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Social Responsibility and Influences on Financial Returns: A Study on the Sustainability Performance Indicators

*Responsabilidade Social e Influências sobre Retornos de Cotações: Um Estudo
Acerca do Desempenho de Índices de Sustentabilidade*

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Abstract

This study presents an analysis of performance and randomness of the sustainability's series indexes concerning to prices of the major stock exchanges worldwide. The approach was performed by applying a variance ratio test in order to evaluate the autocorrelation of each series. Historical data of the ISE, DJSI, FTSE4Good and JSE SRI Indexes were used. Those indexes belong, respectively, to the stock exchanges of São Paulo, New York, London and Johannesburg. The information was collected in the Wall Street Journal database. The results indicated that there is no evidence of the indices' series randomness. Sustainability indexes have different variances when compared to the main indices, however, are lower only for ISE and FTSE4Good.

Keywords: Sustainability; Performance; Randomness.

Resumo

Este estudo apresenta uma análise do desempenho e da aleatoriedade de séries de cotações de índices de sustentabilidade das principais bolsas de valores mundiais. A abordagem foi realizada através da aplicação de teste de razão de variância no qual foram avaliadas a correlação serial das séries. Foram utilizadas séries históricas dos índices ISE, DJSI, FTSE4Good e JSE SRI, respectivamente, das bolsas de valores de São Paulo, Nova York, Londres e Johannesburg. As informações foram coletadas na base de dados do Wall Street Journal. Os resultados indicaram que não há evidências de que as séries dos índices sejam aleatórias. Os índices de sustentabilidade têm variâncias diferentes quando comparados aos índices principais, contudo, são menores somente para ISE e FTSE4Good.

Palavras-chave: Sustentabilidade; Desempenho; Aleatoriedade.

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Introduction

The discussions about sustainability and sustainable responsibility in organizations are a recurrent theme in the academic and institutional environments. The theoretical perspectives question on the insertion of this management characteristic as a strategic administrative aspect of the organizations, capable of influencing the agents' interest in the market for an asset or business. Other theoretical perspectives, however, defend that the concentration, for example, of investors occurs primarily with perspectives on returns, regardless of the management aspects involved.

The adoption of sustainability as a practice can exert influence on the choices of market agents and impact the cost of entrepreneurial capital. According to Silva and Quelhas (2006), the impact of sustainability on capital costs leads managers to continually re-evaluate projects in terms of economic growth, civil society, and the environment. Corporate adherence to sustainable ventures also influences their corporate risk, reducing the cost of capital and the economic value to organizations.

The performance of assets linked to sustainable enterprises is constantly contrasted with that of portfolios that are not linked to the type of responsibility. The research of Cavalcante, Bruni, and Costa (2009) addresses the lack of superior performance of the Corporate Sustainability Index (ISE) of BM & FBovespa after the indicator was created and over 345 trading sessions before and after this creation. No specific moments were identified with significant increases in quotations after the indicator was released, but there were moments of better performance before that date.

On the other hand, recently, in Brazil, an ecological incident occurred, the rupture of ore residue dams in the city of Mariana, causing serious impacts, such as expropriations in the district of Bento Rodrigues, with deaths and damages to the regional population, and several consequences such as water contamination. As a result, the incident was followed by declines in stock prices of its parent companies.

Facing questions as the lack of resources and possibilities of social responsibility's influences on quotations and returns of investment assets, the main objective of this article is to verify the randomness or non-randomness in the behavior of time series of sustainability indices of the stock exchanges in São Paulo, New York, London and Johannesburg, which developed the first sustainability indexes.

This study is structured in five sections, one introductory, the second with reference studies, the third with a description of the applied methods, the fourth with the presentation of the analysis of results and the fifth with the final considerations identified with the accomplishment of the study.

Efficient Markets Hypothesis and Sustainability Impacts on Investor Decision

The modern theory of finance brings within its scope the expression of market efficiency. A market is known as efficient when the prices of an asset completely reflect all the information about it, with no opportunities for superior or abnormal gains for investors (Fama, 1970, 1991).

According to Lim and Brooks (2011), efficiency addresses how information about a particular asset or company can impact prices, consists of observing the dynamics of the market over time and also suggests a hypothesis of adaptive markets. In the effective market, it is impossible to obtain abnormal gains practicing arbitrage, since all investors have all the news concerning all assets, which means an existence of informational symmetry (Camargos, & Barbosa, 2003).

However, the feasibility of this fully efficient market is questioned and, with the observation of the forms (which will be dealt with below), efficiency levels are also considered. Fama (1970, 1991) defines three forms of market efficiency: weak, semi-strong and strong. In weak form, asset prices contain only the information passed on them. In the semi-strong prices reflect both over data and current public data on assets and firms. At the strong level of efficiency, the quotes of financial assets consist of all existing information; that is, over and current, public and private.

The efficient form represents the strongest and, according to the author, also the rarest characteristic of being found in the markets. Minardi (2004) questions the existence of a highly efficient market. However, Fama (1991) argues that this level, despite its non-feasibility, plays a role in being efficient.

Through studies of market efficiency, the concept of randomness, which means that stock prices behave in a random way (Random Walk Hypothesis) stands out.

According to Camargos and Barbosa (2003), this hypothesis is based on the assumption that current prices are not influenced by past quotations.

The randomness of the financial assets returns is a type of finding of the weak form. Thus, it is impossible to identify patterns and predicts behaviors of market asset prices (Chang, Lima & Tabak, 2004).

According to Fama (1995), in a market whose prices are arbitrary, assets have an intrinsic value. That is, due to information diffusion, all investors are able to adequately price the shares. It is concluded that such a market is purely efficient since price changes are independent and there is no memory or correlation between such price changes, given their arbitrary behavior (Fama, 1995; Minardi, 2004).

However, Lo and MacKinlay (1988) rejected the hypothesis of market share randomness by testing the conduct of US stock indices on weekly watch windows. According to them, returns have a memory and can be predicted, but the results of the study did not imply market inefficiency.

The perception that the natural, social and financial resources are scarce led towards the development of acts concerning their unbalanced use, which led to the term sustainability (Diniz & Bermann, 2012). This term, according to the Brundtland Report (1987), is an attempt by society to guarantee development in the present without any possible harm to future generations. In this sense, Sustainability Entrepreneurship - SE is constituted by corporate action in defense of the environment and social welfare, without neglecting its economic interests (Milani Filho, 2008).

According to Rico (2010), the business sector has a great deal of responsibility for the preservation and balanced use of resources, as companies use them on a larger scale and frequency when compared to their use by individuals. An intervention of companies in sustainability issues can be defined as Corporate Social Responsibility - CSR or Corporate - CSR, which, according to the Ethos Institute (2015), addresses the concern on the part of organizations regarding issues related to degradation environmental, labor exploitation, political-economic arbitrariness, and unfair competition.

The importance of the participation of institutions in the conservation of the means of production that they employ in a given production process is well known. It

should be emphasized that the aspects and the factors of sustainable thematic are defined from the dimensions of the triple bottom line: environment, society, and economy.

Still, on CSR, Marrewijk (2003) separates it from the concept of SE, arguing that this is a major objective, a real commitment about the future, while the former has an intermediary character and concerns the triple bottom line practices adopted by companies. However, in this work, there is no effort in the semantic differentiation of the terms, opting for the general definition of the Ethos Institute, linked to the triple bottom line perspective.

The CSR practices adopted by companies in the capital markets are a target of financial interest, resulting in attempts to measure them through numerical indicators, making them more understandable and clear to investors' vision (Orsato, Garcia, Mendes-da- Silva, Simonetti & Monzoni, 2015). The sustainability indexes of several stock exchanges are a good example of this since they allow agents to visualize the performance of a theoretical portfolio composed of assets of socially responsible companies, such as the Brazilian stock exchange and the Corporate Sustainability Index of BM & FBOVESPA (2015).

It is believed that the adoption of sustainability practices give companies a certain visibility in terms of accounting and financial transparency, which reflects in investors' perceptions, as investors can classify them as less risky and opt for their assets (Marcondis & Bacarji, 2010).

In addition, there are studies that show that the performance of sustainable companies in terms of risk may outperform others (Cheng, Ioannou & Serafeim, 2014). Environmental disclosure, the disclosure of resources allocated to sustainability-related projects, is seen as a strategic issue for socially responsible institutions, since among them, there is a concern about the conscious consumption of resources (Pletsch Brighnti & Silva, 2005), due to legal and economic pressures to maintain the sustainability seal.

However, companies that do not adopt sustainable practices are considered negligent (Rico, 2010). Much is being asked about the perception and demand of market agents for socially responsible investments. Murray, Sinclair, Power, and Gray

(2006) demonstrate the inexistence of a relationship between the disclosure of environmental expenses and the returns of US assets.

Guidry and Patten (2010) also point out the non-reaction of investors with the announcement of the adoption of sustainability practices by companies. In Brazil, social transparency, to a certain extent, occurs incompletely; the companies are limited to what is legally required in the income statements (Milani Filho, 2008, Murcia, Rover, Lima, Fávero & Lima, 2008, Vellani, 2009).

The construction of social indices by the stock exchanges is related to the effort to allow investors to have access to more transparent companies with a differentiated profile with respect to CSR (Orsato et al., 2015). The assumption is that sustainability indexes serve as a benchmark, that is, a reference for companies that wish to adopt such practices (Marcondis & Bacarji, 2010).

The New York Stock Exchange - NYSE pioneered the sustainability benchmark by developing the Dow Jones Sustainability Index - DJSI indexes in 1999. In 2001, the London Stock Exchange created the FTSE4Good. Johannesburg Stock Exchange, with the JSE SRI Index in 2004.

Then, it was Brazil's turn to publish the Corporate Sustainability Index (ISE) in 2005 by BM & FBOVESPA. Under the assumption that business sustainability can confer a competitive advantage, López, Garcia & Rodriguez (2007) analyze the existence of possible differences in the performance of sustainable companies listed in the DJSI, compared to those that are not. The authors point out that there are no positive changes in the stock performance of companies participating in the DJSI in relation to the others. However, Lo and Sheu (2007) show that the fact that a company is considered socially responsible gives the company greater value to investors.

Cheng et al. (2014) conclude, in a way similar to Lo and Sheu, and that, when acting with social responsibility, actions directed at stakeholders with social and environmental transparency, companies incur fewer restrictions on access to capital sources.

It turns out that the results of research on sustainability, and social responsibility is divergent. Artiach, Lee, Nelson & Walker (2010) concluded that the difference between firms depends on the variable used. The authors show that, in

general, firms that practice CSR are larger, have higher rates of growth and return on investment than non-practitioners. In contrast, these socially sustainable and responsible companies do not have a higher free cash flow nor even lower levels of indebtedness.

Orsato et al. (2015) conclude that there are non-financial reasons, such as competitive advantage, isomorphism, and visibility, that motivate companies to be part of sustainability index portfolios.

Methodological Procedures

The present study has the objective of ascertaining the behavior of some sustainability stock exchange market index series of returns comparing it to indices that do not value sustainability. For that, the Variance Ratio (VR) tests were used to verify the hypothesis of randomness. BM & FBOVESPA's Corporate Sustainability Index (ISE), the NYSE's Dow Jones Sustainability Index (DJSI), the LSE Financial Times Securities Exchange For Good (FTSE4Good) and the JSE SRI Index Socially Responsible Index of Johannesburg Stock Exchange. These indices were compared respectively to the benchmarks of each market: Ibovespa, DJIA, FTSE100 and JSE Composite. The data are from the daily closures that were collected from the Wall Street Journal databases, and the returns were calculated by the logarithm of prices according to equation (1).

$$R_t = \ln \left(\frac{P_t}{P_{t-1}} \right) \quad (1)$$

Whereupon:

R_t : return on assets in the period t ;

P_t : price of the asset in t ;

P_{t-1} : price in the period $t-1$ and immediately prior.

The volatilities of the sustainability index returns were compared to the volatilities of the respective global indices by a variance ratio test. This procedure has the purpose to observe the dependence level between the dispersions of the series: if the ratio is equal to the unit, the series has the same variance; if it is lower (higher) to the unit, the sustainability index is more (less) volatile than the overall index.

According to Charles and Darné (2009), the idea behind the Variance Ratio (VR) test is based on the correlation check between returns over time. Thus, VR can be classified as a means of verifying the null hypothesis $H_0: \rho_k = 0$ ($k = 1, \dots, n$), that is, no correlation in the series in question, where ρ represents the coefficient of autocorrelation.

Therefore, the non-rejection of such a hypothesis would imply the conclusion that the returns tested for the series discussed have no memory and are thus random. The variance ratio was constructed according to equations (2) (3) and (4).

$$VR(k) = \frac{\hat{\sigma}^2(k)}{\hat{\sigma}^2(1)} \quad (2)$$

$$\hat{\sigma}^2(k) = \frac{1}{k(T-k+1)(1-kT^{-1})} \sum_{t=k}^T (x_t + x_{t-1} + \dots x_{t-k+1} - k\hat{\mu})^2 \quad (3)$$

$$\hat{\sigma}^2(1) = \frac{1}{T-1} \sum_{t=1}^T (x_t - \hat{\mu})^2 \quad (4)$$

Whereupon:

$\hat{\sigma}^2(k)$: estimator of the variance of the series of returns over the lag period k ;

$\hat{\sigma}^2(1)$: estimator without the bias of the variance of the series of returns x_t in the total sample period T ; $\hat{\mu}$: in the total sample period.

According to Lo and MacKinlay (1988) and Charles and Darné (2009), if the series of returns x_t is identically and independently distributed (i.i.d.) under hypothesis of homoscedasticity of the series, the statistical test for the verification of the variance ratio is given by means of the M_1 statistic, which has asymptotic standard normal distribution, whose mean approaches the normal distribution in (5).

$$M_1(k) = \frac{VR(k) - 1}{\varphi(k)^{1/2}} \sim N(0,1) \quad (5)$$

Whereupon:

$\varphi(k)$: the asymptotic variance given by the following equation (6).

$$\varphi(k) = \frac{2(2k-1)(k-1)}{3kT} \quad (6)$$

Lo and Mackinlay (1988), however, also developed a model that assumes the existence of heteroscedasticity in the series, in the form of the M_2 statistic, which also presents asymptotic standard normal distribution, represented in (7).

$$M_2(k) = \frac{VR(k) - 1}{\varphi^*(k)^{1/2}} \sim N(0,1) \quad (7)$$

Whereupon:

$$\varphi^*(k) = \sum_{j=1}^{k-1} \left[\frac{2(k-j)}{k} \right]^2 \delta(j)$$

$$\delta(j) = \left\{ \sum_{t=j+1}^T (x_t - \hat{\mu})^2 (x_{t-j} - \hat{\mu})^2 \right\} \div \left\{ \left[\sum_{t=1}^T (x_t - \hat{\mu})^2 \right]^2 \right\}$$

The variance ratio test described defines that there is no rejection of the non-autocorrelation hypothesis in the returns, considering a significance level of 5%, if the values of $M_1(k)$ and $M_2(k)$ are less than or equal to the critical value of 1.96, implying that VR is not different from unity. In this case, we conclude that the series are random. Otherwise ($VR \neq 1$), it is assumed that memory exists, that is, positive autocorrelation ($VR > 1$) or negative ($VR < 1$) (Charles & Darné, 2009).

Results Analysis

Sustainability entrepreneurship presupposes a greater degree of transparency and; consequently, a lower level of risk for companies that use social responsibility practices. Because of this, it is important to compare the volatilities of sustainability indices with those of the main indicators. Table 1 presents the results of the F-test of the variance's ratio returns.

Table 1 - Comparison of Variances Test.

	Variance Ratio	P-value
ISE and Ibovespa	0,8378	0,0000
DJSI and DJGI	1,8090	0,0000
FTSE4Good and FTSE100	0,8604	0,0001
JSESRI and JSEA	1,1015	0,0548

Source: Elaborated by the authors.

The results show that ISE and FTSE4Good have lower volatilities than the Ibovespa and FTSE100, respectively since they present a ratio of variance lower than unity. In addition, DJSI has 80% higher dispersion than DJGI, while JSESRI is 10% higher than JSEA.

The p-values reported in the Table indicate that the variances are different at a significance level of 1% for the São Paulo, New York and London stock market indicators. However, it can be verified that the null hypothesis that the JSESRI and JSEA variances are equal can only be rejected at a level of 10% of significance. That is, there is less statistical slack to show differences between the dispersions of these indices.

After the comparison between the variances of the sustainable series and the global series, their randomness must be analyzed by the variance ratio test of Lo and MacKinlay (1988), described in section 3. The memory of the series of returns is verified from their lags of orders of two, five, ten, fifteen and twenty-one days. The results of this test are shown in Table 2.

For the ISE, there is a change in the self-dependence of its returns, as the ratio decreases as the lag increases, indicating that past index valuation data cause a trend reversal for periods longer than five days. Note that the index does not have a short-term memory, since there is no rejection of the hypothesis of absence of serial correlation for the lags of two and five days to 5%, as demonstrated by the M_1 statistic.

However, it can be argued that the existence of long-term dependence can be caused by the heteroskedasticity of the series, since all values of M_2 are lower than the critical value of .96, evidencing the absence of memory in ISE returns. The Ibovespa returns show statistically significant dependence for longer maturities, as it is

presented by the results of M_1 . However, when the data are adjusted for heteroskedasticity, there is no rejection of randomness.

Table 2 - Variance Ratio Test.

Index / Gaps	2	5	10	15	21
ISE	1,0143	0,9202	0,7868	0,7496	0,7408
M_1	0,6988	-1,7813	-3,0883	-2,8819	-2,4842
M_2	0,3842	-0,8997	-1,5555	-1,4497	-1,2547
Ibovespa	0,9842	0,8884	0,7934	0,7678	0,7793
M_1	-0,8060	-2,6053	-3,1306	-2,7967	-2,2136
M_2	-0,5269	-1,5282	-1,8040	-1,6001	-1,2688
DJSI	1,0852	1,0510	1,0001	0,9671	0,9627
M_1	3,5854	0,9802	0,0018	-0,3260	-0,3078
M_2	2,1880	0,5483	0,0010	-0,1760	-0,1669
DJGI	1,1028	1,1373	1,0973	1,0920	1,1079
M_1	5,6085	3,4191	1,5731	1,1821	1,1541
M_2	2,8991	1,6408	0,7374	0,5494	0,5371
FTSE4Good	1,1117	1,1005	1,0399	1,0240	1,0371
M_1	5,8592	2,4063	0,6195	0,2961	0,3819
M_2	3,1787	1,2216	0,3090	0,1470	0,1901
FTSE	0,9585	0,8587	0,7833	0,7551	0,7183
M_1	-2,1475	-3,3353	-3,3193	-2,9821	-2,8555
M_2	-1,1429	-1,7053	-1,6658	-1,5096	-1,4622
JSRI	0,9622	0,8767	0,7748	0,7340	0,6711
M_1	-1,4541	-2,1669	-2,5676	-2,4109	-2,4816
M_2	-1,2487	-1,8337	-2,1680	-2,0360	-2,1018
JSEA	0,9899	0,8891	0,8022	0,7712	0,7147
M_1	-0,4144	-2,0744	-2,4010	-2,2076	-2,2920
M_2	-0,3528	-1,7023	-1,9735	-1,8129	-1,8858

Source: Elaborated by the authors.

The variance ratio values of the New York Stock Exchange's sustainability index, in turn, also decrease with the lag, however, it is evident that such a series loses memory over time. In this case, there are no differences between the results of the M_1 and M_2 statistics. The Dow Jones Global Index is influenced by its heteroskedastic characteristic, and it is possible to measure the absence of memory.

The results of FTSE4Good are similar to those of DJSI; however, there is a complete rejection of the hypothesis of randomness for the FTSE100, an index that has RV values lower than unity; that is, their prices tend to move in a way that is contrary to

the trend. However, the same caveat is that the results are different when adjusted for heteroskedasticity. The JSESRI series can be considered as independent in short periods of time from the M2 statistic. For the JSE, the series is not random for the ten-day lag (M2).

Final Considerations

CSR links corporate activity to environmental preservation and balanced use of resources from the triple bottom line perspective. The central idea is to guarantee the present development without harming the existence of future generations. In this context, organizations began to suffer greater demands for social responsibility practices; a path took also by stock exchanges that developed indexes of shares of sustainable companies. The first was the Dow Jones Sustainability Index, the FTSE4Good, the JSESRI and the ISE of the New York, London, Johannesburg and São Paulo stock exchanges, respectively. This work used daily returns of these indicators to evaluate the existence of memory in the series.

It is assumed that companies adopting sustainability practices have a higher level of transparency and, thus are less risky. Thereby, it is necessary to verify its randomness, comparing it to the main indices of those exchanges. The test of the variance of Lo and MacKinley (1988) was used that makes adjustments for heteroscedasticity of the series.

The results indicate that all indices have memory, that is, there is no evidence that the data is random. However, this finding changes when the adjusted values for heteroskedasticity are observed, indicating that the instability of the variance of the index returns is responsible for its interdependence. Therefore, there are no differences between the sustainability indices and the global indices with regard to randomness, since both these and related ones present similar results, except for the London stock market indicators, where FTSE4Good showed no dependence in its lags, something not verified in the FTSE100.

This study is limited by the non-use of other types of tests for the verification of randomness and of statistical procedures that make up the lags necessary for the calculation of the ratios of variance. Thus, as a suggestion for future work, the

comparison of randomness tests, as well as the investigation of serial dependence through regression models, is done.

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