FINANZAS

Corporate sustainability and shareholder return: A comparative study on the return of the shares that make up the B3 corporate sustainability index

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This article aims to answer the following question: Do companies with sustainable initiatives bring a greater return to shareholders? The authors have built a hypothetical portfolio based on the B3 Corporate Sustainability Index (ISE) methodology through an ex-post facto descriptive research. The authors have also calculated the beta and weighted returns considering each share weight and the proportional impact on the portfolio. The alpha calculation and the association with the *Student* 's t-test allowed investigation on the possibility of an incremental return concerning the adopted reference. We have concluded that the responsible investment strategy in companies considered sustainable, through the hypothetical portfolio, does not bring the possibility of an incremental return to the shareholder when compared to the market portfolio. On the other hand, the hypothetical portfolio does not bring a return lower than the market portfolio. That is, its performance does not fall short.

Keywords: sustainability, corporate social responsibility, financial return, corporate sustainability index

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https://doi.org/10.18800/contabilidad.202301.004
Contabilidad y Negocios (18) 35, 2023, pp. 96-116 / e-ISSN 2221-724X

Sostenibilidad corporativa y rendimiento para los accionistas: un estudio comparativo sobre el rendimiento de las acciones que componen el índice B3 de sostenibilidad corporativa

Este artículo tiene como objetivo dar respuesta a la siguiente pregunta: ¿Aportan las empresas con iniciativas sostenibles una mayor rentabilidad a los accionistas? Los autores han construido un portafolio hipotético basado en la metodología B3 Índice de Sostenibilidad Corporativa (ISE) a través de una investigación descriptiva *ex post facto*. Los autores también han calculado la beta y la rentabilidad ponderada teniendo en cuenta la ponderación de cada acción y el impacto proporcional en la cartera. El cálculo alfa y la asociación con la prueba *t* de *Student* permitieron investigar la posibilidad de un retorno incremental de la referencia adoptada. Hemos concluido que la estrategia de inversión responsable en empresas consideradas sostenibles, a través del portafolio hipotético, no brinda la posibilidad de un retorno incremental al accionista en comparación con el portafolio de mercado. Por otro lado, la cartera hipotética no aporta una rentabilidad inferior a la cartera de mercado. Es decir, su rendimiento no se queda corto.

Palabras clave: sostenibilidad, responsabilidad social empresarial, retorno financiero, índice de sostenibilidad corporativa

Empresas sustentáveis e o retorno ao acionista: Um estudo comparativo do retorno das ações que compõem o índice de sustentabilidade empresarial da B3

Este artigo tem como objetivo responder à seguinte questão: empresas com iniciativas sustentáveis trazem maior retorno aos acionistas? Os autores construíram um portfólio hipotético com base na metodologia do Índice de Sustentabilidade Empresarial B3 (ISE) por meio de pesquisa descritiva *ex post-facto*. Os autores também calcularam o beta e os retornos ponderados considerando o peso de cada ação e o impacto proporcional na carteira. O cálculo do alfa e a associação com o teste *t-Student* permitiram investigar a possibilidade de um retorno incremental em relação à referência adotada. Concluímos que a estratégia de investimento responsável em empresas consideradas sustentáveis, por meio da carteira hipotética, não traz a possibilidade de retorno incremental ao acionista quando comparada à carteira de mercado. Por outro lado, a carteira hipotética não traz retorno inferior à carteira de mercado. Ou seja, seu desempenho não fica aquém.

Palavras-chave: sustentabilidade, responsabilidade social corporativa, retorno financeiro, índice de sustentabilidade empresarial

1. Introduction

Through the Environmental, Social, and Governance (ESG) agenda, the theme of sustainability is increasingly present in the financial market. Scholars and experts have discussed the impacts of climate change, natural disasters, and the reduction of biodiversity caused by human actions, either as individuals or through corporations. This perspective leads to a great debate on the companies' financing and investment, how to interconnect the return objectives with a new concern, namely, the sustainability of the practices.

Many studies seek to understand how these two factors move: implementing greater sustainability to companies' activities and financial return. For Roman et al. (1999) indicate that in 63,5% of the surveys conducted, the relationship between social and environmental performance and financial performance was positive. Only 9,5% of the surveys indicated a negative relationship, that is, in which social and environmental performance were not in correlation with financial performance. The cases of neutrality, in which the authors could not understand the relationship between the two, accounted for 27% of the total (Ortas & Moneva, 2011).

Some authors claim that no matter how much the relationship between financial performance and sound environmental practices is not causal and positive when observing the past and the present, such a relationship is highly likely to become causal and positive in the future. It is so because sustainable practices can impact risk management, brand reputation, business continuity, which would result in positive impacts related to financial performance.

The theme's importance lies in need to transition from an economic model based on extractivism and the search for greater productivity and profit to a model that can reconcile reliable performance with forms of production and operation that are harmonious with society and the environment. Thus, the perspective addressed in the study is of investment in companies and the possibility of coexistence between economic and sustainability interests.

The article aims to provide an analysis of the relationship between financial performance and socio-environmental performance. The central question is: Do companies with sustainable initiatives bring a greater return to shareholders? The authors expect to continue the studies developed in the field and add a new result to the current universe.

Specifically, the survey aims to analyze the Corporate Sustainability Index (ISE) composition of the Brazilian stock exchange (Brazil, Bolsa, Balcão [B3]) by selecting

companies presenting uninterrupted permanence in its composition. The authors have created a hypothetical portfolio from this selection and compared its indicators to the market portfolio, defined as the Bovespa Index. Finally, the authors have investigated whether the hypothetical portfolio, with investment strategy in sustainable companies, brings incremental return compared to the market.

2. Theoretical foundation

This section presents the main concepts needed to fulfill the objective of the work, highlighting the concepts related to responsible business practices and the return generated by the companies.

2.1. Responsible investment

The Principles for Responsible Investment (PRI), a project supported by the United Nations (UN), defines responsible investment as "a strategy and practice which incorporates ESG in investment and property decisions" (United Nations Principles for Responsible Investment [UNPRI], 2021a, p. 1). Experts who support the responsible investment modality defend it as part of the institutional investors' fiduciary duty. They impose the fiduciary duty on the party which has discretionary power over the interests of others, and has particular importance in asymmetric relationships: where there are imbalances in *expertise* and where the beneficiary has limited capacity to monitor or supervise the actions of the entity acting in its interests (Sullivan et al., 2015).

In other words, the duty of trust ensures that the party responsible for managing securities acts correctly in the interests of the beneficiaries and not in their interest. The authors support that the beneficiaries' interests permeate the ESG factors, as these "may affect the performance of investment portfolios (UNPRI, 2021a).

Bollen (2007) adds that investors do not base their decisions only on the classic risk-return relationship. They also incorporate their personal and social values. Thus, they expand the traditional economic-financial analysis and adjust it to include ESG factors in the investment decision. There are three main ways to incorporate such factors: integration, positive or negative screening, and thematic.

The integration method includes the ESG factors at the economic-financial analysis to the commonly observed risk-return dilemma. Such an integration method applies a filter that selects, or vetoes investment possibilities based on the values and practices defended by investors. Screening concerns the selection of companies or assets, in

case of positive screening, or the exclusion of companies or assets in case of negative screening. Finally, the authors base the thematic method on developing an attractive portfolio concerning the risk and return levels. In addition, the thematic method aims to invest in and support a specific social or environmental theme that focuses both on the result generated for the investor and on the impact generated on the selected problem (UNPRI, 2021b).

Finally, it is noteworthy that not only are there mechanisms to include ESG factors in investment decisions and, consequently, access the responsible investment modality, but there is also demand from investors. The study by Marc J. Epstein entitled "What Shareholders Really Want" (1991) reveals that shareholders have shown a preference for cleaning production plants and reducing pollution, as well as investing in safer products rather than higher dividends, which occupied third place on the list. This empirical observation corresponds to the theories of economist Milton Friedman. He defended corporate social responsibility (CSR) exclusively as the generation of profit and the possible penalty for corporations that deviate from this objective at the expense of customers and shareholders (Friedman, 1970).

Thus, even though investors' interests still permeate the value and return generation, there seems to be a more significant concern regarding the means of obtaining them. In addition, a greater expectation for solutions that enable a solution where everyone benefits - a win-win situation, in which return, and sustainability objectives are achieved simultaneously.

2.2. Corporate social responsibility

Whenever we consider the scope of responsible investment and focus on investing in companies with sustainable initiatives, there is a need to explore the concept of Corporate Social Responsibility (CSR). The CSR concept consolidates when one observes the historical moments of capitalism, given the awareness of the industry as a cause of the depreciation of the quality of life, through the emergence of environmental problems and the precariousness of labor relations (Nascimento et al., 2004). Thus, it happens and intensifies the pressure for changes in the mode of production and in the industry conducting, being government and corporations responsible for solving these issues and restoring the previous dynamics. However, society is responsible for exercising control over private activities.

State that the concept of social responsibility is based on values acquired in post-industrial society. In this context, it is understood that companies are placed "in a complex environment, where their activities influence or have an impact on various

social agents, community and society" (Nascimento et al., 2004, p. 16). Thus, for the company to integrate itself into the environment in which it operates, considering the forces that affect its activities, it is necessary to observe and meet the interests of groups that are fundamental for its development.

The current dynamic in which ownership becomes diluted among hundreds, thousands, or millions of shareholders validates this view, reducing the latter's power and control. Thus, the administration exercises power and control. From this point of view, the company's continuity also depends on the satisfaction of other agents (Nascimento et al., 2004). Freeman, in 1984, developed the stakeholder theory in line with this dynamic and based his theory on the idea of incorporating the "demands of agents, hitherto ignored, into the heart of corporate strategic management" (Ortas & Moneva, 2011, p. 397).

Borger (2001) adds a relevant dimension when he argues that companies must respond to social demands to survive, adapting corporate behavior to social needs. The concern for survival brings out the element of time and future generations. The author Van den Bergh (2010) defines unsustainability as the impact of current decisions in the future, with an inevitable dynamic or intertemporal externality.

The concept that permeates this current of thought is inter-generational equity, which Weiss (1992) defines as the maintenance of our planet's natural environment in common with other species, other people and with past, present and future generations. Thus, he puts the need for sustainability to be pursued within the current generation's time and also from a perspective that considers future generations. Furthermore, the most widely used definition of sustainable development is that which the Brundtland Commission has drawn up, a commission established by the UN, which places sustainable development as the human capacity to satisfy its present needs without compromising the ability of future generations to satisfy theirs (Brundtland, 1987).

When we think about the activity of current corporations that adopt sustainable practices in a broad and transformative way in their production processes and operations, we recognize that such corporations have in mind the continuity of their business over a more extended period than the current generation. Beyond what one can see today, it is this projection of the future that various currents of CSR defend. That acts as a strong incentive for rethinking practices and placing the survival of companies at the center of debates.

2.3. Corporate social performance

In addition to understanding how a company can become more sustainable and responsible concerning its actions, it is necessary to develop and apply mechanisms to measure its performance in the social and environmental spheres. Furthermore, in addition to being essential to understand the results of companies' efforts, it is crucial to avoid recognizing those who practice green washing, "the practice of making unjustified or exaggerated claims about sustainability or respect for the environment, in an attempt to obtain greater market share" (Dahl, 2010, p. 247).

The concept of stakeholder used here is quite broad and concerns any group or individual that can affect or is affected by the achievement of an organization's purpose (Freeman & McVea, 2005). Therefore, a system for monitoring and analyzing the initiatives considered sustainable by the companies becomes relevant. Such monitoring and analysis enable companies to implement strategies and measure results and costs (Jasch, 2000) and for stakeholders to assess those companies with similar concerns to theirs (Carroll, 1979; Wood, 1991).

As much as this article encompasses theories that defend the company's concern with various stakeholders, we have chosen the shareholder perspective to understand the company's financial performance: how the financial return for the shareholder behaves. Thus, the authors have used the ISE as a thermometer to measure publicly-traded Brazilian companies' social and environmental performance, the object of the research.

Created in 2005, the ISE seeks to create an investment environment compatible with the demands for sustainable development of contemporary society and encourage ethical responsibility in corporations (B3, 2021). The ISE brings the weighted return of shares listed on B3, a Brazilian stock exchange headquartered in São Paulo. However, what makes it different from other indexes is the perspective used to compare companies based on economic efficiency, environmental responsibility, social justice, and corporate governance (B3, 2021).

The B3 and the Fundação Getúlio Vargas Sustainability Studies Center (GVCes) have developed a methodology that uses a qualitative approach to classify companies. This methodology analyzes companies concerning the level of commitment to sustainable development, equity, transparency, accountability, nature of the product, and business performance in the economic-financial, social, environmental and climate change dimensions (B3, 2021).

The ISE is a total return index. It combines the variation price of shares that makes up the hypothetical portfolio with the impact of the distribution of earnings by the companies issuing these assets (BM&FBovespa, 2014). An asset can only make up the portfolio if it meets the following specific eliminatory criteria: (1) in a period of validity of three previous portfolios, it must be among the 200 most traded; (2) it must be traded on at least 50% of the trading sessions during the effective period of three previous portfolios; (3) it must not be classified as Penny Stock, that is, an asset whose price is lower than R$1.00; (4) it must meet the selection criteria of the ISE Board of Directors; (5) all asset types represent 99% of the indicator's sum (BM&FBovespa, 2014).

The authors have based the present work on the historical portfolios of the ISE, comprising the index selection criteria as qualitative indicators of Brazilian publicly traded companies with sustainable concerns.

2.4. Pricing formation and abnormal return

The research focus of this work is the return for the shareholder who invests in companies that present sustainable initiatives. The return is the price variation of the asset in focus, the gain/loss that the shareholder can have when buying a share for a lower/higher price and selling for a higher/lower price.

According to Damodaran (2012), the leading pricing model for financial assets, the Capital Asset Pricing Model (CAPM), assumes no transaction costs for investors and that everyone shares the same available information. Thus, there are also no diversification costs. Therefore, the least costly option for the investor would be to maintain a portfolio containing all the available assets in the market, as diversified as possible. This portfolio is the market portfolio. Investors must then calculate the risk of any other portfolio from the incremental risk concerning the market portfolio. This cumulative risk, in turn, must be defined by the cost to the investor (Damodaran, 2012).

Equation 1 shows the cost to the investor (Ke, Cost of Equity), where Rf is the risk-free rate and Rm is the return of the market portfolio, where $(Rm - Rf)$ is the stock market risk premium. Equation 2 demonstrates the calculation of beta (β). The beta is the relative measure of risk, equal to 1 when it comes to the market portfolio. Stocks with a beta higher than 1 are at comparatively higher risk. Stocks with a beta smaller than 1 are less risky than the market portfolio. In this case, investors calculate the beta of a given asset (βi) as from the covariance between its return and the market return (Ri, Rm, respectively) by the variance of the market return (Rm).

Equation 1 - Cost of equity (Ke)

$$Ke = Rf + \beta i\ (Rm - Rf)$$

Equation 2 - Calculation of the beta (β)

$$\beta i = \frac{Cov(Ri, Rm)}{\sigma_{(Rm)}^{2}}$$

From an economic point of view, the cost of invested financial capital represents an opportunity cost, as the amount applied could be used in another investment, with less risk, or used for other purposes. The cost of capital is the minimum amount that the investor must receive for the investment to be justified. Thus, the cost of capital is equal to the expected return by the investor considering the risk of the chosen investment (Mankiw, 2014).

The authors have defined abnormal return as the difference between an asset's actual and expected return (Brown & Warner, 1985). Furthermore, according to Berk and DeMarzo (2013), a cumulative abnormal return can be characterized as the return relative to what was predicted based on the beta. Scholars often use this approach for event studies. For this work, we have used indicators that analyze the return of a hypothetical portfolio concerning the market portfolio's return over time - and not from a given event.

3. Research method

Returning, the objective of this paper is to conduct a comparative analysis between the return to shareholders promoted by companies that have sustainable and responsible practices and the return earned by the market portfolio, in this case, by the Bovespa Index. To this end, we have created a hypothetical portfolio weighted with shares that make up the B3 ISE.

The survey aims to understand the impact of sustainable initiatives on shareholder returns compared to the market average. Instead of analyzing the individual return of each share, we have chosen to build a portfolio to include the diversification of investments in the analysis, making the observed situation credible and consistent with the reality of individual and professional investors.

For the selection of companies whose shares make up the hypothetical portfolio, the authors analyzed the historical portfolios of the ISE since 2010. Thus, the scope of

the research is that of the Brazilian Stock Exchange and the shares listed in it. We have weighted the selected assets by the volume traded during the entire year of 2019.

However, for the return analysis, we used the time horizon of 10 full years - that is, from 2010 to 2019. The calculated return itself was made year by year weekly from the simple return equation (equation 3).

Equation 3 – Simple return in the period t

$$ri = \frac{P_t}{P_{t-1}} - 1$$

i: company

P_t: share price at the moment t

P_{t-1}: share price at the moment t-1

In addition to the return, we have calculated the portfolio's beta (equation 2) at each evolution over time to understand its systematic risk compared to the market portfolio. Furthermore, we have calculated Jensen's alpha to enable the qualification of the observed return concerning the portfolio's expected return based on its risk level (Nossa et al., 2009).

The Jensen Index, better known as Jensen's alpha, is used to measure abnormal returns in the stock market. This index measures how far above or below a particular stock's market curve is (Berk & DeMarzo, 2013). For the alpha calculation, we have considered the asset's beta. The Jensen index equation, or alpha (αp), can be described by rquation 4. Rp is the average return on the portfolio in the period, Rf is the risk-free rate, Rm is the return on the market portfolio, being ($Rm - Rf$) the stock market risk premium, and β is the portfolio beta.

Equation 4 - Jensen's alpha index

$$\alpha p = Rp - [Rf + \beta (Rm - Rf)]$$

A positive alpha informs that that stock is above the market line and that there is a possibility of incremental return compared to the market portfolio. A negative alpha indicates poor asset performance, which presents a return below expectations according to beta (Berk & DeMarzo, 2013; Nossa et al., 2009). From the calculation, it was possible to understand if there is a difference in return for the shareholder when he chooses a responsible investment over an investment that does not meet this criterion.

Finally, we performed the Student's t-test to confirm the alpha values obtained and understand if there is a significant difference between the returns or if the market portfolio can obtain the same results at random. For this, the null hypothesis (h0) is that the average of the alphas found is equal to zero; that is, there is no significant difference between the returns obtained by the hypothetical portfolio and the market portfolio. The alternative hypothesis (h1) is that the average of the alphas found is different from zero; that is, there is a significant difference between the returns obtained by the hypothetical portfolio and the market portfolio. For this purpose, we adopted a significance level of 5% (Alves, 2017; Basílio et al., 2000).

Regarding the construction of the hypothetical portfolio, the criterion for selecting companies on the ISE was the uninterrupted permanence in the index, from 2010 to 2019, the same period used for measuring returns. We have considered this criterion to avoid inconsistent conclusions. The core hypothesis would be affected if we had chosen a company included in the index but subsequently removed from the index. We would not have information about the reasons that led that company to this movement. A company that has demonstrated sustainable initiatives in its past, but does not implement them today, could affect the core hypothesis. Likewise, a company that did not implement such initiatives, but started to do so recently, could change the return results - if the reason for higher or smaller returns was related to the presence or absence of responsible initiatives.

Thus, we have made up the hypothetical portfolio with the following companies: AES Tietê, Banco do Brasil, Bradesco, Braskem, CEMIG, COPEL, Duratex, EDP, Engie, Itaú Unibanco, Itaúsa, Light S/A, Natura, and Tim Participações S/A. Following the reasoning for selecting the companies, Enel should be part of the hypothetical portfolio, as it comprised the index from 2010 to 2019. However, the share trading was interrupted in November 2019, which could affect the return analysis in the year, so we have chosen not to include it. Finally, all shares considered in the work calculations were common shares.

The portfolio's return was weighted by the weight of each share and calculated based on the share trading in 2019 over the total trading of the shares that comprise it. To calculate the trading in reais (BRL), we have added the total volume traded each week in 2019 to the closing price in the same period. All prices used in this work were adjusted, for comparative bases, to the earnings of the period: dividends, bonuses, subscriptions. Table 1 shows the calculation results.

Table 1. *Composition of the hypothetical portfolio*

Company	Negotiation in 2019 (R$)	%	TICKER
AES Tietê	61.192.426	0,02%	TIET3
Banco do Brasil	131.503.257.378	50,80%	BBAS3
Bradesco	22.433.066.619	8,67%	BBDC3
Braskem	60.886.650	0,02%	BRKM3
CEMIG	6.233.355.722	2,41%	CMIG3
COPEL	1.983.813.073	0,77%	CPLE3
Duratex	5.756.756.705	2,22%	DTEX3
EDP	12.555.764.099	4,85%	ENBR3
Engie	14.351.144.454	5,54%	EGIE3
Itaú Unibanco	3.889.968.093	1,50%	ITUB3
Itaúsa	674.434.427	0,26%	ITSA3
Light S/A	10.363.096.275	4,00%	LIGT3
Natura	34.994.353.071	13,52%	NTCO3
Tim Participações S/A	13.993.316.150	5,41%	TIMS3

4. Research results and analysis of results

This section highlights the results obtained considering the methodology and equations we have previously exposed.

4.1. Beta calculation

To calculate the beta, using equation 2, we have calculated the covariance between variation in the price of the shares present in the hypothetical portfolio and the variation in the quotation of the leading Brazilian stock market index, the Bovespa Index, on the variance of the variation of the same index.

To calculate the stock price-variation, we have used the closing prices each week, obtained from the Economatica platform, from 2007 to 2019, and applied the weekly year-on-year variation equation $\left(\frac{Final\ value}{Initial\ value} - 1\right)$. Considering that not all stocks that make up the portfolio have the same weight and that movements in each stock can be more impactful than others, we have calculated the beta weighted by the market capitalization of each company.

Market capitalization results from the number of shares outstanding at the asset price in each period (Berk & DeMarzo, 2013). Market capitalization is also known as the company's market value since the market starts pricing the company at the share's trading value.

The authors have conducted the variation weighting based on the sum of each company's capitalization result by the variation of each asset weekly divided by the total capitalization of the companies in the period. Thus, a kind of index was created, resulting in the portfolio's weighted variation.

The Ibovespa quotation was also taken from the Economatica platform, from 2007 to 2019, weekly. To calculate the weekly beta, the authors used a sample of the last 104 weeks - two years - starting from the specific week of observation. It is a market practice to choose a sample showing weekly results from two to five years before. To calculate the annual beta, the authors have calculated the arithmetic mean of the results of the 52 weeks that make up each year. Table 2 shows the result after the series of calculations described.

Table 2. *Betas of the hypothetical portfolio*

	Beta
2010	0,81
2011	0,75
2012	0,79
2013	0,75
2014	0,52
2015	0,63
2016	1,22
2017	1,18
2018	1,18
2019	1,22

It is noticeable that the portfolio's beta decreased successively until 2015. That is, its systematic risk was lower than the systematic risk of the market portfolio. However, as of 2016, the beta surpassed the 1 mark, which places the portfolio in a higher systematic risk position than the market portfolio.

This movement was mainly due to higher betas of Banco do Brasil shares - to which the hypothetical portfolio is more concentrated - Bradesco, CEMIG, and Light S/A.

The shares of Braskem, EDP, and Engie played a more significant role in counterweighing the portfolio's beta. As of 2016, the values were above 1; however, still close to the systematic market risk. Table 3 highlights these observations.

Figure 1. *Individual betas of stocks from the hypothetical portfolio*

	TIET3	BBAS3	BBDC3	BRKM3	CMIG3	CPLE3	DTEX3	ENBR3	EGIE3	ITUB3	ITSA3	LIGT3	NTCO3	TIMS3
2010	0,57	1,39	0,78	1,23	0,37	0,87	3,57	0,49	0,30	0,78	0,53	0,16	0,38	0,28
2011	0,33	1,43	0,64	0,93	0,17	0,92	3,65	0,46	0,06	0,73	0,43	-0,02	0,57	0,01
2012	-0,04	1,18	0,80	1,41	-0,18	0,90	3,15	0,53	0,32	0,90	0,37	-0,46	1,90	-0,39
2013	-0,04	0,73	0,88	0,45	1,13	0,44	2,34	0,23	0,64	0,80	0,28	-0,33	2,47	-0,64
2014	0,22	0,56	0,45	-0,62	1,57	0,82	0,74	0,57	0,41	0,54	0,28	0,94	1,76	-0,52
2015	0,01	1,22	0,45	-0,98	1,28	1,41	-0,58	0,44	-0,14	0,90	0,42	1,57	0,24	-0,03
2016	0,39	2,10	1,29	-0,85	2,43	1,22	0,69	-0,35	0,18	1,31	0,89	2,05	0,80	1,50
2017	0,36	2,18	1,17	0,63	2,03	1,04	0,89	-0,03	0,14	1,11	0,95	2,41	0,64	1,15
2018	0,82	2,33	1,30	0,40	2,04	1,24	0,70	0,34	0,21	1,06	0,82	2,53	0,23	0,77
2019	0,84	1,53	1,61	0,28	-0,44	1,50	1,07	0,38	0,15	1,14	1,02	1,08	1,21	1,48

4.2. Return of hypothetical portfolio

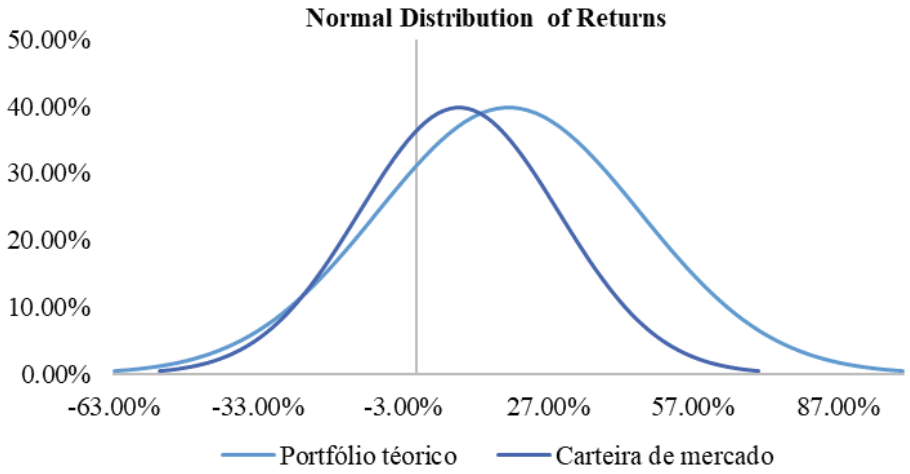
To calculate the theoretical portfolio return, we use the stock price variation equation $\left(\frac{Final\ value}{Initial\ value} - 1\right)$ year against year, weekly - being the weekly closing price taken from the Economatica platform. We then calculate the arithmetic mean of the weekly results, consolidating the average annual return of each share. Finally, we chose to weigh it by the share of the asset in the hypothetical portfolio - previously developed and presented in table 1. Table 3 shows the annual results of the weighted average return.

Table 3. *Weighted average return of the hypothetical portfolio*

Average return			
2010	45,16%	**2015**	-9,51%
2011	4,22%	**2016**	10,63%
2012	7,25%	**2017**	45,54%
2013	14,57%	**2018**	15,68%
2014	6,82%	**2019**	49,11%

Afterward, using the alpha, it was possible to achieve a qualitative analysis. The annual return individually does not say much about the portfolio's performance, as there is no comparative basis. However, it is possible to state that the return of the hypothetical portfolio had a higher average of results than the market portfolio when the normal distribution of these returns begins to be exposed. However, the hypothetical portfolio also presented more significant variability (standard deviation).

Figure 2. *Normal distribution of hypothetical portfolio and market portfolio returns*



4.3. Calculation of Jensen's Alpha

To calculate the alpha, resuming equation 4, we used the betas and annual returns, as well as the annual average risk-free rate (*Rf*) and the annual market portfolio return (*Rm*). We calculate the annual market portfolio return (*Rm*) by averaging the weekly year-on-year variation results, based on the weekly closing quotes of the Bovespa Index, taken from the Economatica platform. The risk-free rate (*Rf*) used was the annual average CDI - Interbank Deposit Certificate, based on daily quotations (business days) taken from the B3 website. Table 4 shows the Jensen alpha results.

Table 4. *Jensen's Alpha*

	Portfolio weighted return	Beta	Risk-free rate	Return of the market portfolio	Alfa
2010	45,16%	0,81	9,80%	31,47%	0,18
2011	4,22%	0,75	11,65%	-8,80%	0,08
2012	7,25%	0,79	8,44%	-1,90%	0,07
2013	14,57%	0,75	8,04%	-9,87%	0,20
2014	6,82%	0,52	10,77%	-0,96%	0,02
2015	-9,51%	0,63	13,36%	-5,07%	-0,11
2016	10,63%	1,22	14,06%	8,01%	0,04
2017	45,54%	1,18	10,07%	29,43%	0,13
2018	15,68%	1,18	6,47%	20,48%	-0,07
2019	49,11%	1,22	5,94%	23,67%	0,21

No matter how much the alphas' observations since 2010 have been positive, no matter how much there was the possibility of a positive incremental return on investment in the market portfolio, the annual indices are close to zero. Thus, initially, it is possible to see that the hypothetical portfolio could bring greater returns to the investor than the market portfolio. However, the slight difference between the alfas of the portfolio and the market portfolio (*of* $\alpha = 0$) raises questions:

(1) whether there was a statistically significant difference; and

(2) whether the result of primarily positive alphas is due to the responsible investment strategy or whether another strategy could have randomly obtained such a result.

To understand the result of this research is necessary to use a statistical test, in this case, the Student's t-test, which qualifies the differences between the calculated alpha and the alpha of the market portfolio.

4.4. Student t-test

To prepare the Student t-Test, we have resorted to the following hypotheses:

- Null hypothesis (h1): the average of the alphas found is equal to zero; there is no significant difference between the returns obtained by the hypothetical portfolio and the market portfolio.
- Alternative hypothesis (h1): the average of the alphas found is different from zero; there is a significant difference between the returns obtained by the hypothetical portfolio and the market portfolio.

For the analysis, we adopted a significance level of 5%. We calculated the t-test based on equation 5.

Equation 5 - t Statistics

$$t = \frac{(\underline{x} - \mu_0)}{\sigma / \sqrt{n}}$$

$\underline{x}$: sample mean

μ_0: null hypothesis value ($\alpha = 0$)

σ: standard-deviation of the sample

n: number of observations in the sample

Based on Table 5, one can conclude that it is impossible to reject h0. So, it is impossible to state that the hypothetical portfolio brings greater or lesser returns than the market portfolio. Thus, the observed differences are not significant. Therefore, there is the possibility that the hypothetical portfolio return observed annually was obtained at random by the market portfolio rather than attributed to the responsible investment strategy.

Table 5. *Variables and Student t-test result*

Variables	
$\underline{x}$	0,07
μ_0	0,00
σ	0,11
n	10,00
$t_{calculated}$	**2,13**
GL	9,00
tabulated	**2,26**
Does not reject h_0	

5. Final considerations

This article aimed to understand whether sustainable companies bring greater returns to shareholders compared to the market portfolio. After a theoretical review on the modality of responsible investment and the concept of sustainable companies - or companies that aim to include initiatives that make their practices increasingly sustainable -, we have sought to revisit the main concepts in finance. We have included the methodology of the stock market index used for the research and the main performance calculations for the hypothetical portfolio elaborated.

To investigate the core question of the work, we have built a hypothetical portfolio based on the B3 ISE methodology, weighted by the trading of each share in the year 2019. We have calculated the beta and weighted return, considering each stock's market weight and proportional impact on the portfolio. Regarding this issue, it is essential to highlight a limitation of the present study, since the portfolio concentrated in the banking sector, with 61.2% of predominance - 50.8% being attributed only to Banco do Brasil (BBAS3). Thus, one can understand a perspective and suggest a future study to understand the impact of this sectorial concentration on the results found.

We have calculated the portfolio's alpha and the association with Student t-test to confirm whether an incremental return is possible. However, we have concluded that the responsible investment strategy in companies considered sustainable through the hypothetical portfolio does not bring returns to the shareholder higher than the market portfolio. On the other hand, it is possible to affirm that the hypothetical portfolio does not return lower than the market portfolio. That is, its performance does not fall short. Thus, the result of this work falls within the scope of neutral results of studies that seek to understand the return of sustainable companies' actions to the detriment of other strategies.

Considering the limitations and simplifications of the research, we suggest future studies that deepen the analysis and calculations. The studies to explore the nuances of this type of investment, which has received increasing prominence in the stock market, should consider the following:

I. new methodologies for selecting companies,

II. different time horizons,

III. distinct types of shares - not only common shares.

In conclusion, the future of the companies we know today depends on how sustainable their practices will be in the long run. As resources become even more scarce, there is a change in values, which can affect all areas of decision-making, especially investments and financing for such activities. Thus, the analysis results, conducted with data on past facts, are far from definitive when we look at the range of possibilities for the future.

Contribución de autores:

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Declaración de conflicto de Intereses

El (los) autor(es) declara(n) que, durante el proceso de investigación, no ha existido ningún tipo de interés personal, profesional o económico que haya podido influenciar el juicio y/o accionar de los investigadores al momento de elaborar y publicar el presente artículo.

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Fecha de recepción: 15/2/2022
Fecha de aceptación: 23/10/2022
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