Do Socially Responsible Indices Outperform the Market During Black Swan Events: Evidence from Indian Markets During Global Financial and COVID-19 Crises.

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Abstract

This paper aims to examine and compare the effect of black swan events on the performance of companies with strong Environmental, Social, and (Corporate) Governance (ESG) backgrounds with that of other companies. Compared to established firms, companies with ESG backgrounds are perceived to be stable that will help them outperform established companies that are volatile during times of crisis. This research focuses on SENSEX for conventional market index and BSE GREEENEX and S&P BSE CARBONEX for ESG indices. We evaluated performances of the three indices during U.S. Debt Ceiling Crisis (201112), Black Monday China, BREXIT and Demonetization (2015-16), and COVID-19 (2020) crisis. We checked whether ESG indices outperformed conventional index significantly using Student's T-test. We have also compared the volatility of the three indices during the different black swan periods using the GARCH model.

JEL: P28, Q01, Q56, G32, G34

Keywords: Socially responsible investing, ESG, Student's T-test, ARCH, GARCH, performance, GREENEX, SENSEX, CARBONEX

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Introduction

The importance of environmental, social, and governance (ESG) principles has never been more significant. ESG principle takes Environment as criteria while considering how an organization performs while taking care of nature. Social standards analyze how it oversees associations with workers, providers, clients, and the networks where it works. Governance manages an organization's authority, chief compensation, reviews, interior controls, and investor rights. With increasing awareness among people, investors consider such factors while selecting their choice of companies for their investment portfolio. With that said, it has never been more important to pay heed to these environmental issues, some of them leading to a threat to the survival of all living species. When ESG policies are considered, people choose not to invest in companies that threaten society and the world itself, and we move towards a better and sustainable future. Such investments are known as Socially Responsible Investing (SRI).

With expanding dangers of environmental, social, and governance (ESG) issues, the idea of socially responsible investing (SRI) turns into an even more significant issue in the present financial world. In short words, SRI implies investment in organizations after considering their stance on ESG issues as opposed to the idea of simply monetary gain out of an investment. Likewise, it can be characterized as a course of recognizing and putting resources into an organization that fulfills specific guidelines of CSR and is progressively polished globally. In this manner, ESG issues can likewise be settled by considering compelling and proficient CSR strategy (Tripathi & Bhandari, 2016).

To evaluate an organization dependent on environmental, social, and governance (ESG) rules, financial specialists take a gander at a broad scope of practices. Environmental measures may incorporate an organization's energy use, waste, pollution, and treatment of creatures. Social rules take a gander at the organization's business connections. These principles ask a bigger question. Does the organization give its benefits to the local community or urge representatives to perform humanitarian efforts there?

Concerning governance, financial specialists might need to realize that an organization utilizes exact and straightforward bookkeeping strategies and that investors are allowed a chance to decide on significant issues. Likewise, it can be characterized as a cycle of distinguishing and putting resources into an organization that fulfills specific guidelines of CSR and is progressively practiced internationally. The Indian Companies Act, 2013 makes it obligatory for specific organizations to contribute in any event 2% of the normal net benefits of going before three financial years towards CSR and society welfare exercises (Tripathi & Bhandari, 2014). Notwithstanding, such a law's requirement and effective execution are uncertain since organizations can undoubtedly discover ways to get away from such a duty.

The developing familiarity with ESG issues is changing the impression of financial players and attracting the attention of many investors towards SRI around the world. Notwithstanding, the fundamental worry for a financial player is whether the interest earned in socially responsible investment might create lower returns than the returns earned without considering these concerns, hence whether an investor is ready to forego a piece of their profits by being socially mindful. Subsequently, financial players feel hesitant while investing in socially responsible assets. The developing consciousness of ESG issues is changing the view of speculators and draws in part of financial specialists' consideration towards SRI around the world. Nonetheless, the primary worry in the psyche of speculators is whether interest in socially mindful items may create returns lower than the overall items and subsequently forego some portion of their

profits by being socially responsible. Consequently, speculators feel hesitant while making an interest in socially responsible items (Galema, Plantinga & Scholtens, 2008).

While looking for existing research papers, we found literature on socially responsible investing, performance and comparing performance between the socially responsible and general indices. However, there is not much research done on analyzing the performance of both during times of crisis. Through research, we plan to compare the performance of ESG Indices with that of the conventional index during the black swan events that occurred within the last decade. It will help investors make a better choice in the future when the economy and stock market will again suddenly turn bearish due to some crisis. Conventionally, investing has been primarily about achieving significant financial returns. While that is important, the consequences on the Environment have never been considered while making decisions. Nowadays, some businesses have corporate social responsibility (CSR) programs, and some investors follow policies around ethical investing; however, the implementation of these policies has never been consistent. With changing times, globally, an ethical and long-term sustainable investment strategy is gaining importance. Stakeholders now recognize the importance of responsible investing and the role of financial markets in fostering sustainable development. Therefore, it is pertinent that we understand where we stand before forecasting an outlook into the future. Through this research paper, we try to gauge the performance of socially responsible stocks with reference to standard market indices during times of crisis. This valuation would serve as a benchmark for investors in terms of future sustainable investment performance.

This research focuses on SENSEX for conventional market index and BSE GREEENEX and S&P BSE CARBONEX for ESG indices (Sharma & Jasuja, 2020). The reason for taking these three indices is that all of them are listed on the same stock exchange, i.e., the Bombay Stock Exchange. SENSEX would give a holistic view of a conventional index as it is made up of top 30 companies with the highest market capitalization, whereas CARBONEX assesses the '632 carbon performance' of stocks based on purely quantitative performance-based criteria, and the GREENEX index was created to meet the market demand for a method to portfolio management integrating climate change risk and opportunity. We have considered the major events during the last decade (2011-2021), which had a significant impact on the share markets due to their occurrence. Below are the events that meet the criteria. (Phadnis, Joshi & Sharma, 2021)

- Black Swan Event 2011-12: U.S. Debt Ceiling Crisis
- Black Swan Event 2015-16: Black Monday China, BREXIT and Demonetization
- Black Swan Event 2020: COVID-19

Literature Review

There has been a lot of study on socially responsible stocks, and on general stocks, and some even specific to India. Researchers have also covered analysis in terms of their performance, individually as well as while putting them next to each other. What is important and remaining to cover is the performance of each socially responsible stock and that of general stock during important black swan events. Throughout the history of investment, we have seen some interesting behavior of equity, whose reflection we will try to accommodate for socially responsible stocks by comparing them with the performance of general stock investments during times of crisis.

Camilleri (2020) explains the evolution of socially responsible investing over the years and its relevance to present times. It outlines different forms of socially responsible investing in the financial market and explains the rationale behind the utilization of screening of businesses and public organizations. It has presented that over the years, the market has shown a newfound interest in socially responsible investments that have led to increasing NGOs and research firms which are responsible for scrutinizing enterprises' ESG credentials. Similarly, Tripathi & Bhandari (2015) emphasized the importance of effective and better implementation of CSR law for the development of Socially Responsible Investing. With proper enforcement of CSR principles, the investor chooses to invest socially responsibly. On the basis of the study, they were able to establish better performance in terms of risk, return, and various risk-adjusted measures during pre-crisis, crisis, and post-crisis periods.

Similar to our study, Śliwiński & Łobza (2017) analyzed the performance of socially responsible stocks and general indices in the periods of different intensities of global risk. Their results concluded in line with our hypothesis that socially responsible indices perform better during high-risk periods than in low-risk periods. Tripathi & Bhandari (2016) and Bhanumurthy, Bhandari & Pandey (2014) too reported a higher growth rate and return for socially responsible investment over conventional investment. We were able to conclude that socially responsible stocks produce significantly greater returns despite the higher risk. It clearly shows that people can take benefit out of socially responsible stocks, especially during the crisis period.

In a complete study performed by Tripathi & Bhandari (2012) over the performance of green and non-green portfolio investment performance during three different phases, pre-financial crisis (2004-2007), during the financial crisis (2007-2009), and post-financial crisis (20092012), they found out that green portfolio underperformed during the pre-financial crisis, but outperformed, and provide positive returns during the financial crisis. Interestingly, the green stock portfolio earned a higher return per unit of risk in the post-financial crisis period. This unusual change in behavior makes them a preferred choice in terms of safeguarding portfolios during and post-financial crisis investment world. Nofsinger & Varma (2012) too observed this unusual behavior where on comparing the performance of conventional mutual funds with that of socially responsible mutual funds, they observed that socially responsible funds underperformed the conventional mutual funds during the regular market period; however, socially responsible mutual funds outperformed the conventional funds during the crisis. Their findings do support socially responsible funds' performance during crisis, but it puts them under bad light during the conventional period. It shows them more like a hedge during the fall. In another study, Kempf & Osthoff (2007) found out that on buying high-rated socially responsible stocks and selling low-rated socially responsible stocks, they were able to earn significantly higher returns, up to 8.7%. Their findings support the view that through selective buying and selling of socially responsible stock, we can earn extra returns.

Tripathi & Kaur (2020) researched on the performance of socially responsible stocks across emerging BRICS countries. Their findings show India at the top during the crisis, whereas Brazil was able to secure a position among the top ranks consistently. Focusing completely on the performance of socially responsible stocks within the Indian stock market, Tripathi and Bhandari (2016) analyzed the performance of socially responsible stocks in various sectors in India and found that socially responsible stocks belonging to FMCG, I.T., and financial sectors are well rewarding. Their research helped in learning the choice of the sector while investing in socially responsible stocks in the Indian Stock market for higher returns. Another paper concluded that socially responsible portfolios perform significantly better and produce higher

returns when compared to a conventional stock portfolio over different business economic conditions. Their findings support the view that socially responsible investing is a boon for investors in India (Tripathi and Bhandari, 2015a). They also performed a comparative analysis on ethical mutual funds and conventional mutual funds and found out that ethical funds outperformed conventional funds on the basis of various risk-adjusted measures, despite having higher risk papers (Tripathi & Bhandari, 2015b).

While comparing the performance of socially responsible mutual fund returns with that of the general market index over the 1990-80 period, Statman (2000) observed that socially responsible funds outperformed the S&P500 index significantly; however, when calibrated over a risk-adjusted return, the results were not statistically significant. Amenc & Sourd (2008) too concluded that socially responsible funds did not earn significant returns between 2007 to 2013. However, they updated these results in accordance with the period of crisis. The results were different from any other previous reports. Through their analysis, they found out that socially responsible investment funds do not provide any protection against market fall during this period (Amenc & Sourd, 2010). Bauer, Koedijk & Otten, R. (2005) reviewed and researched the performance of 103 ethical mutual funds belonging from three different countries Germany, the U.S., and the U.K. From the results, they concluded that there was no significant difference in risk-adjusted return between ethical and general funds for the period 1990-2001. Guenster (2012) discussed two common socially responsible investment strategies and their impact on investors' portfolio performance. One is where investors invest in organizations with leading ESG policies, and another where investors reject firms that are involved in "sinful" business activities. On analysis, it was concluded that investors would miss out on the high returns of sinful businesses and thus underperform the conventional investors. On the same lines, Timothy & Kritzman (2008) calculated the cost of investing in socially responsible funds. They defined several parameters like portfolio size, the base investable universe, skills of the manager in order to estimate the cost. Through their analysis, they concluded that the cost increases for a highly skilled manager with the most stringent limitation on their investible universe. They argued that the investors looking to invest in socially responsible investments should be fully aware of the cost.

Research Methodology

The conventional market index that we will be using for our research is SENSEX, and the ESG indices are GREENEX and CARBONEX. The reason for taking these three indices is that all of them are listed on the same stock exchange, i.e., Bombay Stock Exchange. SENSEX would give a holistic view of the conventional index as it is made up of the top 30 companies with the highest market capitalization. We chose BSE-GREEENEX and S&P BSE CARBONEX for ESG indices after referring to a study performed by Sharma & Jasuja (2020) as it gives us a holistic view of ESG stocks. The first assesses the 'carbon performance' of stocks based on purely quantitative performance-based criteria, and the second index was created to meet the market demand for a method to portfolio management integrating climate change risk and opportunity.

For our report, we will be taking data for various periods in accordance with the impact of those crises on the market. We have decided upon the events from the last decades after referring to the research study performed by Phadnis, Joshi & Sharma (2021). For the 2011 U.S. Debt Ceiling Crisis, we have taken data from April 2011 to December 2012. For Black Monday China, BREXIT and Demonetization, we have taken the data starting from June 2015 to

December 2016. Moreover, for the COVID-19 market crisis, we have considered data from Feb 2020 to November 2020.

The Closing Price of the indices during these periods are extracted with the help of the BSE India official website. It is further used to calculate risk-adjusted measures for performance evaluation of the indices. For return involving no risk, daily return on Govt. Bond has been taken. We have calculated the following measures to compare the performance of socially responsible investing and conventional investing. We have taken these parameters in reference to the study performed by Tripathi and Bhandari (2015).

Sharpe Ratio

Statistically, the higher the Sharpe ratio of an investor for its portfolio, the better is its performance, i.e., risk-adjusted return. The Formula for Sharpe Ratio is:

$$Sharpe\ ratio = \frac{Return\ of\ Portfolio - Risk\ Free\ rate}{standard\ Deviation\ of\ the\ Portfolio}$$

Treynor Ratio

The formula for the Treynor ratio is:

$$Treynor\ Ratio = \frac{Portfolio\ Return - Risk\ Free\ rate}{Beta\ of\ portfolio}$$

Statistical Tools

We applied the linear regression model to examine the relationship between the return of SENSEX and the other two ESG indices. We followed Student's T-test to check whether the difference in their performance is significant or not.

Our dependent variable is the SENSEX and CARBONEX, and SENSEX and GREENEX, which is affected by the independent variable, i.e., return of respective indices.

Student's T-Test

A t-test is a type of inferential statistic used to determine in case there is a significant distinction between the method for two groups, which might be related to certain features. It is mostly utilized when the data sets, similar to the data set recorded as the outcome from flipping a coin 100 times, would follow a typical distribution and may have obscure fluctuations. A t-test is utilized as a hypothesis testing tool, which permits the testing of an assumption appropriate to a population. We will be using paired sample T-test to identify whether there is any significant difference in the performance of ESG indices and SENSEX during black swan events in the last decade.

The formula for the T-Test is:

$$T - Test = \frac{Average\ of\ Sample\ I\ \_\ Average\ of\ Sample\ II}{\sqrt{\frac{Sum\ of\ sample\ I^2}{number\ of\ observation\ I} + \frac{Sum\ of\ sample\ II^2}{number\ of\ observation\ II}}}$$

The ARCH and GARCH Models

The ARCH model, also known as the Autoregressive Conditional Heteroskedasticity model, presents a method of describing a change in variance in a time series value depending on a temporal restriction, such as increasing or decreasing the volatility measure. GARCH (Generalized Autoregressive Conditional Heteroskedasticity) is a more advanced form that is meant to handle increases in volatility. The GARCH (1,1) equation can be represented as: GARCH = C(1) + C(2)*RESID(-1)^2 + C(3)*GARCH(-1)

The GARCH model discussed here is commonly referred to as the GARCH (1,1) model. The (1,1) in parentheses is a typical notation in which the first number indicates the number of autoregressive lags, or ARCH terms, in the equation, while the second number indicates the number of moving average lags, also known as the number of GARCH terms. To find appropriate variance projections, models with more than one lag are sometimes required. Although this model is designed to forecast for only one period, it turns out that a two-period forecast may be created using the one-period forecast. Long-horizon forecasts can eventually be created by repeating this phase. The two-step forecast for the GARCH (1,1) is slightly closer to the long-run average variance than the one-step forecast, and the distant horizon forecast remains the same for all time periods as long as a + b 1. This is simply the unaffected variance. As a result, the GARCH models are mean reverting and conditionally heteroskedastic, but their unconditional variance is constant.

Hypothesis

For the aforementioned study, we hypothesize that the return generated through socially responsible investing are less volatile and yield higher returns as compared to volatility and returns through conventional investing during the event of a stock market crisis. Additionally, the numerical difference between the returns generated through conventional investing and returns generated through socially responsible investing will be significant.

Results and Analysis

Index Return (2011-2021): Descriptive Statistics

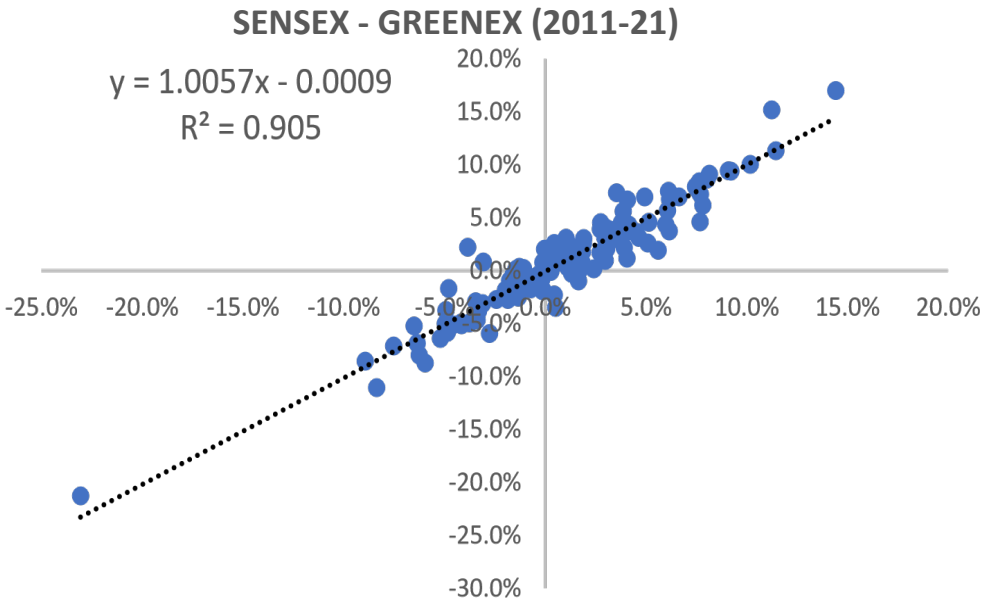
Particulars	BSE SENSEX	BSE GREENEX	BSE CARBONEX	G-SEC
Mean	0.0094411	0.0085899	0.0094762	0.075305242
Max	0.144192322	0.170048903	0.150763221	0.09044
Min	-0.230533283	-0.212806952	-0.235569904	0.05837
Standard Deviation	0.049381186	0.052201983	0.050992096	0.008709461
Variance	0.002438502	0.002725047	0.002600194	7.58547E-05
N	124	124	124	124

Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**
Average return (%)	11.33%	10.31%	11.37%
Std. Deviation (%)	4.94%	5.22%	5.10%
CAGR (%)	10.21%	8.94%	10.15%
CV	5.23	6.08	5.38
Beta	1	0.89991799	0.959056581
Sharpe Ratio	0.769283503	0.532048129	0.753237419
Treynor Ratio	0.037988132	0.030862776	0.040048893

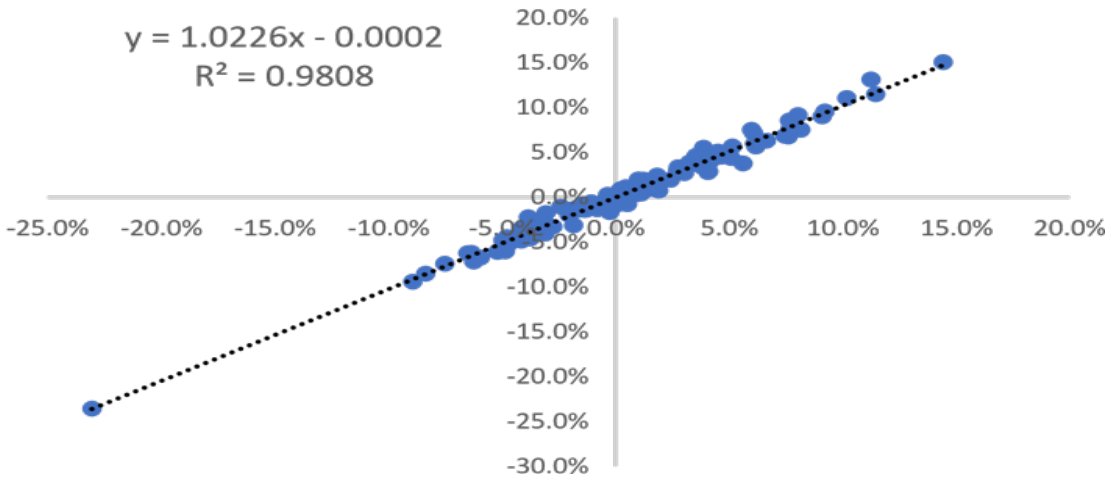
T-test SENSEX – GREEENEX	
Df	244
t Stat	0.130836
p-value	0.896013
t Critical	1.969734

T-test SENSEX – CARBONEX	
Df	244
t Stat	-0.00546
p-value	0.995649
t Critical	1.969734

Linear Regression Model



CARBONEX (2011-21)



U.S. Debt Ceiling Crisis, 2011-2012: Descriptive Statistics

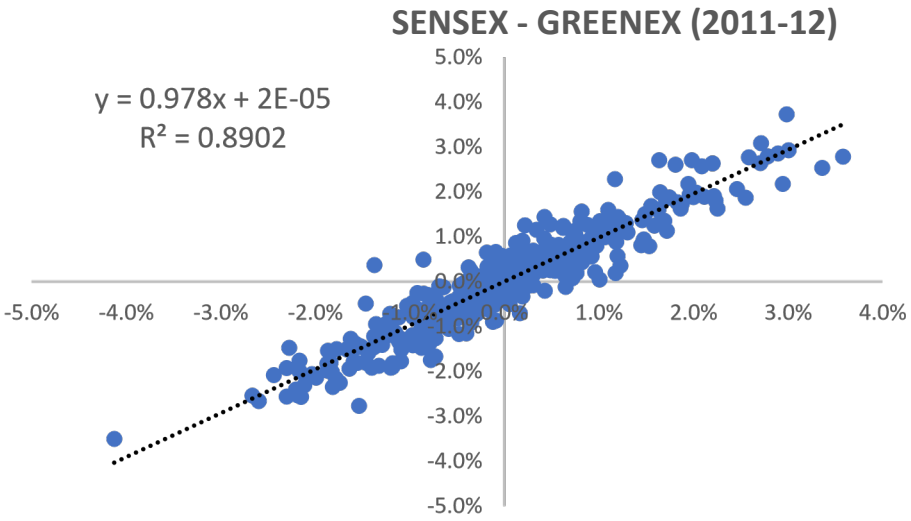
Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**	**G-SEC**
Mean	0.0000646	0.0000835	0.000104282	0.083284
Max	0.03580706	0.037331065	0.034338712	0.09061
Min	-0.041253666	-0.03500189	-0.038974881	0.07965
Standard Deviation	0.011114945	0.011522033	0.010894936	0.00207
Variance	0.000123542	0.000132757	0.0001187	0.883733
N	434	434	434	483

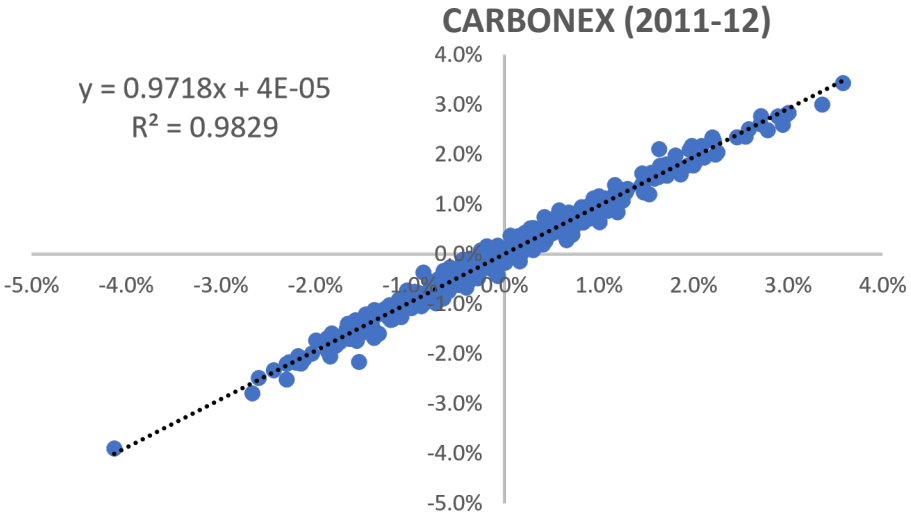
Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**
Average return (%)	2.36%	3.05%	3.81%
Std. Deviation (%)	1.11%	1.15%	1.09%
CAGR (%)	0.11%	0.63%	1.65%
CV	172.10	137.99	104.48
Beta	1	0.910159028	1.011417916
Sharpe Ratio	-5.372048969	-4.5830757	-4.150632314
Treynor Ratio	-0.059710031	-0.05801882	-0.044710372

T-test SENSEX – GREEENEX	
Df	866
t Stat	-0.02458
p-value	0.980392
t Critical	1.962707

T-test SENSEX – CARBONEX	
Df	866
t Stat	-0.05307
p-value	0.957686
t Critical	1.962707

Linear Regression Model





Black Monday China, BREXIT and Demonetization, 2015-2016: Descriptive Statistics

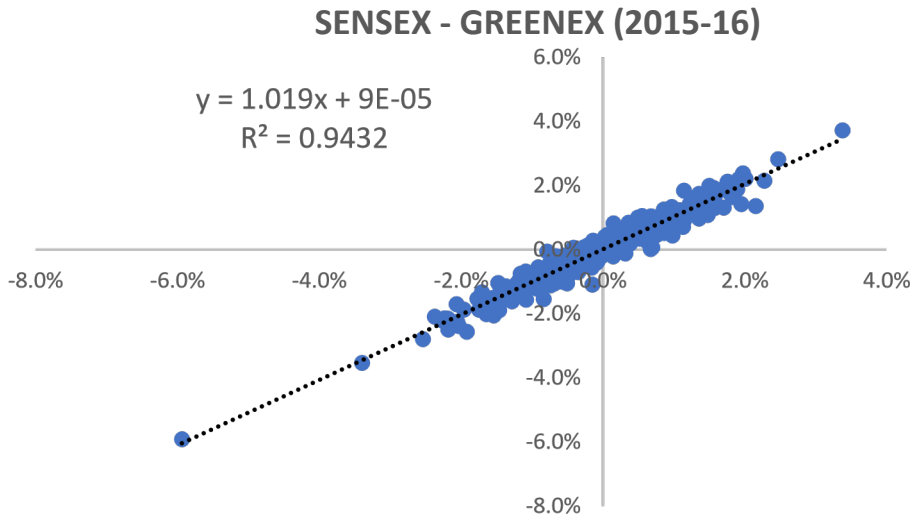
Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**	**G-SEC**
Mean	-0.0000672	0.0000174	2.48E-05	0.074212494
Max	0.033794887	0.037178795	0.033869892	0.0801
Min	-0.059362196	-0.059167809	-0.062221175	0.06183
Standard Deviation	0.009680282	0.010157268	0.009890351	0.004290203
Variance	9.37E-05	0.00010317	9.78E-05	1.84058E-05
N	394	394	394	401

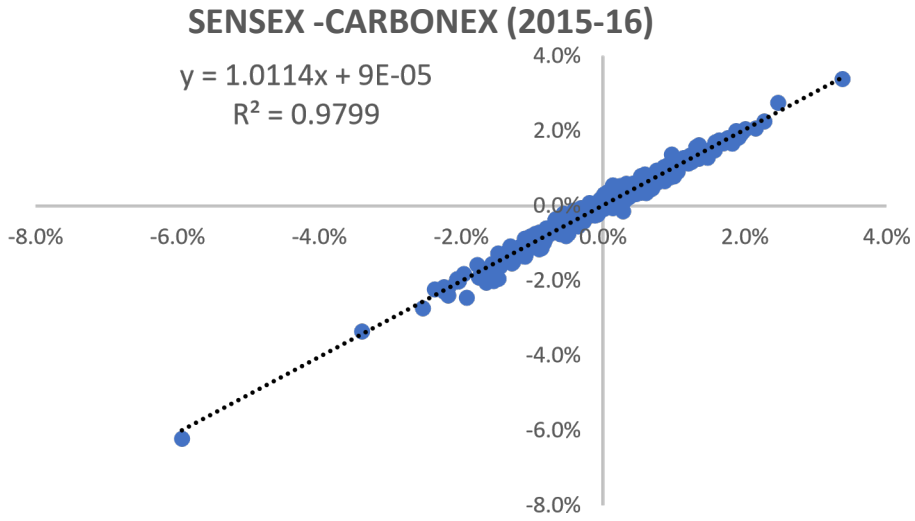
Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**
Average return (%)	-2.45%	0.63%	0.90%
Std. Deviation (%)	0.97%	1.02%	0.99%
CAGR (%)	-4.07%	-1.25%	-0.88%
CV	-144.05	583.75	398.80
Beta	1	0.925571953	0.968898402
Sharpe Ratio	-10.19894233	-6.681789991	-6.589985983
Treynor Ratio	-0.098728638	-0.073326262	-0.067269462

T-test SENSEX – GREEENEX	
Df	784
t Stat	-0.1193
p-value	0.905067
t Critical	1.962994

T-test SENSEX – CARBONEX	
Df	784
t Stat	-0.13151
p-value	0.895409
t Critical	1.962994

Linear Regression Model





COVID-19, 2020: Descriptive Statistics

Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**	**G-SEC**
Mean	0.0007402	0.0007793	0.000743078	0.06035465
Max	0.089748994	0.083898041	0.086672979	0.06505
Min	-0.131525781	-0.1182744	-0.130302494	0.0576
Standard Deviation	0.021820888	0.019368635	0.02099802	0.002032834
Variance	0.000476151	0.000375144	0.000440917	4.13241E-06
N	205	205	205	200

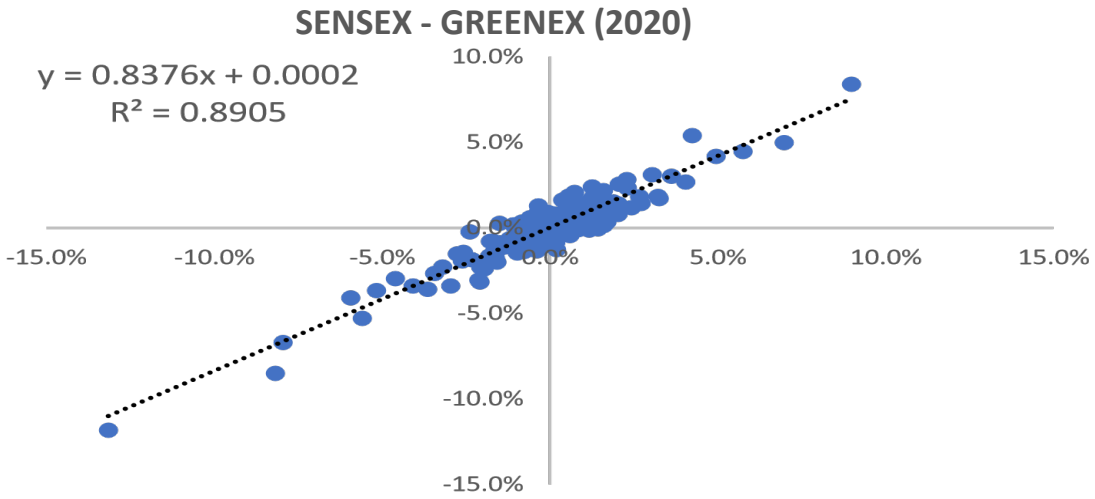
Particulars	**BSE SENSEX**	**BSE GREENEX**	**BSE CARBONEX**

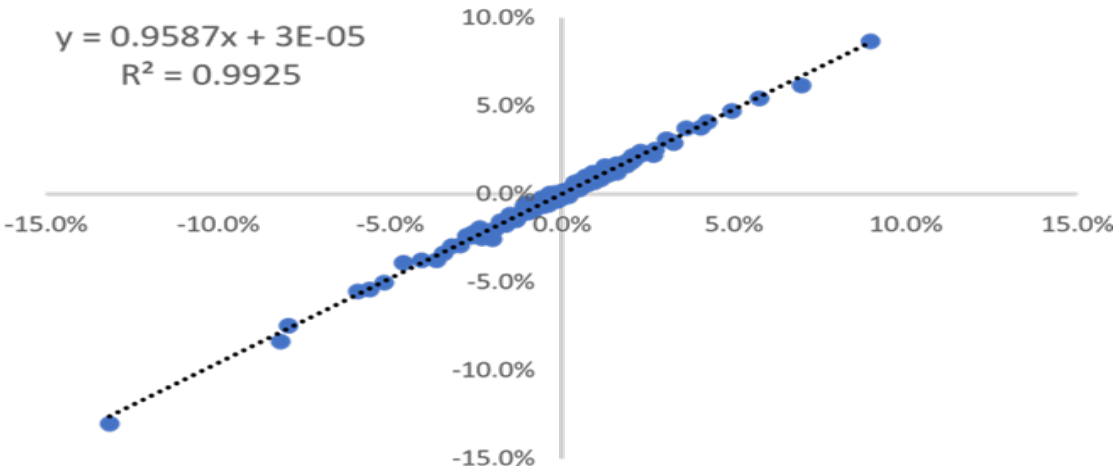
Average return (%)	0.89%	0.94%	0.89%
Std. Deviation (%)	2.18%	1.94%	2.10%
CAGR (%)	0.60%	0.70%	0.62%
CV	29.48	24.85	28.26
Beta	1	1.063111684	1.035264564
Sharpe Ratio	-2.358875139	-2.63326155	-2.449646109
Treynor Ratio	-0.051472751	-0.0479749	-0.049685578

T-test SENSEX – GREEENEX	
Df	408
t Stat	-0.01918
p-value	0.98471
t Critical	1.965795

T-test SENSEX – CARBONEX	
Df	408
t Stat	-0.00138
p-value	0.998902
t Critical	1.965795

Linear Regression Model





Result of GARCH (1,1) Estimation

		2011 - 2012			2015 - 2016			2020		
Indices	Measure	Coefficient	Std. Error	Pr(>|t|)	Coefficient	Std. Error	Pr(>|t|)	Coefficient	Std. Error	Pr(>|t|)
BSE SENSEX	C	1.18E-08	6.80E-07	0.9862	-6.96E-07	6.60E-07	0.2914	1.23E-05	6.81E-06	0.0707
	RESID(-1)^2	0.030966	0.011121	0.0054	-0.00552	0.000152	0	0.192495	0.050084	0.0001
	GARCH(-1)	0.967676	0.014262	0	1.006513	0.002405	0	0.775819	0.062435	0
BSE GREENEX	C	2.07E-06	1.57E-06	0.1881	-2.25E-07	5.94E-07	0.7051	-2.25E-07	5.94E-07	0.7051
	RESID(-1)^2	0.033113	0.018367	0.0714	-0.00747	0.00016	0	-0.00747	0.00016	0
	GARCH(-1)	0.951845	0.02445	0	1.007061	0.00198	0	1.007061	0.00198	0
BSE CARBONEX	C	1.59E-07	7.90E-07	0.8405	-8.51E-07	5.66E-07	0.1327	1.18E-05	6.20E-06	0.0573
	RESID(-1)^2	0.030971	0.011771	0.0085	-0.00809	0.000178	0	0.188451	0.048397	0.0001
	GARCH(-1)	0.966755	0.015625	0	1.009083	0.002112	0	0.778027	0.061883	0

Findings and Discussion

Each of the events in the last decade was taken into consideration while analyzing the data. With that, we also analyzed the whole time series data for the last ten years in order to better understand, compare and draw a conclusion as per the results. Our focus during this study has strictly been on the Indian Stock Market, irrespective of the country of origin of the crisis, as the effect of these crises eventually rippled into the global market from its epicenters. On breaking down the years into events: the first event of the decade, the U.S. Debt Ceiling Crisis (2011-12), hit the world economy almost when the markets had started recovering from the Great Financial Crisis 2008. The Black Monday China, BREXIT, and Demonetization all occurred around the same time in 2015 & 2016. Lastly, we are still looking at the developed and developing economies finding their way out of the unprecedented pandemic COVID-19 that shook the world in 2020.

For extracting data, we have used the closing price of SENSEX, GREENEX, and CARBONEX index during times of crisis. Using the data, we have looked at a few parameters such as returns, volatility and applied a t-test to compare and test the hypothesis.

We observed that there is a strong correlation between SENSEX and GREENEX & CARBONEX indices. This relation was found to be consistent irrespective of happening of any black swan event. The R2 factor was as high as 98% between SENSEX and GREENEX even during the period of crisis. We could observe that the correlation did fall by a few basis points, but that still concluded high correlation and similar responses from both conventional index and ESG indices towards the black swan event. It could also be observed from the results that CARBONEX had a higher correlation to SENSEX compared to the GREENEX index.

On observing the results of Average return and CAGR, we can see a relatively better performance of both ESG indices compared to the conventional index during all considered black swan events. However, it can also be observed that conventional investment outperformed socially responsible investment in the long run.

Through the analysis of additional parameters that we calculated, we observed that the beta in the last decade for ESG indices was less than one, i.e., it moved relatively less compared to market movement and was more stable. However, during the events, it could be seen that the Beta for ESG indices shot up above one, indicating higher movement compared to the market index during the black swan event. This observation goes against our hypothesis.

Observations from T-test clearly reject our hypothesis. The p-value (probability function) during all the considered timelines is higher than 90% for all cases. This clearly states that the return from the conventional index is not significantly different from the returns from ESG indices during black swan events as well as in the entire last decade.

Conclusion

On comparing the performance of the conventional index, SENSEX, against the green indices, GREENEX and CARBONEX during the black swan events from last decade, U.S. Debt Ceiling Crisis (2011-12), Black Monday China, BREXIT and Demonetization (2015-16), COVID-19 (2020), we can conclude that even though socially responsible investments did perform better than conventional investments in terms of returns, however, the difference in their performance was not significant. The black swan events negatively affected the correlation relation between SENSEX and GREENEX and SENSEX and CARBONEX.

As explained in the literature review, this study aimed at expanding the research (Tripathi, V., & Bhandari, V., 2016) on the performance comparison between conventional investment and socially responsible investment by comparing their performance during various black swan events in the last decade. This study tries to fill in the gap to find whether stable green stocks can hold fluctuation even during times of higher volatility.

The uniqueness of the study lies in its attempt to evaluate the correlation between socially responsible investment and conventional investment at times when the volatility in the market is at its peak. The results obtained from the study could be used by investors while making decisions in terms of their investment to secure themselves from such future black swan events.

Practical Implications

The study rejects the hypothesis that socially responsible investing does not produce significantly better results than conventional investing during the black swan events. However, it is to be observed that the ESG indices produced similar returns to the conventional index. Thus, one would not be sacrificing on returns if an investor chooses to invest in socially responsible stocks over conventional stocks. The results will help shatter the bias among investors, and the increased awareness and demand for ESG stocks would lead to the adoption of better policies, approaches, and agendas towards CSR and ESG issues by more organizations.

Recommendations

On the basis of the results from the study, while strictly considering the Indian stock market, we found out that the performance of the conventional index was not significantly different from that of ESG indices during the black swan event. In recommendation, the scope of the study should be expanded to other geographies, considering the Indian Stock Market is still at its nascent stage. Even for the same geography, the study could be expanded to various green indices from different sectors to check whether one sector outperforms the other during times of crisis. Additionally, the timeline considered for the study was only inclusive of a few black swan events, which in itself cannot justify the trend of green investment during different times.

A possible work-around to the limitations of this research could be establishing a similar study from the point of view of various major markets around the world and pursuing a study at places as per the crisis's epicentre. This would give us improved estimated values in terms of the magnitude for each of the crises individually, in turn helping reinforce the relative measurements.

Limitations

Since the scope of our research was limited to indices traded in India's stock market, results might not give a strong verdict on correlations and performance of conventional and ESG indices around the world. The indications might also have been stronger had we considered stock market exchanges of the respective countries where the crisis had originally occurred. Additionally, there are also overlaps of company shares between the two indices. For example, Infosys is registered in both SENSEX as well as GREENEX index. Similar overlaps of more organizations would result in a greater correlation between indices, which leads to distorted conclusions while gaining an understanding between the performance of socially responsible investing and conventional investing.

The subjective and quantitative aspects administering the development of the stock market are past the extent of this specific research. All things being equal, this investigation manages the consolidated impact of the events on the development of the stock index. The ramifications of this could be felt in a more articulated way in the following years and years when the elements of the equity market are totally unique, so, all in all, this investigation will become out of date, and more up to date research would need to be applied.

The lookback idea of the research mentions it so that all observable facts and subsequent experiences have been gotten from a historical occurrence. To this end, while the other short comes of the study is its scope itself, this specific one is an intrinsic limitation due to the rarity of reoccurrence of the same error in foreseeing time. As we keep on encountering occasions that are exceptional and unprecedented in nature, the calculation will continue to improve in terms of productivity.

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