

EFFECTIVENESS OF INVESTMENT IN SUSTAINABILITY INDICES IN THE BOMBAY STOCK EXCHANGE

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Abstract

Social and environmentally responsible investing is a recent and growing trend in India, in which investors look for twin objectives, financial returns, and reduced socio-environmental impact. Yet, selecting an Indian stock having both these properties is not easy. To help investors track companies that follow energy-efficient and eco-friendly practices, the Bombay Stock Exchange (BSE) has developed indices with environmentally responsible stocks in collaboration with some other organizations. This study focuses on determining the effectiveness of investing in environmentally responsible stock by analysing the performance of three BSE indices; the S&P BSE Greenex, S&P BSE ESG-100, and S&P BSE Carbonex indices. The study intends to reduce apprehensions in the minds of investors who intend to invest in environmentally responsible stocks as the findings indicate that the companies listed in sustainable indices performed as well or better than the market performance.

Keywords: Bombay Stock Exchange, BSE Carbonex, BSE Greenex, Sustainability.

JEL Classification: M41

Introduction

In a growing economy like India, the balance between economic growth and environmental sustainability is fascinating. A country having severe pollution problems, with four of its cities being the world's most polluted among the top 20, and the country with second-most premature deaths due to air pollution, looking for eco-friendly options is the need of the hour in India (Oberoi, 2018). The concern for the environment has led to investors and businesses giving more priority to sustainable development than before. As a result, investors have started looking into eco-friendly stock choices from companies with a minimal ecological impact and robust returns. Social and environmentally responsible investing is a new and upcoming trend in India, in which investors look for twin objectives, financial returns, and positive socio-environmental impact (Shah, 2018). Yet, selecting an Indian stock having both these properties is not easy. To help investors track companies that follow energy-efficient and eco-friendly practices, the Bombay Stock Exchange (BSE) has developed indices with environmentally responsible stocks in collaboration with some other organizations.

The study's focus is to determine the effectiveness of investing in environmentally responsible stock by analyzing the performance of three BSE indices; the S&P BSE Greenex, S&P BSE ESG-100, and S&P BSE Carbonex indices. These three indices were studied upon since they list only those stocks that perform well in environmental and

energy efficiency have a comparatively low carbon footprint and have considerably better sustainability performance.

1. Objective of the study

The study's objective is to determine the effectiveness of investing in sustainable and environmentally responsible stock by analysing the performance of three sustainable indices of the BSE.

2. Significance of the Study

Climate change and pollution are the biggest detrimental outcomes arising out of the market-centric economic growth (OECD, 2015). The public is now highly concerned about the negative impacts of business concerns on the environment (Porter and Reinhardt, 2007). Investors are now aware that investment in eco-friendly and energy-efficient securities is the way forward (Boffo and Patalano, 2020; Inderst, Kaminker, and Stewart, 2012). But investors are concerned about whether such stock's investment shall derive adequate returns at minimum risk (Ameli et al., 2020; Huber, Palan & Zeisberger, 2019). The study focuses on the performance analysis of such indices in the BSE that have environmentally responsible stock.

3. BSE and Sustainable Development

Sustainable development (SD) is a rapidly evolving concept widely discussed in international forums because there must be a balance between economic and social progress and concern for the environment. The idea was first used at the Stockholm Conference on Human Environment, conducted by the United Nations. It is a concept that considers economic, environmental, and technological well-being (Brundtland, 1987; Sulphrey and Safeer, 2015). The Brundtland Commission Report defines SD as a development that meets the current generation's needs without compromising future generations' ability to fulfill their own needs (Schaefer & Crane, 2005). Simply said, it is the moral obligation that the current generation owes to the coming generations. Though SD is hotly debated, the concept of corporate sustainability (CS) is still evolving (Bansal & DesJardine, 2012; Sulphrey & Alkahtani, 2017; Whiteman et al., 2013). Scholars, academicians, and researchers now make honest attempts to define, theorize, and measure CS (Montiel & Delgado-Ceballos, 2014). Interest in CS arose due to growing concerns of ecological collapse and massive depletion of natural resources, which is a global phenomenon (Perman, Ma & McGilvray, 2003).

Mirroring the global trend, many institutions in India have taken praiseworthy steps in the direction of SD and CS (Prasad et al., 2019; Prasad et al., 2016; Ramya et al., 2020). For instance, India's oldest stock exchange, the Bombay Stock Exchange, has taken various sustainability and environmental responsibility initiatives. It is the first exchange in Asia to participate in the sustainable stock exchanges initiative (SSE). It is a project promoting corporate investment in sustainable development, developed by the United Nations (UN), co-organized by the United Nations Conference on Trade and Development (UNCTAD),

the United Nations Global Compact, the United Nations Environment Programme Finance Initiative (UNEP-FI) and the UN-supported Principles for Responsible Investment (PRI). They provide a unique platform for various countries' stock exchanges to explore how they can work together with investors, regulators, and companies to create more sustainable capital markets (www.sseinitiative.org).

The BSE developed an ESG disclosure document that provides guidelines for Environmental, Social, and Governance disclosures, which organizations can voluntarily incorporate into their reporting framework. BSE also collaborates with the Global Reporting Initiative (GRI), which created a linkage document for corporates to provide a common set of disclosure standards on sustainability for organizations to communicate their impact on the environment, society, and economy. It helps organizations create a framework for sustainability report SEBI rules as well as GRI Standards. The GRI Sustainability Reporting Standards (GRI Standards) help organizations increase their transparency and communicate their positive and negative impacts on sustainable development (www.globalreporting.org). Through better understanding, managing, and disclosing their impacts, companies can enhance strategic decision-making, reduce risks, identify business opportunities, and strengthen stakeholder relationships. In addition, GRI helps businesses, governments, and other organizations understand and communicate the business impact on critical sustainability issues such as climate change, human rights, corruption, and many others (Singhal and Dev, 2016).

For helping the investors identify the sustainable and environmentally responsible stock, BSE also launched theme-based indices such as the BSE Greenex, BSE Carbonex, and BSE ESG-100. These indices only list those companies that comply with rigorous environmental and social standards and follow several sustainability benchmarks. These indices are highly beneficial for those investors and institutions that look for investment in the stock of companies that impact the environment the least and have higher carbon and energy efficiency and acceptable socio-environmental governance practices (Sharma and Jasuja, 2020).

3.1 S&P BSE Greenex Index

The BSE Greenex is the first environmentally responsible benchmark index developed in India. It was created by a collaboration between the BSE, IIM Ahmedabad and gTrade Carbon Ex Ratings Services Private Limited. BSE Greenex utilises publicly disclosed quantitative and financial data to analyze various companies' energy efficiency and carbon performance. The index indicates the 20 largest and most fuel-efficient companies from the BSE-100 index. The launch of Greenex was an important first step in creating an inclusive market-based mechanism for the promotion of energy-efficient practices amongst the larger business entities in India. The index measures companies' performance in terms of carbon emissions (Swalih & Vinod, 2017). BSE considers the companies' initiative to offset the carbon emissions, the offset limit being set to 2/3rd of the companies' total emissions. The index follows a unique sector-specific algorithm. It benchmarks each company against the best in the same specific industry, reviewing the performance biannually based on publically disclosed energy and financial data.

3.2 S&P BSE ESG 100 Index

The S&P BSE-100 ESG index is an index of 100 companies listed in the BSE that meet the sustainability investing criteria and maintain risk and performance similar to the BSE 100 index. Companies with United Nations Global Compact (UNGC) scores that don't meet the standard and those doing ineligible business practices such as tobacco and specified weaponry were excluded from the index. As its name suggests, the ESG-100 reviews its list of companies based on three indicators, the Environmental, Social, and Governance factors. Environmental criteria analyse the companies based on their policies on green technologies, climate change, greenhouse gas emissions, renewable or alternate energy sources, waste management, pollution control, water management, natural resource conservation, deforestation, etc. Social criteria look at a company's policies regarding social factors like consumer protection, human rights, working conditions, health and safety measures, employee relations and diversity, and supplier relationships. Finally, governance criteria look at transparency in accounting methods, board independence, bribery, corruption, political party donations, executive compensation, disclosures under various regulations, and rights of minority shareholders.

3.3 S&P BSE Carbonex Index

BSE Carbonex is an index in the BSE that takes a strategic view of organizational commitment to climate change mitigation by holistically incorporating strategies, disclosures, performance, and action in carbon emission areas to create a comprehensive benchmark that identifies a company's commitment to mitigate risks arising from climate change. The index includes those 100 companies that meet the assessment criteria while maintaining industry weightage and risk and return performance similar to the BSE-100. Assessment of companies is done with the help of data sourced from the Carbon Disclosure Project (CDP) by ENDS Carbon, a not-for-profit organization that holds the largest and most continuous climate change data set in the world. The BSE Carbonex is 'industry neutral'. An investor who shifted their entire investment from the BSE-100 index to the BSE Carbonex would maintain the same overall investment level in each Industry. Investors, therefore, retain a substantial exposure to the full range of companies in the index.

4. Previous studies

Stakeholders the world over are concerned about the environmental impacts and costs associated with it. They are on the lookout for information about Corporate Social Responsibility, disclosure policies, transparencies, environmental impacts, and associated costs (de Villiers and Van Staden, 2010; Cho et al., 2018).

Only a few studies have examined the performance analysis of Sustainability Indices in India. The research in India is based mostly on annual or sustainability reports (Prasad et al., 2017; Sen et al., 2011). A study by Bansal and Roth (2000) identified legitimization, competitiveness, and ecological responsibility to motivate organizations to respond to environmental issues. Organizations that are motivated by legitimization merely complying with the norms and regulations. They intend only to ensure the smooth functions of their

business operations. Those focusing on competitive advantage aim at profitability through cost-benefit analysis and product differentiation (Reinhardt, 1999). The organizations motivated by ecological responsibility seek to boost corporate image and morale. Prasad et al. (2019) examined companies' environmental sustainability in India against energy intensity's backdrop. They focused on energy intensity as it is one of the critical elements of sustainable enterprise and can be measured objectively (DeSimone & Popoff, 2000; Boustead, 1999). The study used data of six years from 100 firms listed in BSE 100. The results showed no significant association between CSR and energy intensity.

As stated earlier, only a few empirical examinations have been done in India in this regard. No systematic investigation has been done using data that extend over long periods. This lack of systematic empirical analysis could be due to the multiple challenges associated with measuring the various dimensions related to environmental sustainability (Prasad et al., 2017). The present study is an earnest attempt to fill this gap in the literature.

5. Research Methodology

In this study, the effectiveness of investing in environmentally responsible stock is studied. For this purpose, three indices of BSE having environmentally responsible stock have been analyzed. The risk and returns of BSE Greenex, BSE ESG 100, and BSE Carbonex indices are measured using various technical analysis indicators over a period of two years from December 2018 to November 2020. Monthly and annual returns, variances, and standard deviation of returns have been collected from BSE's official site. Covariance, ex-ante Beta, and Jensen's alpha have been measured to take S&P BSE Sensex as a standard measure. Data for fundamental analysis such as PE ratio, dividends, etc. have also been considered. Secondary data from online platforms of BSE India, Money control and Economic Times shall be utilized for this purpose.

6. Data Analysis

Monthly returns of three indices, BSE Greenex, BSE Carbonex, and BSE ESG 100, over 24 months from December 2018 to November 2020, were utilized for the study to measure the risk-return performance of the indices. The data is as follows:

Table 1: Monthly returns and variances of green indices

Date	Greenex		Carbonex		ESG-100	
	Returns	Variance	Returns	Variance	Returns	Variance
Dec-18	-0.80624	1.853667	-0.28928	0.083681	-0.16915	0.02861
Jan-19	-3.70351	18.13713	-1.03878	1.079073	-0.06994	0.004891
Feb-19	-0.20146	0.572617	-0.76342	0.582807	-0.9138	0.835031
Mar-19	5.683636	26.30026	7.090342	50.27295	7.005438	49.07617
Apr-19	1.090041	1.188189	-0.11156	0.012446	0.048945	0.002396
May-19	0.220115	0.048451	1.168626	1.365688	0.956522	0.914934

Jun-19	-1.12774	1.271801	-1.54894	2.399208	-1.22043	1.48945
Jul-19	-6.06127	36.73903	-6.35151	40.34165	-6.06077	36.73294
Aug-19	-0.82151	0.674878	-0.68202	0.465155	0.179533	0.032232
Sep-19	3.535608	12.50052	4.487079	20.13388	3.507957	12.30576
Oct-19	4.125931	17.0233	3.033157	9.200043	3.308926	10.94899
Nov-19	-1.01979	1.039969	1.053223	1.109279	1.77259	3.142074
Dec-19	0.665782	0.443266	0.096905	0.009391	0.754021	0.568547
Jan-20	0.012363	0.000153	-1.57689	2.486581	-2.05276	4.213804
Feb-20	-8.94843	80.07441	-6.80697	46.33482	-5.95733	35.48982
Mar-20	-22.3208	498.2203	-24.7485	612.4878	-24.6431	607.2822
Apr-20	16.69003	278.5571	14.77853	218.4049	16.05312	257.7026
May-20	4.433495	19.65588	0.458175	0.209925	-0.34659	0.120122
Jun-20	3.267581	10.67709	6.210882	38.57506	7.02832	49.39728
Jul-20	6.822221	46.54269	7.126637	50.78896	8.463855	71.63685
Aug-20	1.516603	2.300085	2.866866	8.21892	3.531175	12.4692
Sep-20	-0.05827	0.003395	-1.09379	1.19637	-0.12305	0.015141
Oct-20	0.369561	0.136575	1.934104	3.740758	2.140088	4.579977
Nov-20	9.962287	99.24717	10.37279	107.5947	10.09648	101.9388
Average	0.555258	50.13948	0.652736	52.91713	0.970419	54.82295

Source: www.bseindia.com

We see that Greenex index has a monthly average return of 0.555258%, implying an annual return of 6.663093%. It has an average monthly variance of 50.13948 and therefore has a standard deviation of 7.080924. The data of BSE Sensex was utilized as a market standard for comparison. The average monthly rate of return of Sensex for the same period was 0.890004%, annual return being 10.680052%, average variance 52.235968, and a standard deviation of 7.227445. Similarly, the average annual returns and standard deviations of Carbonex and ESG-100 have been found out as follows.

Table 2: Average annual returns and Standard deviation of indices

Index	Greenex	Carbonex	ESG-100	Sensex
Average annual returns	6.663	7.833	11.645	10.681
Standard Deviation	7.081	7.274	7.404	7.227

Source: Computed from data given in table 1.

The above table shows that ESG-100 gave a higher return at 11.64503% than Sensex with 10.680052% in the measured period. Though Greenex gave a lower average return than Sensex, it came at a lower standard deviation of 7.080924, implying lower risk.

For further analysis, the covariance between each of the three indices against Sensex was done. The covariance of Greenex was found to be 48.95266, that of Carbonex being 52.3001, and ESG-100 being 53.14105. Using covariance, ex-ante Beta of each of the three indices were measured.

$$\text{Beta} = \text{covariance (s,m)} / \text{variance (m)}$$

Where, covariance (s,m) = covariance between the security and the market index,
and variance (m) = variance of the market index.

Ex ante beta is a measure of systematic market risk taken for a period of two years. The beta values of the indices were;

1. Beta of Greenex = 0.937145
2. Beta of Carbonex = 1.001245
3. Beta of ESG-100 = 1.017327

In addition to the ex-ante Beta, Jensen's alpha was also calculated. The Jensen's alpha (α) introduced by Jensen (1967). This metric is used to measure the risk-adjusted return of a security or a portfolio of securities in line with the expected market return from Capital Asset Pricing Model (CAPM). It is a formula used to determine abnormal returns of a security.

$$\text{Alpha} = R(i) - (R(f) + B \times (R(m) - R(f)))$$

Where, $R(i)$ = the realized return of the portfolio

$R(m)$ = the realized return of the market index

$R(f)$ = the risk-free rate of return for the period

B = the Beta of the portfolio of investment concerning the market index

For the market Index, Sensex was considered and the India Government 10 year bond rate at 5.85% was taken for risk free return. Alpha for the corresponding indices were,

1. Alpha of Greenex index = -3.71336%
2. Alpha of Carbonex index = -2.85323%
3. Alpha of ESG-100 index = 0.88128%

From the above data we have the following summary of information, on Annual returns, Variance, Standard deviation, ex ante Beta and Jensen's alpha.

Table 3: summary of findings.

Index	Annual Returns	Variance	SD	Beta	Alpha
Greenex	6.663	50.139	7.081	0.937	-3.713
Carbonex	7.833	52.917	7.274	1.001	-2.853
ESG-100	11.645	54.823	7.4043	1.017	0.881
Sensex	10.681	52.236	7.227	1.0	0.0

Source: Computed from data given in table 1.

We can see that the ESG-100 index has a better average annual return at 11.645% at a beta of 1.017 and alpha of 0.881%, which is higher than the market index, Sensex. While Greenex has a lower annual return of 6.663%, it came at a lower variance of 50.139 and standard deviation of 7.081, implying that it has a lower risk than Sensex. Carbonex gave a 7.833% average annual return at a standard deviation of 7.274 and a Beta of 1.001.

The correlation between the different indices was also found out. The result is as follows.

Table 4: Correlation matrix between indices.

Correlation Matrix	Greenex	Carbonex	ESG	Sensex
Greenex	1	0.9725	0.9635	0.9566
Carbonex		1	0.9965	0.9955
ESG-100			1	0.9635
Sensex				1

Source: Computed from data given in table 1.

All the indices showed a very high correlation with the maximum correlation between Carbonex and ESG-100 with a correlation factor of 0.996. The least correlation was between Greenex and Sensex, with 0.957.

Fundamental data from BSE was also collected regarding the Price/Earnings ratio, Price to Book value ratio, and dividend yield for each index. The data is provided in the following table.

Table 5: Fundamental data of Indices.

	Greenex	Carbonex	ESG-100	Sensex
PE Ratio	54.15	33.24	33.36	32.05
PB Ratio	2.82	2.76	2.67	2.99
Dividend yield	1.02	0.97	0.77	0.90

Source: www.bseindia.com

The data shows that all the three indices have a higher PE ratio than Sensex, with Greenex the highest, having a PE ratio of 54.15. The price-earnings ratio (P/E Ratio) is the ratio for assigning a value for a firm that measures its current share price relative to its per-share earnings (Nicholson, 1960). The price-earnings ratio is normally calculated as the market value per share divided by earnings per share. The Greenex index also has a lower PB ratio than Sensex, with ESG-100 having the least at 2.67. While Greenex and Carbonex provide higher dividend yields than Sensex at 1.02 and 0.97 against 0.90, ESG-100 gives a lower dividend of 0.77.

7. Findings and Interpretation

The analysis on BSE Greenex shows that it performs comparatively lower in terms of Beta (0.937) and Jensen's Alpha (-3.713) than the benchmark Sensex index due to its lower returns. But it comes at a lower risk rate (SD 7.081) than Sensex, along with a significantly higher P/E ratio (54.15) and a considerable Dividend yield (1.02). P/E ratio is generally associated with the prediction of earnings anticipated during the next year. (Nicholson, 1960). Normally, a high P/E ratio implies that investors anticipate higher earnings growth within the next years, while firms with a lower P/E are expected to lower growth. A low P/E indicates that a firm is presently undervalued or performing exceptionally well relative to its past trends (Goodman & Peavy III, 1986). Therefore, though it has given lower returns, investing in BSE Greenex is a viable option for those sustainable investors who are risk-averse, as it is expected to perform well in the coming terms.

Investment in BSE Carbonex is also desirable for investors as they perform and the Sensex index with a 0.995 correlation between the two indices and 1.001 Beta value. A socially and environmentally responsible investor would have no second thoughts in investing in the Carbonex index stocks due to its two prolonged benefits of adequate returns and sustainable investing. The study by Prasad et al. (2019) showed a relationship between energy and environmental sustainability, and since Carbonex index focuses on energy efficiency, the stock listed in the index is a suitable avenue for sustainable investing. Of the three indices studied upon, BSE ESG-100 performs exceedingly better than the other two indices and the benchmark index, with 1.01 Beta and 33.36 P/E ratios.

With 0.88 Jensen's Alpha, the index does show significantly higher excess returns than the market index, indicating its better performance (Jensen, 1967). The Stocks in ESG-100 are a desirable option for all investors looking for environmental and socially responsible investment. Bansal and Roth (2000) show that the organizations motivated by ecological responsibility shall seek to boost corporate image and morale by investing in an environmentally responsible stock.

Conclusion

The study was done to help prospective investors look for sustainable investing in Indian companies. There is a constant doubt in investors' minds whether investing in environmentally responsible stock would give them adequate returns. The effectiveness of investing in three sustainability indices of BSE, the BSE Greenex, BSE Carbonex, and BSE ESG-100, was studied through risk-return performance analysis. It was found that sustainable indices performed as well or better than the country's market performance. This study cleared the doubt of such investors as it pointed out that companies listed in sustainable indices performed significantly better than the market index at considerably lower risks. Therefore, investing in sustainable stock listed in the three indices of study, BSE Greenex, BSE Carbonex, and BSE ESG-100, is advisable as it gives adequate financial returns to the investors at low risk and has a low socio-environmental impact on the society and the nation as a whole.

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