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Financial Performance of Greenex and Carbonex in Comparison to BSE Sensex

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Abstract:
This study aims to know the financial performance of Greenex and corbonex compared with the BSE Sensex during the post covid and pre-COVID. The study uses risk-adjusted return methods such as the Sharpe ratio, Treynor Ratio, and Jensen's Alpha for methodology. The data is collected from the period 2010-2023 which is divided into three sections i.e., overall period (2010-2023), pre covid (2010-2020), and post covid (2020-2023). The findings of the study are that *the performance of the carbonex is good in all three periods when compared with BSE Sensex and this study is useful for portfolio managers, individuals, investors, and also the common public.*

1. Introduction

In this 21st century, businesses don't concentrate only on the sole moto i.e., profit maximization. Other than profit maximization other risks are to be considered by the organizations to depict the overall performance. The risks such as climate change, economic inequality, internal controls, etc. are also important and part of the organizations' performance. According to the studies (Sood, Pathak, Arjith, & Purohit, 2022), it is found that investors make decisions and give importance to the company's environmental, social, and economic responsibility and their regular management besides their financial results while making the decisions to buy the shares.

Usually, until sustainable development was included in the "World Commission on the Environment and Development" (WCED) in 1987, sustainable investment became part in deciding for investment by investors where decades back the investors used to concentrate only on the traditional concept i.e., risk and profit maximization while making the decisions in their investment portfolios (Sood, Pathak, Arjith, & Purohit, 2022). Sustainable investment is also known as Socially Responsible Investment (SRI), which allocates funding to businesses that work to stop environmental and climatic change while fostering corporate responsibility. An investor who practices sustainable investing considers a company's environmental, social, and corporate governance (ESG) concerns. According to the study, it is proven that investors invest in such companies that are into ESG compared to other companies that are not into sustainable investment (Tripathi & Bhandari, 2015) (Sood, Pathak, Arjith, & Purohit, 2022).

Although the term "sustainability" was fairly well-known before the COVID-19 epidemic, more significant efforts have been made and are still being made to ensure sustainability practices in business only following the pandemic (Sood, Pathak, Arjith, & Purohit, 2022). It is necessary to incorporate sustainability goals into business practices because numerous studies (Sood, Pathak, Arjith, & Purohit, 2022) have found that organizations that pursue sustainability goals are more profitable and able to withstand various crises than organizations that don't pursue such goals.

To invest in the sustainable companies, the investors look into the sustainability indices. Sustainability indexes are the instruments that estimate the environmental and social performance of industries and companies. This index guides investors to build sustainable portfolios for the long term and also helps consumers spend their money on sustainable companies.

One of the two main stock market indicators used in the Indian equity markets is the BSE Sensex. Thirty respectable, financially sound companies listed on the Bombay Stock Exchange make up the free-float market-weighted stock market index known as the BSE SENSEX. It is also referred to as the SENSEX or the S&P Bombay Stock Exchange Sensitive Index. In India, there are mainly three types of sustainability indices that are launched by the BSE SENSEX. They are S&P BSE GREENEX, S&P BSE CARBONEX, and S&P BSE 100 ESG Index. These indices comprise businesses measured by their carbon emissions and environmental performance.

Majorly in this paper we are concentrating on BSE GREENEX and BSE CARBONEX for the study.

S&P BSE GREENEX is the 25th dynamic index that was introduced on the Bombay Stock Exchange. It is a benchmark index that evaluates the carbon performance of the companies by applying primarily quantitative performance-based criteria. The BSE-GREENEX equity index is the first green equity index to be publicly broadcast in real-time, giving "green" institutional and retail investors a new tool to track the performance of India's biggest and most liquid, energy-efficient firms. Additionally, BSE-GREENEX is the first objective green equity index in India to use index constituent weight capping. The top 25 BSE-100 Index firms, which have low carbon emissions, high free-float market capitalization, and low market turnover are included in BSE-GREENEX.

The index is a market capitalization-weighted cap-weighted free-float index and the BSE CARBONEX was introduced in the year 2012. This seeks to raise awareness of the risks posed by climate change while also serving as a standard. In response to their stated need for advanced portfolio management techniques that take climate change risk and opportunity into account, BSE CARBONEX was established. The tilted versions of the BSE-100 index are used by BSE CARBONEX.

Therefore, the main purpose of this paper is to understand sustainable investing and to compare the performance of the sustainability indices and the BSE SENSEX. This will provide insight for the investors and the stock brokers about the performance of the indices.

2. Review of Literature

This section explains various studies that are based on the different factors and the performance of the stock market during different periods by which the study of sustainable development can be understood and how it is affecting the environment, organizations, investors, etc.

Here the article from Kadam, (2019), explains the performance of the BSE-GREENEX Index from the period 2014 to 2018 where the data are collected in a quarterly period during the five years where the results say that returns from BSE GREENEX were comparatively more and consistent. Jasminder Kaur & Parmjit Kaur (2021), the study assessed the market response to reconstitutions in BSE Greenex and Carbonex. The study concludes that the certification hypothesis which implies steady price and trading volume changes in the event of index reconstitutions where listing (delisting) is understood as good (bad) news by the investor community.

Swati Sharma (2022), analysed the performance of the BSE GREENEX during the pre and post covid, and the daily closing prices were collected from the period 2008-2022 and the study concludes that the post-COVID return outperformed the pre covid return. Yujing et al. (2004), analysed the correlations of

the ESI and selected comparative measures and it found that densely populated regions were not inevitably subject to pollution damage and natural resources shortage.

Sumit and Ashoke (2015), present paper seeks to investigate whether BSE-Greenex is getting positive support from the investors through comparing the risk and return with that of other popular BSE Indices. The day-to-day share price data of the different companies and indices for the period from 22/02/2012 to 31/08/2014 are collected for analysis. The result of the study suggested that as a portfolio Greenex is performing much better than other popular indices in terms of risk and return.

Manivannan et al (2022), study is based on investigating the impact of the COVID-19 Pandemic on Indian Sustainable Investment. The results revealed that the daily returns of sample indices were volatile, throughout the COVID-19 Pandemic.

Chinnadurai et al (2020), studied the factor i.e., temperature, where the study of temperature (carbon) is taken up from the period 2009-2018 and analysed the BSE GREENEX Index in India and it basically concentrated on the temperature influence the carbon index. The results revealed that temperature did exercise a significant impact on BSE GREENEX.

There are other factors also which are considered for the study like, the study from Suresh Kumar et al, attempts to analyse the sensitivity of returns on securities of infrastructure companies in India to the returns from the sectoral indices such as BSE Infra structure, BSE Greenex, and BSE Carbonex. The results revealed that the securities of such companies are sensitive more to the indices that indicate environmental protection.

Also, the study from Anupam et al (2021), is related to the field of research highlighting the importance of strategic commodities such as crude oil and gold to the risk of SR stocks. The results show that risk significantly transmits from crude oil, gold, and silver markets to various Indian green stock indexes.

Abhay Raja (2018), study aims at measuring the performance of BSE Greenex vis-à-vis performances of BSE Sensex and BSE – 100 indices. For the analysis purpose, the data has been collected from the period March 2012 to March 2018. The study found that the performances of BSE Greenex and its constituent companies were not better than the performances of other indices and control companies.

Rajib Bhattacharya (2013), study analyses the performance of BSE-GREENEX vis-à-vis other broad-based indices like the BSE-SENSEX and the BSE-500. The study has taken the closing values of the indices up to March 28th, 2013 i.e. the last trading day of the 2012-13 fiscal. The study concluded that it should be verified for validity by conducting similar studies on other green indices of various countries and considering more variables.

Some studies provide results not only based on the daily, monthly, quarterly, or yearly returns from the market but also by including some tests, models, ratios, etc. The study from Dinesh and Dr. Janet (2020), aims to examine the volatility of BSE GREENEX INDEX using statistical tools, viz, one-way ANOVA were tested. The monthly data has been collected from March 2012 to March 2019. The results of F-statistics state that, 85% of the stocks of the BSE Greenex Index have no significant difference in the stock returns and indicate no variations in the returns for all the days in the month.

Also, Nishi et al (2022), aims to investigate whether it is advantageous to invest in ESG stocks during the oscillation caused by to onset of coronavirus. The study has used GARCH, EGARCH, TARCH, and APARCH models and the six-year data has been collected from the period 2015 to 2021. The findings indicate the positive impact of COVID-19 on the volatility of the indices.

Kanchan and Madhu (2022), this study examine how the macroeconomic factors affect both sustainability indices. The auto-regressive distributive lag approach is used for the analysis. The noteworthy connections

demonstrate how the macroeconomic factors are vital to the sustainability of the Indian economy.

Chirag and Sonali (2020), this study investigate if asymmetric volatility exists in Indian sustainability indicators. The current study uses ARIMA and GARCH models to shed light on the sustainability index's variations. The study concludes that investors that substantial implications should be able to adjust their risk premium for anticipated variances when making investments in sustainable businesses.

Jasminder Kaur (2021), this paper explores the EMPs of firms listed on S&P BSE Greenex and Carbonex. The data has been collected from the period 26/02/2012 and 30/11/2012 for BSE Greenex and Carbonex.

Sanjay and Poonam (2020), this article attempts to explore the behaviour of sustainability indices to market indices. The study uses the monthly data from the period September 2010 to June 2019. The result of the study revealed that the volatility in one index can be used to outline the movement in another index.

Kirti et al (2022), this paper aims to empirically examine the performance of the high-ESG (environment, social, and governance) portfolio vis-a-vis the low-ESG portfolio at the Indian stock market before and during the Covid19 pandemic. Five years of data have been collected from the period April 2016 to March 2021. The absolute rate of return and several risk-adjusted performance measures, like, the Sharpe ratio, Modigliani–Modigliani measure, Treynor ratio,

Jensen's alpha, information ratio, Fama's decomposition measure, and Fama and French's three-factor model have been used in this study along with the t-test. The findings revealed that all three indices (CARBONEX, GREENEX, and BSE 500) had better returns during the Covid19 period as compared to the pre-COVID-19 period. Victoria (2007), this paper examines whether business performance is affected by the adoption of practices included under the term Corporate Social Responsibility (CSR). The study has been made from the period 1998 to 2004. the study has used accounting ratios for the analysis. The conclusion revealed that differences in performance exist between firms that belong to the DJSI and to the DJGI and that these differences are related to CSR practices the study also found that a short-term negative impact on performance is produced.

Vanita and Varun (2015), the purpose of this paper is to empirically examine the performance of socially responsible stock portfolios. The study has used various measures to evaluate the performance of the portfolio Sharpe ratio, Treynor ratio, Jensen's α, Information ratio, Fama's decomposition measure, and dummy regression model. The findings of the study reveal that socially responsible stock portfolios are found to have lower relative risk despite having higher systematic risk.

Jasvinder and Rashmi (2021), this paper investigated the performance of various ethical mutual fund schemes and compared them with the benchmark index (NIFTY 500 Shariah Index). The performance of the sample schemes was measured based on the risk-return profile and Sharpe's ratio, Treynor's ratio, and Jensen's alpha measures. This has been collected from the year 2014/15 to 2019/20. The analysis showed that all the schemes and benchmarks provide positive returns, and most of the schemes generated higher returns than the benchmark market index.

The study from Jayshree and Kinjal determines how the different macroeconomic factors affected both bank indices and the Indian Stock Market. From October 2007 to October 2022, the information was gathered for analysis purposes. The study found a substantial correlation between the Cash Reserve Ratio, Exchange Rate, Foreign Institutional Investors, Prime Lending Rates, and Statutory Liquidity Ratio and the NSE, Bank Nifty, and BSE.

Preeti et al (2021), determine how a set of macroeconomic variables affects sustainability indices used in India. The study collected the monthly data from April 2012 to March 2021 for analysis purposes. The findings revealed that GREENEX and CARBONEX have relationships with the indicators of Industrial

Production, Wholesale Price Index, M3, Crude Oil Prices, and (REER), but not with the indicator of Wholesale Price Index.

Kiran and Bhawna (2016), this paper seeks to investigate the long and short-term correlations between a few macroeconomic variables and how well the Indian stock market is doing. The data is collected from the period July 2001 to July 2015. The study reveals that BSE Sensex and a few macroeconomic factors, including the exchange rate, wholesale price index, T-bill rates, and M3, have a long-term link.

Baranidharan et al (2018), this study goal is to examine how macroeconomic factors affect the Bombay Stock Exchange Sensex. The data has been collected from the period April 2008 to March 2018. The variables that are taken for the study are WPI, REER, M3, and IIP. The analysis shows that macroeconomic factors have had a substantial impact on the stock market's volatility.

Baranidharan and Dhivya (2020), this study examined how the macroeconomic variable regime affected the spillover of BSE stock returns. The study has considered the period from 1 January 2010 to 31 December 2019 and has used variables like FII, IFT, M3, Production Index, and WPI. The study used descriptive statistics, correlation, the Granger causality test, and VECM for the purpose of analysis. The analysis discovered that the selected macroeconomic variables had partial normal distributions and that during the study period, the risk was more closely associated with high than low returns.

The paper by Kishore and Ajai (2018), studied the level of adoption of sustainable banking tools and the extent to which banking institutions practice the same in India. The findings revealed that, in the Indian banking sector, the adoption of the international sustainability code of conduct is still in its nascent stage. Therefore, from the above pieces of literature, we can understand that there are different results from different factors, ratios tests, etc. which are sometimes favourable, negative, and positive based on the period the researchers have considered for the study.

3. Data and Methodology

This study measures the daily performance of CARBONEX and GREENEX in comparison with SENSEX for the period from October 2010 to March 2023. The study used the Sharpe ratio, Treynor ratio, and Jenson's Alpha ratio which are mainly used to measure the risk-adjusted return of indices. The study period was further divided into pre-covid and post-covid to analyse the performance before and after the pandemic.

The pre-covid period covers from October 2010 to February 2020, whereas the post-covid period starts from March 2020 to March 2023. The performance of indices is also measured using average daily return, cumulative return, and volatility, which is measured through standard deviation. All the data were sourced from BSE and RBI.

Sharpe Ratio: The Sharpe ratio is the ratio that was developed by Sharpe in the year 1966. It is the ratio that considers both the systematic and unsystematic risk which is measured by standard deviation. It measures the extra risk that investors have accepted by comparing the return on an investment pay-out to the risk-free return. According to this ratio, the investors should generally select the portfolio with the highest Sharpe ratio. This ratio also gauges the capital allocation line's slope. As the slope rises, the asset's performance gets better. Due to its focus on overall portfolio risk and lack of consideration for per-unit risk in a portfolio for excess returns, this ratio is not especially helpful. It would, nevertheless, be suitable for a portfolio that is not diversified. The equation reads as follows:

$SR = (rp–rf)/\sigma p$

Where RP shows the return of the investments, RF shows the return at risk-free risk and SDp displays the

excess return of the portfolio's standard deviation.

Treynor Ratio: It is the variation of the Sharpe ratio. This ratio measures the portfolio risk-adjusted performance and considers only the systematic risk which cannot be diversified and surplus profit compared to the risk-free rate is adjusted. This can be calculated by the excess return per unit of systematic risk in a portfolio. The formula can be written as:

TR = (rp–rf)/ βp

Where RP indicates the portfolio return, RF indicates the risk-free rate of return and βp indicates the portfolio beta.

Jensen Alpha Ratio: Jensen Alpha is a measure that was first used in the year 1968. This ratio measures the absolute risk performance of the securities or portfolios and it also gives information or ideas about a particular index about its performance and explains whether a specific asset or index performs better or worse than the market portfolio. This is due to the discrepancy between the portfolio's actual return and the anticipated risk-adjusted return. The value of the alpha is used for ranking the portfolios and portfolio managers. As per this ratio the portfolio which is having a positive excess return consistently will have a positive alpha and that which has a negative excess return consistently will have a negative alpha.

The formula for this ratio is:

Jenson's Performance Index = (Rp – Rf) – β (Rm – Rf)

Where Rp indicates the portfolio return, RF indicates the risk-free rate of return, β indicates the portfolio Beta, and Rm indicates the expected market return.

4. Results and Discussion

The empirical results and discussions of the findings are presented in this part. The description of the indices is presented in the below table. The table consists of 3 sets i.e., Total period (Overall), Before Covid, and After Covid. The results show that the post-COVID period has the highest mean value of all indices compared to the other two sets and among all the three indices the value of BSESENSEX has got the highest mean value. The table also shows that during the post-covid return, all three indices showed the highest standard deviation because of the risks raised due to the pandemic nature and the kurtosis showed negative values in all the sets and during the post-covid, all the three indices are negatively skewed.

Table 1: Descriptive Statistics of total period, pre-covid & post-covid of GREENEX, CARBONEX and SENSEX Descriptive Statistics

	Total period			Pre-covid			Post-covid		
	carbonex	greenex	sensex	carbonex	greenex	sensex	carbonex	greenex	sensex
Mean	1612.6184	2576.2329	32592.0071	1321.654	2140.266	26515.3	2500.272	3906.252	51130.41
Standard Error	11.8035	17.7718	240.7360	7.867385	10.98879	154.4806	17.69566	30.37538	345.7252
Median	1446.1950	2472.5000	28681.1050	1308.3	2253.68	26395.71	2667.85	4196.83	54088.39
Standard Deviation	650.1597	978.9033	13260.1599	376.0742	525.2825	7384.429	484.2924	831.3092	9461.762

Sample Variance	422707.6691	958251.6722	175831840.9940	141431.8	275921.7	54529793	234539.2	691075	89524932
Kurtosis	-0.4787	-0.0897	-0.4589	-1.31054	-1.50453	-1.07529	-0.56578	-0.77803	-0.51908
Skewness	0.7315	0.8613	0.7764	0.231251	-0.14621	0.334507	-0.84382	-0.73248	-0.84493
Range	2378.2000	3750.4900	48109.1100	1274	1794.25	26777.55	1883.97	3121.49	37302.95
Minimum	734.8700	1204.7600	15175.0800	734.87	1204.76	15175.08	1229.1	1833.76	25981.24
Maximum	3113.0700	4955.2500	63284.1900	2008.87	2999.01	41952.63	3113.07	4955.25	63284.19
Count	3034	3034	3034	2285	2285	2285	749	749	749

From the below table, we can see that the performance of the Sensex is comparatively good when compared to the other two indices in almost, all the years. CARBONEX has also performed well and is almost equal to the Sensex. The performance of the GREENEX is quite low compared to other indices. But when we see the individual year performance of GREENEX, it is good during the post covid.

Table 2: Average return, Cumulative return, and Variance of GREENEX, CARBONEX AND SENSEX.

	Average return			Cumulative Return			Variance		
year	Greenex	Carbonex	Sensex	Greenex	Carbonex	Sensex	Greenex	Carbonex	Sensex
2010	**-0.018%**	-0.037%	-0.027%	-3.47%	-5.93%	-4.65%	0.0117	0.0119	0.0121
2011	-0.038%	-0.031%	-0.032%	-10.43%	-8.38%	-8.84%	0.0132	0.0126	0.0129
2012	0.049%	0.052%	0.051%	12.42%	13.03%	12.73%	0.0090	0.0083	0.0082
2013	0.053%	0.056%	0.063%	11.59%	11.71%	13.59%	0.0108	0.0110	0.0109
2014	0.105%	0.089%	0.082%	27.63%	22.51%	20.57%	0.0087	0.0091	0.0089
2015	-0.001%	-0.009%	-0.016%	-4.02%	-5.23%	-6.69%	0.0113	0.0111	0.0110

2016	0.061%	0.084%	0.067 %	14.88%	21.80%	16.84%	0.0083	0.0078	0.007 4
2017	0.038%	0.059%	0.067 %	8.85%	14.67%	16.87%	0.0067	0.0058	0.005 8
2018	0.007%	0.032%	0.049 %	0.71%	6.92%	10.96%	0.0088	0.0081	0.007 9
2019	- 0.055%	-0.060%	- 0.040 %	- 15.56%	-17.25%	- 13.50%	0.0183	0.0198	0.020 4
2020	0.195%	0.176%	0.160 %	64.62%	59.66%	53.81%	0.0121	0.0123	0.012 7
2021	0.091%	0.075%	0.070 %	22.19%	18.34%	17.12%	0.0111	0.0102	0.010 2
2022	- 0.022%	0.007%	0.019 %	-5.48%	0.79%	3.54%	0.0104	0.0092	0.009 2
2023	0.174%	0.117%	0.094 %	31.62%	50.35%	24.61%	0.0063	0.0068	0.006 3
Averag e	0.046%	0.044%	0.043 %	11.110 %	13.071%	11.211 %	0.0105	0.0103	0.010 3

The table below represents the main ratios that are used to compare the portfolio returns. This table shows that in the first set among all the three ratios the CORBONEX has outperformed when compared to the other two indices and during the pre-covid time, we can see that both the SENSEX and CARBONEX have outperformed, and in the post-covid time period we can see that GREENEX has outperformed compared to the other two indices.

Table 3: Portfolio performance evaluation ratios for Overall period, Pre-Covid & Post-Covid Risk adjusted return

	Overall			**Pre-Covid**			**Post-Covid**		
	Carbon ex	Greene x	Sensex	Carbon ex	Greene x	Sensex	Carbon ex	Greene x	Sensex
Sharpe ratio	0.1658 67	0.1848 73	0.1502 06	- 0.0937 6	- 0.2007 8	- 0.0561 6	0.6556 83	0.9575 09	0.5213 28
Treynor Ratio	0.0281 75	0.0329 25		- 0.0141 6	- 0.0315 7		0.1362 71	0.2121 07	
Jensen' Alpha	0.0027	0.0071 66		- 0.0057 6	- 0.0229 1		0.0274 16	0.0935 72	

5. Conclusion:

The study gives the overall view on the Greenex, Carbonex, and BSE Sensex for the investors to invest in the market. From the results, we can understand that among all the three ratios the Corbonex has outperformed when compared to the other two indices and during the post-COVID covid the performance of Greenex has outperformed all three indices and gradually the performance of Greenex has increased.

References:

1. Raja, A. (Volume - IX | July 2018 ISSN : 2349-7165). Sustainable Business Practices and Stock Performance: A Study of BSE GREENEX and its Constituents. *International Bulletin of Management and Economics*.
2. (Sood, Pathak, Arjith, & Purohit, 2022). Did ESG portfolio augment investors' wealth during Covid19? Evidence from Indian stock market. Sustainability Accounting, Management and Policy Journal. DOI: 10.1108/SAMPJ-02-2022-0087
3. Kumari, S. K. (2020). Indian Stock Market Movements and Responsiveness of Sustainability Indices: A Risk Adjusted Analysis. *International Management Review* Vol. 16 No. 1
4. Bhandari, V. T. (2015). Socially responsible stocks: a boon for investors in India. *Journal of Advances in Management Research*. Vol. 12 No. 2,
5. Chaudhary, J. K. (December, 2021). A Performance Evaluation of Ethical Mutual Funds: Evidence from India. *Colombo Business Journal of, Vol. 12, No. 02*.
6. Jain, A., & Biswal, P. C. (2016). Dynamic linkages among oil price, gold price, exchange rate, and stock market in India. *Resources Policy*, *49*, 179–185. https://doi.org/10.1016/j.resourpol.2016.06.001
7. Chang, B. H., Bhutto, N. A., Turi, J. A., Hashmi, S. M., & Gohar, R. (2020). Macroeconomic variables and stock indices: an asymmetric evidence from quantile ARDL model. *South Asian Journal of Business Studies*, *10*(2), 242–264. https://doi.org/10.1108/SAJBS-09-2019-0161
8. Javangwe, K. Z., & Takawira, O. (2022). Exchange rate movement and stock market performance: An application of the ARDL model. *Cogent Economics and Finance*, *10*(1). https://doi.org/10.1080/23322039.2022.2075520
9. Osamwonyi, I. O., & Evbayiro-Osagie, E. I. (2012). The Relationship between Macroeconomic Variables and Stock Market Index in Nigeria. *Journal of Economics*, *3*(1), 55–63. https://doi.org/10.1080/09765239.2012.11884953
10. Hashmi, S. M., & Chang, B. H. (2023). Asymmetric effect of macroeconomic variables on the emerging stock indices: A quantile ARDL approach. *International Journal of Finance and Economics*, *28*(1), 1006–1024. https://doi.org/10.1002/ijfe.2461
11. Kwon, C. S., & Shin, T. S. (1999). Co-integration and causality between macroeconomic variables and stock market returns. In *Global Finance Journal* (Vol. 10).
12. Srivastava, A. (2010). Relevance of Macro Economic factors for the Indian Stock Market. In *Decision* (Vol. 37, Issue 3).
13. Sood, K., Arijit, K., Pathak, P., & Purohit, H. C. (2022). Did ESG portfolio augment investors' wealth during Covid19? Evidence from Indian stock market. *Sustainability Accounting, Management and Policy Journal*. https://doi.org/10.1108/SAMPJ-02-2022-0087
14. Kaur, J., & Kaur, P. (2021). Impact of S&P BSE sustainability indices membership and delisting on stock liquidity: Evidence from volume and spread event study. *Environmental Challenges*, *3*. https://doi.org/10.1016/j.envc.2021.100052

15. Vanitha, S., & Priyangha, V. C. (2017). *Vanitha & Priyangha, An Examination of Stock Reaction of BSE GREENEX* (Issue 1).
16. Sharma, S. (2022). BSE GREENEX: A Pre & Post Covid-19 Empirical Study. *Procedia Computer Science*, *214*(C), 149–155. https://doi.org/10.1016/j.procs.2022.11.160
17. Babu, M., Antony Lourdesraj, A., Hariharan, C., Gayathri, J., Karishma Butani, C. S., & Kathiravan, C. (2022). Impact of Covid-19 Pandemic on Environmental, Social, and Governance Index in India. *IOP Conference Series: Earth and Environmental Science*, *1057*(1). https://doi.org/10.1088/1755-1315/1057/1/012017
18. Rajput, N., Varshney, A., & Chopra, P. (2018). Carbon Credit Market in India: An Empirical Analysis. *International Journal of Management Studies*, *5*(2(2)), 15. https://doi.org/10.18843/ijms/v5i2(2)/03
19. Dutta, A., Bouri, E., Dutta, P., & Saeed, T. (2021). Commodity market risks and green investments: Evidence from India. *Journal of Cleaner Production*, *318*. https://doi.org/10.1016/j.jclepro.2021.128523
20. Kumar Patel, S., & Kumari, P. (2020). Indian Stock Market Movements and Responsiveness of Sustainability Indices: A Risk Adjusted Analysis. In *International Management Review* (Vol. 16, Issue 1).
21. Sharma, N., Kaur, A., & Rawat, S. (2022). Does commitment to environment and society pays? Evidence from COVID-19 impact on stock volatility. *Vilakshan - XIMB Journal of Management*. https://doi.org/10.1108/xjm-08-2021-0213
22. Hashmi, S. M., & Chang, B. H. (2023). Asymmetric effect of macroeconomic variables on the emerging stock indices: A quantile ARDL approach. *International Journal of Finance and Economics*, *28*(1), 1006–1024. https://doi.org/10.1002/ijfe.2461
23. Javangwe, K. Z., & Takawira, O. (2022). Exchange rate movement and stock market performance: An application of the ARDL model. *Cogent Economics and Finance*, *10*(1). https://doi.org/10.1080/23322039.2022.2075520
24. Tripathi, V., & Bhandari, V. (2015). Socially responsible stocks: a boon for investors in India. *Journal of Advances in Management Research*, *12*(2), 209–225. https://doi.org/10.1108/JAMR-03-2014-0021
25. Preeti Sharma, A. K. (01 Sep 2021). Impact of macroeconomic variables on sustainability indices using ARDL mosel. *Journal of Sustainable Finance and Investment, 13, 2023*(1), 572-588
26. Chaudhary, J. K. (12 May 2022). Relationship Between macroeconomic variables and sustainable stock market index: an emperical analysis. *Journal of Sustainable Finance & Investment*.
27. Kishan, E. (April-July 2022). Nexus between Macroeconomic variables and Sustainable Investments-Evidence from Indian Sustainable Stock Indices. *Research Bulletin, 48*(1-2), 153-168. doi:10.33516/rb.v48i1-2.153-168p
28. Kanchan Sehrawat, M. K. (October 4, 2022). Analysing the presence of volatility clustering and impact of macro-economic variables on sustainability indices in India: using GARCH (1,1) model and ARDL framework. *International Journal of Global Environmental, 21*(2-4), 372-389.
29. Seth, N. S. (Apr-Jun 2022). Are Green Indices and Regular Inidces Interrelated?-Evidence from BSE. *SCNS Journal of Indian Management, 19*(2), 56-65. 10p.
30. Kwon, C. S., & Shin, T. S. (1999). Co-integration and causality between macroeconomic variables and stock market returns. In *Global Finance Journal* (Vol. 10).
31. Zhao, H. (2010). Dynamic relationship between exchange rate and stock price: Evidence from China. *Research in International Business and Finance*, *24*(2), 103–112.

https://doi.org/10.1016/j.ribaf.2009.09.001

32. Chee, R., Chia, J., & Lim, S. Y. (2015). *MALAYSIAN STOCK PRICE AND MACROECONOMIC VARIABLES: AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) BOUNDS TEST* (Vol. 33).