%	2.2846%	0.0402	0.0332%	22.1322%	0.0015
6	-0.2330%	1.7669%	-0.1319	-0.1998%	23.8991%	-0.0084
7	-0.0036%	1.7540%	-0.0021	-0.2034%	25.6532%	-0.0079
8	-0.0667%	2.6880%	-0.0248	-0.2701%	28.3412%	-0.0095
9	0.1227%	2.4789%	0.0495	-0.1474%	30.8201%	-0.0048
10	-0.1284%	1.9976%	-0.0643	-0.2758%	32.8177%	-0.0084
11	-0.2517%	4.4299%	-0.0568	-0.5275%	37.2477%	-0.0142
12	0.0260%	2.3819%	0.0109	-0.5015%	39.6296%	-0.0127
13	0.3212%	1.9075%	0.1684	-0.1803%	41.5370%	-0.0043
14	-0.0561%	2.5373%	-0.0221	-0.2364%	44.0743%	-0.0054
15	0.4453%	1.7916%	0.2485	0.2089%	45.8660%	0.0046
16	-0.0891%	2.7083%	-0.0329	0.1198%	48.5742%	0.0025
17	0.1272%	2.1624%	0.0588	0.2470%	50.7366%	0.0049
18	-0.1587%	1.9977%	-0.0794	0.0883%	52.7343%	0.0017
19	0.0920%	2.2276%	0.0413	0.1803%	54.9619%	0.0033
20	0.0127%	2.2957%	0.0055	0.1931%	57.2576%	0.0034
21	-0.4429%	2.5088%	-0.1765	-0.2498%	59.7665%	-0.0042
22	-0.3722%	2.6548%	-0.1402	-0.6220%	62.4213%	-0.0100
23	0.1717%	1.8857%	0.0911	-0.4503%	64.3069%	-0.0070
24	-0.0372%	1.9422%	-0.0192	-0.4876%	66.2491%	-0.0074
25	0.2070%	2.6190%	0.0791	-0.2805%	68.8681%	-0.0041
26	0.1057%	2.2968%	0.0460	-0.1748%	71.1649%	-0.0025
27	0.0577%	2.3078%	0.0250	-0.1172%	73.4727%	-0.0016
28	-0.0400%	1.9726%	-0.0203	-0.1572%	75.4453%	-0.0021
29	-0.0624%	2.1741%	-0.0287	-0.2196%	77.6194%	-0.0028

*AR = Abnormal Return; **CAR = Cumulate Average Return.

In spite of a greater number of abnormal positive returns (12), concerning to the abnormal negative ones (10), *t* Student test results, in the sector analysis, also showed no significant results at 10% level, indicating that the average abnormal return of all the sectors is statistically equal to zero. Nevertheless, by means of CAR we could verify that the sector showed different results in the analyzed period. While the sector of services to the consumer had a positive cumulative average abnormal return of 63.2682%, the real state sector had a negative average cumulative abnormal return of -18.5235%. However, it is important to highlight that these sectors are composed of one company only, which prevents the generalization of this data.

The sample is also divided in six geographic regions. Table 3 presents the event study results when considering these regions.

The results show that there is equilibrium between the positive and negative results when considering geographic area, which in itself already indicates the lack of a correlation between the analyzed event and the company results. The *t* statistic confirms this fact and shows no statistical significance at 10%level for average abnormal returns.

Another aspect to be taken in account is the year when the companies took part of DJSI list. We used

Table 2. Summary of the event study by activity sector.

Activity Sector	Samples	*AR* Average*	Number of Positive *AR**	Number of Negative AR*	*CAR** Average*	*t*
Automobiles and Components	01	0.1662%	19	16	5.8175%	-
Banks	10	0.0544%	17	18	1.9030%	<VC
Capital Goods	10	0.0411%	18	17	1.4381%	<VC
Commercial and Professional Services	01	-0.4496%	15	20	-15.7377%	-
Durable Goods and Clothing	01	-0.0863%	14	21	-3.0188%	-
Services to the Consumer	01	1.8077%	29	06	63.2682%	-
Financial Services	08	-0.0255%	17	18	-0.8922%	<VC
Energy	13	-0.2745%	12	23	-9.6086%	<VC
Food. Beverages. and Tobacco	06	-0.1330%	11	24	-4.6542%	<VC
Equipment and Services for healthcare	08	-0.0385%	16	19	-1.3480%	<VC
Insurance	02	0.3022%	19	16	10.5757%	<VC
Materials	19	-0.1053%	16	19	-3.6870%	<VC
Average	02	0.0431%	16	19	1.5079%	<VC
Pharmaceuticals. Biothecnology. and Life Sciences	07	0.0443%	16	19	1.5491%	<VC
Real State	01	0.5292%	17	18	18.5235%	-
Retail Sector	04	-0.0688%	16	19	-2.4090%	<VC
Semiconductors and Semiconductor Equipment	02	0.1993%	19	16	6.9767%	<VC
Software and Services	03	-0.0541%	19	16	-1.8951%	<VC
Hardware Technology and Equipment	06	0.1216%	20	15	4.2570%	<VC
Telecommunication Services	09	0.2483%	21	14	8.6919%	<VC
Transportation	04	-0.3081%	10	25	-10.7822%	<VC
Utilities	05	0.0986%	16	19	3.4504%	<VC

*AR = Abnormal Return; **CAR = Cumulate Average Return.

Table 3. Event study result summary by geographic region.

Area	Samples	*AR* Average*	Number of Positive AR*	Number of Negative AR*	CAR** Average	t-test
Africa	02	-0.1578%	15	20	-5.5244%	< VC
North America	55	-0.0443%	17	18	-1.5494%	< VC
South America	07	0.0358%	17	18	1.2890%	< VC
Asia	10	-0.0137%	15	20	-0.4811%	< VC
Europe	45	0.0239%	21	14	0.8357%	< VC
Oceania	04	0.1960%	17	18	6.8593%	< VC

*AR = Abnormal Return; **CAR = Cumulate Average Return.

the same procedures of the previous analysis and we got no different results: on some of the years the positive results prevailed, while in others the negative ones did. In zero date (D0) we observed both positive and negative results and this demonstrated no correlation between participating in DJSI list and financial performance. The *t* test showed values lower than the 10% critical ones for the sample size, which confirms the null effect.

Average year CAR reinforces the results acquired by sector and by geographic area and indicates that there are other variables that affect the company results.

As in the stock prices analysis, we based the Student *t* test on the second hypothesis of this study: "The traded stock volume suffered significant

changes after disclosure of the DJSI list". The results indicate that there were no statistically significant changes in abnormal traded volume. Table 4 presents results concerning abnormal volume and abnormal accumulated volume.

The analysis of volume variable only reinforces the previous results to price variable. Although the observed average traded volumes showed positive results related to the expected ones on twenty-two of the thirty-five event window, reaching a positive accumulated volume of more than 2 million, the results have no statistically significance to prove changes in investor behavior arising from the disclosure of companies entering the DJSI list.

As in the studies carried out by Iwata & Okada (2011), Aragón-Correa & Rubio-López (2007), and Link & Naveh (2006), the analysis points a probable lack of correlation, or null correlation between participating in DJSI group of companies, regarded here as an indication of better environmental performance, and financial performance. An aspect to highlight is that this null correlation weakens the argument that a better social corporate performance would entail worse financial performance of stocks traded by them, given the excessive resource expenditure on activities unrelated to the business (Friedman, 1970; Frooman, 1997).

Table 4. Event study aggregated results by Abnormal Value.

Days	*AV* Average*	Standart Deviation *AV**	*t AV**	*CAV** Average*	*CAV** Deviation*	*t CAV***
-5	-165,648	1,928,502	-0.0859	-165,648	1,928,502	-0.0859
-4	77,476	1,363,369	0.0568	-88,172	3,291,871	-0.0268
-3	260,942	2,437,032	0.1071	172,771	5,728,903	0.0302
-2	381,231	2,707,164	0.1408	554,002	8,436,068	0.0657
-1	-687,014	4,360,417	-0.1576	-133,012	12,796,484	-0.0104
0	68,965	1,753,086	0.0393	-64,048	14,549,571	-0.0044
1	268,746	2,466,663	0.1090	204,699	17,016,233	0.0120
2	141,629	2,797,282	0.0506	346,327	19,813,516	0.0175
3	62,557	1,824,154	0.0343	408,884	21,637,670	0.0189
4	2,219	1,499,958	0.0015	411,103	23,137,628	0.0178
5	300,732	3,230,218	0.0931	711,835	26,367,847	0.0270
6	268,247	2,362,920	0.1135	980,082	28,730,766	0.0341
7	136,816	2,055,011	0.0666	1,116,899	30,785,777	0.0363
8	15,271	2,393,209	0.0064	1,132,169	33,178,986	0.0341
9	26,375	2,352,836	0.0112	1,158,544	35,531,823	0.0326
10	-892,411	8,832,700	-0.1010	266,134	44,364,523	0.0060
11	270,844	2,639,603	0.1026	536,977	47,004,126	0.0114
12	712,550	6,641,050	0.1073	1,249,527	53,645,176	0.0233
13	141,980	2,504,686	0.0567	1,391,506	56,149,862	0.0248
14	-246,594	1,622,681	-0.1520	1,144,912	57,772,543	0.0198
15	56,861	1,610,890	0.0353	1,201,773	59,383,433	0.0202
16	-53,890	2,974,318	-0.0181	1,147,883	62,357,750	0.0184
17	687,970	9,351,435	0.0736	1,835,853	71,709,185	0.0256
18	370,033	4,241,675	0.0872	2,205,885	75,950,860	0.0290
19	8,009	3,492,088	0.0023	2,213,894	79,442,948	0.0279
20	-130,763	2,532,842	-0.0516	2,083,132	81,975,790	0.0254
21	-114,677	1,876,530	-0.0611	1,968,455	83,852,320	0.0235
22	-109,681	2,250,724	-0.0487	1,858,773	86,103,044	0.0216
23	-21,134	2,512,536	-0.0084	1,837,640	88,615,580	0.0207
24	70,294	3,926,991	0.0179	1,907,933	92,542,570	0.0206
25	668,654	6,338,583	0.1055	2,576,587	98,881,154	0.0261
26	-112,747	1,096,331	-0.1028	2,463,840	99,977,485	0.0246
27	152,755	2,026,056	0.0754	2,616,595	102,003,541	0.0257
28	-89,029	1,171,375	-0.0760	2,527,566	103,174,916	0.0245
29	-12,279	2,700,730	-0.0045	2,515,287	105,875,646	0.0238

*AV = Abnormal Volume ou Volume Anormal; **CAV = Cumulate Average Volume.

6 Conclusion

This study aimed to verify whether the inclusion of a company in the DJSI restrict group, which presupposes high environmental performance, would generate positive financial incomes, in order to contribute to studies that relate environmental and financial performance.

We observed that abnormal average stock returns and traded volume did not show statistically significant changes that could confirm the study hypothesis. When considering activity sectors and geographic areas as well the years when the companies entered DJSI list, the results were not different from the general ones. That is, there was no statistic indication that the disclosure of taking part in the DJSI list influences positively or negatively average investor behavior concerning to their shares in the market.

So that, we can affirm that the social and environmental information was not considered as relevant in the market and there was no positive or negative valuation of companies deemed environmentally and socially correct.

As in the studies carried out by Aragón-Correa & Rubio-López (2007) and Link & Naveh (2006), the results point to null correlation between environmental and financial performance. They seem to corroborate the findings of Cormier et al. (1993, p. 136). Although considering that many investor have ethical concerns and this is confirmed by their interest on information of by their investment goals, these authors point that empiric studies stated that events based on social information affects weakly affect the short term performance in the company's market.

This correlation does not satisfy those who believe in the new sustainability concept, whereby it is possible to invest in environmental and economic questions and get bigger financial results. Nevertheless, it weakens the argument that better corporate social performance would result in worse financial performance due to resource expenditure in environmental activities. So that, as in the study carried out by Cohen et al. (1997), the main result of this search is to verify that after being included in DJSI list, the companies had no significant losses and no lower performance than the other ones, assuming that they had to invest heavily in social and environmental areas.

This search suggests that it is possible to get the same gains by acting with social responsibility and without compromising the environment. Moreover, the investments made nowadays in social and environmental areas can be a future competitive advantage for the companies, as proposed by Elkington (2001) and Porter & Linde (1995).

We thus observed that the DJSI organizers' expectations concerning to the evaluated variables in the selected period were not accomplished. This indicates that the investors need stronger indicatives on the importance of including a company in DJSI list. However, we cannot forget the search limitations including several factors that can affect the stock price and the period of analysis.

It is important to highlight that the correlation between environmental and financial performance is quite complex and this study, as many others, does not exhaust the subject. The results only reveal that the disclosure of a company participation in DJSI does not result in immediate positive reaction in the stock market. From these results we cannot affirm that investing in environmental development does not imply higher long-term financial returns to the company.

We conclude that social and environmental aspects are compatible to competitiveness and profitability. This makes possible, even if the long term, the scope of sustainable development that integrates and respects the needs and limits of human nature.

6.1 Research limitations

Reverse fluke is one of the problems found on studies that relate environmental and financial performance. While corporate financial performance may be consequence of environmental performance, the opposite might just as well occur. This limitation would entail confusion between cause and effect (Asti Vera, 1980, p. 141).

The hardness of elaborating a variable that represents corporate social performance and quantification of this variable are complications of this research genre as well, which harms the generalization of results that we sought to achieve. Other limitations include: the possibility of other events occurring in dates close to the disclosure of the DJSI list that might reinforce or mask the abnormal return and the existence of insiders who might tease significant changes on management and financial performance of companies beforehand.

Besides, the event study, methodology used in this research, does not allow analysis of effects caused the long-term participation of a company in the DJSI. On future studies, one might benefit from alternative methodologies that acknowledge such effects.

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