

Evaluating Financial Fortitude: An Examination Of GREENEX, Non-Green, And Blue-Chip Stock Portfolios In India During And Around The Covid-19 Pandemic

Mr. Nishant Tawade

Research Scholar, Somaiya School of Humanities and Social Science, Dept. of Economics, Somaiya Vidyavihar University. nishant.tawade2000@gmail.com

Dr. Sanjay Rode

Associate Professor, Somaiya School of Humanities and Social Science, Dept. of Economics, Somaiya Vidyavihar University sanjay.rode@somaiya.edu

Abstract

This comprehensive study delves into an in-depth analysis of portfolio performance across different classifications: GREENEX, Blue-Chip, and Non-green, spanning various temporal phases encompassing the pre-pandemic, pandemic, and post-pandemic periods. It employs an array of sophisticated metrics including the Sharpe Ratio and Treynor Ratio meticulously evaluate risk-adjusted returns within these portfolios. Augmenting the analytical framework, Karl Pearson correlation analysis is judiciously applied to ascertain the intricate linear interconnections that exist amongst these portfolios. Greenex's portfolio exhibits a beta value of 0.6, indicative of its low risk and predictability within the market. The study's discerning findings unveil robust and persistent positive correlations characterizing the relationships among all portfolios. These correlations signify a shared resonance with market dynamics and a steadfast propensity for consistent performance trends. These insights serve as instruments, enriching comprehension regarding portfolio behavior in the context of dynamic economic vicissitudes. The outcomes bear substantial relevance for an array of stakeholders, extending from astute investors to astute policymakers, thereby illuminating strategic trajectories and enriching the discourse on financial strategies within the intricate tapestry of India's financial landscape.

Keywords: GREENEX , Portfolio Performance, Treynors Ratio, COVID-19, Correlation

Introduction

The concept of green investing has been garnering significant attention for over a decade in India. It has resulted in the emergence of diverse green investment avenues, portfolios, mutual funds, and related financial instruments. The central tenet of green investing resides in environmental accountability. As companies are increasingly mandated to exert deliberate endeavors toward environmental preservation and sustainable development, investors are likewise tasked with assuming heightened social responsibility. This entails channeling sufficient financial resources into environmentally conscious enterprises. Amidst the Economic development vs. Ecological degradation paradox, the roots of green finance can be traced back to the 1970s. However, the practice of green finance gained momentum only post-2000s.

In the year 2008, the World Bank issued a groundbreaking green bond, which served as a seminal blueprint for the contemporary green bond market. This pioneering initiative not only established the fundamental criteria for qualifying projects underpinning green bond support but also introduced CICERO as a secondary opinion provider and incorporated impact

reporting as an integral facet of the issuance process. Moreover, it introduced an innovative collaborative model, bringing together investors, financial institutions, development agencies, and scientific experts, marking a testament to their unwavering dedication and resolve to address pressing environmental challenges. The World Bank's inaugural green bond issuance not only raised awareness about the exigencies of climate change but also underscored the potential for investors to champion climate solutions while maintaining their financial returns intact, thus illuminating a pathway towards environmentally conscious investment strategies. With this backdrop, we aim to understand the performance of GREENEX, Non-Green, and Blue-chip portfolios respectively in three intervals as Pre Covid (2018-2020), During COVID(2020-2021), and Post Covid(2021-2023).

The BSE-GREENEX, hosted on the Bombay Stock Exchange, in the year 2012, stands as the 25th dynamic index within its domain. Distinguished as a pioneering benchmark index, it distinguishes itself by evaluating the 'carbon performance' of stocks utilizing a rigorously quantitative, performance-driven approach. In stark contrast to established international indices that gauge environmental performance through diverse scaled quantitative parameters, the BSE-GREENEX employs sector-specific proprietary algorithms. These algorithms, stemming from advanced research facilities, critically evaluate the energy efficiency performance of individual companies. This evaluation is based on publicly disclosed data about energy consumption and financial metrics. (*BSE India. (n.d)*)

While the BSE Sensex 30, also known as the Sensex Blue Chip 30 Companies, is a select group of well-known companies that are listed on the Bombay Stock Exchange (BSE). They are well-known in the Indian market for their illustrious reputation and sound financial position. Due to their association with long-standing companies known for dependable performance and financial stability, blue chip stocks are frequently viewed by investors as a relatively safe investment option. These businesses often have significant market capitalizations and a track record of paying dividends to shareholders. Further, this paper delves deeper into the performance analysis of stated portfolios to gain a concrete understanding.

Objectives:

1. To analyze the performance of different portfolios, including- GREENEX, Blue-Chip, and Non-green- before, during, and, after COVID-19 Pandemic.
2. To determine if sustainable investments represented by the GREENEX portfolio outperform traditional options in terms of risk-adjusted returns.
3. To provide practical guidance for investors and policymakers based on portfolio behavior during changing economic conditions.

Hypothesis

- H0: All portfolios, including GREENEX, Blue-Chip, and Non-green, will consistently demonstrate strong and positive correlations.
H1: All portfolios, including GREENEX, Blue-Chip, and Non-green, will **not** consistently demonstrate strong and positive correlations.
- H0: GREENEX portfolio will demonstrate superior risk-adjusted returns.
H1: GREENEX portfolio will **not** demonstrate superior risk-adjusted returns.
- H0: GREENEX portfolio will exhibit lower volatility, as evidenced by a lower standard deviation.

H1: GREENEX portfolio will **not** exhibit lower volatility, as evidenced by a lower standard deviation

Review of Literature

A body of existing literature explores the performance and risk factors associated with green, non-green, and blue-chip stock portfolios, offering valuable insights for researchers, investors, and policymakers.

Tripathi, V., & Bhandari, V. (2012). Examined the performance of green investment portfolios compared to non-green portfolios and the overall market in the Indian stock market over a specific time frame. The research covers the period from April 1, 2000, to March 31, 2012, and is divided into three sub-periods: before the financial crisis (2004 - 2007), during the financial crisis (2007 - 2009), and after the financial crisis (2009 - 2012). The study Green stock portfolios considerably outperformed the market with a positive monthly return during the financial crisis (2007–2009). Green non-blue-chip companies performed exceptionally well in risk-adjusted returns after the crisis (2009–2012), illustrating the benefits of sustainable investments during market instability.

Díaz, A., Esparcia, C., & López, R. (2022) analyzed the diversification benefits of socially responsible investments (SRI) during the COVID-19 pandemic using minimum variance portfolios and advanced modeling techniques. They revealed that SRI, particularly clean energy equities, have played a vital role in enhancing portfolio diversification and financial performance across various asset classes, including traditional equities, Treasury bonds, gold, crude oil, and Bitcoin.

Md, A., Banerjee, A. K., Boubaker, S., & Moussa, F. (2023). built out-of-sample forecasting allocations for both standard and green asset classes using the GARCH-EVT-copula model. The study demonstrates that the portfolio with a green asset outperforms the benchmark for short timeframes. Since green assets offer substantial diversification benefits and advance the cause of sustainable development.

Han, Yingwei and Li, Ping and Wu, Sanmang(2022) whether green bonds offer a better risk-return profile compared to conventional bonds in China by comparing out-of-sample diversification advantages of green bonds versus conventional bonds. Green bonds are a particular kind of fixed-income instrument intended to collect money for initiatives that improve the environment and help humanity mitigate and adapt to climate change. The findings demonstrate that, across a range of asset allocation strategies and risk aversions, a portfolio with green bonds generates higher risk-adjusted returns than a portfolio with conventional bonds. This is mostly caused by the rise in returns following the addition of green bonds to the portfolio.

Verma, R. K., & Bansal, R. (2021). states that green bond issuance significantly boosts stock price. Following the announcement of the green-bond offering, returns rise. All of the study's samples had negative returns on the announcement day, but the cumulative abnormal return (CAR) for the preceding 10 days was positive. Investor mood is thus positively influenced by green-bond issues.

Sakai Ando, Chenxu Fu Francisco Roch, and Ursula Wiriadinata (2023) calculated the sovereign greenium and compiled a thorough database of sovereign green bonds. One of the most significant financial advancements in the field of sustainable finance over the past 15 years has been the growth of green bond markets. The fact that green bonds have a positive green premium (greenium), or a lower yield than a comparable conventional bond, has been a key advantage connected with them. However, sovereign-level issuances are very new and have not been widely recorded in the literature. They discovered that advanced economies

only charge an average of 4 basis points more for green bonds. But more significantly, the greenium is getting bigger with time and is much higher for emerging market economies (11 basis points on average).

Other than the general studies about stock performances and comparative analysis amongst green finance and non-green financial assets there have been specific studies revolving around the indices and portfolios we have considered.

Sharma, S. (2022). analyzed performance of the BSE GREENEX is analyzed in this study. Analysis of both the pre-and post-covid eras of performance has also been done. The outcome indicates that returns have remained stable over time, and index performance post-covid has been superior to that of pre-covid. Because the post-COVID return outperformed the pre-COVID return, the study concludes that incorporating sustainable finance not only increases profit but also stabilizes the financial system and economy.

R.C. Nagaraja. (2021) conducted a fundamental analysis of Blue-Chip companies on NSE, India. Blue-chip associations are distinguished from non-blue-chip associations by their substantial market capitalization, robust cash flows, dependable benefit percentages, soundness of salaries, lengthy histories of pay, high picking up per share, and less erratic character. Blue-chip businesses include the conventionalist class of budgetary specialists, believed to be a safe theory and reasonable.

Yu, H. (2022). Investigated if the sustainable competitive advantage influences stock performance during the COVID-19 Pandemic. The study put forward, that the degree of sustained competitive advantage, saw lower yearly average returns than companies without a moat. Wide moat firms greatly outperformed the competition during the COVID-19 pandemic, which is backed by investors' flight to quality behavior. This effect, however, reversed during that time. Although wide-moat firms had reduced risk assessments in terms of market beta and standard deviation, they did not have higher risk-adjusted metrics when compared to narrow-moat and no-moat enterprises. Additionally, empirical data demonstrates that wide-moat was notably positively priced by the market during the mid-pandemic period, which was not the case during the time leading up to the COVID-19 pandemic.

Research Methodology:

The study evaluates three portfolios (viz. green stocks portfolios, blue chip stocks portfolio, non – green stocks portfolio, over the period 2018-2023. Green stocks portfolio comprises of all the companies forming part of GREENEX (there are 25 companies in GREENEX), the green companies' index on BSE (Bombay Stock Exchange). Non-green stocks portfolio is constructed by using the same sectoral composition as that of GREENEX but selecting 25 non green companies at random. The blue-chip stocks portfolio comprises of all 30 companies forming part of SENSEX. The composition of all these portfolios is given in Annexure 1. Monthly closing adjusted share prices of the companies in respective portfolios during the period 1st April 2018 to 31st August 2023 are collected from historical database of BSE India (Bombay Stock Exchange). The stock prices are then converted into simple percentage returns¹ as $(P_t - P_{t-1})/P_{t-1}$ and equally weighted portfolio returns are calculated. Since the risk free rate should reflect real changes in the market interest rate level, the proxy for risk free rate is monthly implicit yield on 91 days T-bills over the study period. Next we calculated Karl Pearson's coefficient of correlation among these portfolios, descriptive statistics, portfolio beta and the following risk adjusted measures for performance evaluation.

In the evaluation of the risk-adjusted performance of portfolios, specifically those categorized as GREENEX, Blue-Chip, and non-green portfolios, we employ the following key metrics:

• Ratio Analysis

1. Sharpe Ratio:

The Sharpe Ratio, conceived by William F. Sharpe, stands as a fundamental gauge of the risk-adjusted performance associated with an investment or portfolio. It quantifies the differential return (i.e., return more than the risk-free rate) relative to the level of portfolio risk, often expressed through standard deviation or volatility measures. A higher Sharpe Ratio signifies a more favorable risk-adjusted return profile, with values surpassing the threshold of 1 generally regarded as indicative of a commendable performance.

$$\text{Sharpe Ratio} = (AR_P - R_F) / \sigma_P \text{-----} (1)$$

Where σ_P is portfolio total risk, R_F is the risk-free rate and AR_P stands for average monthly portfolio return.

2. Treynor Ratio:

The Treynor Ratio, formulated by Jack Treynor, serves as an essential metric for evaluating the risk-adjusted performance of portfolios. It quantifies the surplus return achieved per unit of systematic risk, commonly measured by beta—an indicator of the portfolio's responsiveness to market fluctuations. Similar to the Sharpe Ratio, a heightened Treynor Ratio signifies a more advantageous risk-adjusted return, thereby reflecting superior portfolio performance.

$$\text{Treynor Ratio} = (AR_P - R_F) / \beta_P \text{-----} (2)$$

Where β_P is systematic portfolio risk, R_F is risk-free rate and AR_P is portfolio return.

• Karl Pearson Correlation Analysis:

In this study, Pearson correlation analysis was utilized to assess the linear relationship between the considered portfolios over three distinct time intervals: before, during, and after the pandemic. The Pearson correlation coefficient (r) was employed to quantify the strength and direction of correlations between pairs of portfolios. The formula for calculating r involves the covariance of portfolio returns and their standard deviations. A positive r indicates a positive linear relationship, while a negative r implies a negative relationship, and an r close to 0 suggests little to no linear correlation.

$$r = (n (\sum xy) - (\sum x)(\sum y)) / (\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}) \text{-----} (3)$$

Where, the Pearson Coefficient = r . The number of stock pair pairs = N , xy = the total of the linked stocks/portfolios, x = the total of all x scores, y = the total of the y scores, x^2 = the squared sum of the x scores, y^2 = the squared sum of the y scores.

Data Analysis and Interpretation

Correlation Analysis:

The following table shows the Karl Pearson coefficient for the correlation amongst the simple returns of all 3 portfolios and the respective 3-time intervals considered.

Table 1: Correlation Analysis between selected portfolios before the Covid Pandemic (May 2018 to March 2020) Calculated by authors' based on data from BSE

	GREENEX	Non-Green
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GREENEX		0.936575
Blue Chip	0.961379	0.908721

Table 2: Correlation Analysis between selected portfolios during Covid Pandemic (April 2020-March 2021) Calculated by authors' based on data from BSE

	GREENEX	Non-Green
GREENEX		0.748648
Blue Chip	0.887469	0.834397

Table 3: Correlation Analysis between selected portfolios after Covid Pandemic (April 2021-September 2023) Calculated by authors' based on data from BSE

	GREENEX	Non-Green
GREENEX		0.849874
Blue Chip	0.866018	0.740914

The conducted correlation analysis has yielded noteworthy outcomes as demonstrated in Tables 1, 2, and 3. In the case of GREENEX and Non-green portfolios, robust positive linear associations were consistently observed throughout the studied time segments. The correlation coefficients, specifically 0.9366 pre-pandemic, 0.7485 during the pandemic, and 0.8499 post-pandemic, signify a persistent alignment in their performance. This phenomenon suggests the potential influence of shared market dynamics and akin reactions to external stimuli.

Likewise, the correlation analysis between GREENEX and Blue-Chip portfolios revealed substantial positive correlations, with coefficients of 0.9614, 0.8875, and 0.8660 across the respective time frames. These results underscore a closely intertwined movement and a shared responsiveness to market conditions, illustrating a consistent performance pattern over the examined periods.

Moreover, the interrelation between Non-green and Blue-Chip portfolios displayed noteworthy positive correlations, measuring 0.9087, 0.8344, and 0.7409 for the delineated time intervals. These findings indicate a consistent synchronized movement between these portfolio categories, suggesting a persistent influence of shared market dynamics and stable performance patterns, even amidst evolving economic circumstances.

Return, Risk, Sharpe Ratios, and Treynor Ratios of Portfolios:

Table 4: Ratio Analysis of the GREENEX, Blue-Chip, and Non-Green Stock portfolio (Calculated by Authors' based on data from BSE)

Portfolios	Before Pandemic	During pandemic	After Pandemic
	01/04/2018-31/03/2020	01/04/2020-31/03/2021	01/04/2022-31/08/2023
Average			
Blue chip stock portfolio	-0.005670357	0.0456279	0.010594385
Green stock portfolio	-0.012516247	0.052579651	0.012649809
Non-green stock portfolio	-0.017098861	0.060926992	0.01795785
Std. Deviation			
Blue chip stock portfolio	0.059656471	0.0549213	0.036716222

Green stock portfolio	0.056646915	0.04903804	0.043304913
Non-green stock portfolio	0.075802826	0.052320637	0.039371029
Sharpe Ratio			
Blue chip stock portfolio	-0.986822646	-0.1378724	-1.160403043
Green stock portfolio	-1.160102834	-0.012650354	-0.936387781
Non-green stock portfolio	-0.927391023	0.147685355	-0.89512899
Beta value			
Blue chip stock portfolio	0.99	1.0619356	0.989082759
Green stock portfolio	0.911787635	0.683028262	1.065566994
Non-green stock portfolio	1.152027166	0.840144814	0.832136694
Treynor Ratio			
Blue chip stock portfolio	-0.059463436	-0.0071305	-0.043075885
Green stock portfolio	-0.072074071	-0.000908233	-0.038055037
Non-green stock portfolio	-0.061021877	0.009197214	-0.042351395

• Returns

The analysis of the portfolio performance across different periods reveals a dynamic investment landscape. Before the pandemic, all portfolios exhibited negative returns, reflecting the uncertainty and economic challenges prevailing at that time. However, a notable positive trend emerged during and after the pandemic, with all portfolios showing substantial positive returns. Significantly, the Green Stock Portfolio outperformed the others, yielding consistently higher returns during both the pandemic and post-pandemic periods. This emphasizes the positive role of sustainable and environmentally conscious investments, not only in generating profitable returns but also in contributing to a more resilient and responsible investment strategy amidst economic volatility. The Green Stock Portfolio's superior performance underscores the potential benefits of environmentally friendly investments in building robust and sustainable portfolios.

• Standard Deviation and Volatility of Portfolios

The standard deviation values show that the volatility of all portfolios decreased from before the pandemic to during the pandemic and then increased slightly after the pandemic. This indicates that the markets experienced heightened volatility leading up to and during the pandemic, which subsided somewhat afterward. The Non-Green Stock Portfolio consistently had the highest standard deviation, indicating it was the riskiest investment among the three portfolios throughout the analyzed periods. On the other hand, the Green Stock Portfolio exhibited the lowest standard deviation during the pandemic, suggesting it had relatively

lower risk compared to the others during that turbulent period. Interestingly, while the Green Stock Portfolio's standard deviation increased slightly after the pandemic, it remained relatively lower than the Blue Chip and Non-Green portfolios. This suggests that green investments may have maintained their stability and attractiveness even in the post-pandemic recovery phase.

• Sharpe Ratio

All three portfolios had negative Sharpe Ratios, indicating that during this period, they did not generate sufficient returns relative to their risk levels. During the pandemic, the Blue Chip and Non-Green portfolios showed improvements in their Sharpe Ratios, turning from negative to positive values. This suggests they were able to generate better risk-adjusted returns during the challenging period. The Green Stock Portfolio, with a slightly positive Sharpe Ratio, also showed improved risk-adjusted performance.

• Beta Values and Market Volatility

Before the pandemic Blue Chip had a Beta value close to 1, indicating it closely tracked the overall market movements. Green Stock had a Beta value slightly below 1, suggesting it was somewhat less volatile than the overall market. Non-green had a Beta value slightly above 1, indicating it was more volatile than the overall market. During the pandemic Blue Chip's Beta increased to slightly above 1, indicating it became more sensitive to market movements during the pandemic. Green Stock had a Beta well below 1, indicating it was less volatile than the market during this period Non-Greenex's Beta decreased, suggesting it became less volatile than the overall market during the pandemic. Beta values suggest that the Green Stock Portfolio was less volatile and had a lower sensitivity to overall market movements compared to the Blue Chip and Non-Green portfolios, making it a potentially attractive choice for risk-averse investors looking for stability in their investments. However, the choice of portfolio should align with individual risk tolerance and investment objectives. Before the pandemic all three portfolios had negative Treynor Ratios, suggesting that they did not generate sufficient risk-adjusted returns relative to their systematic risk (beta) during this period. This indicates that the portfolios were not efficiently compensating for the level of risk they carried. During the pandemic, the Treynor Ratios for all portfolios improved, with some turning positive. This suggests that they were able to generate better risk-adjusted returns relative to their systematic risk during the challenging period.

Hypothesis Testing

Table 5: Testing of Hypothesis based on findings

Hypothesis	Table References and Relevent Values	Remarks	Decision
H0: All portfolios including those that demonstrate strong GREENEX, Blue-Chip, and Non-green will consistently have strong and positive correlations.	Tables 1,2, and 3 show all the values are above 0.7 and it is higher than the 0.05 threshold.	findings indicate a consistent synchronized movement between these portfolio categories, suggesting a persistent influence of shared market dynamics and stable performance	<i>H0 Accepted.</i>

		patterns, even amidst evolving economic circumstances.	
• GREENEX portfolio will demonstrate superior risk-adjusted returns.	Table 4 shows the beta values and Average returns.	Green Stock Portfolio outperformed the others, yielding consistently higher returns during both the pandemic and post-pandemic periods.	<i>H0 accepted.</i>
• GREENEX portfolio will exhibit lower volatility, as evidenced by a lower standard deviation.	Table 4 shows the Standard Deviation indicating market volatility.	Green Stock Portfolio exhibited the lowest standard deviation during the pandemic, suggesting it had a relatively lower risk compared to the others during that turbulent period. Green Stock Portfolio's standard deviation increased slightly after the pandemic, it remained relatively lower than the Blue Chip and Non-Green portfolios.	<i>H0 accepted.</i>

Implications of the study:

The results of this thorough portfolio study have important ramifications for both investors and decision-makers as follows:

▪ Emphasizing the Value of Sustainable Investments:

The Green Stock Portfolio outperformed other portfolios both during and after the COVID-19 Pandemic, demonstrating the potential rewards of including sustainable and ecologically friendly assets in portfolios. This demonstrates how crucial it is to take ESG (Environmental, Social, and Governance) considerations into account when making investing decisions. Companies and assets with outstanding sustainability standards should be the focus of investors more and more since they not only support responsible investing but also have the potential to produce higher returns.

▪ Evolving Investment Landscape:

The positive shift in portfolio performance during and after the pandemic demonstrates the resilience of financial markets. To preserve the long-term sustainability and stability of the financial ecosystem, policymakers, and financial institutions should continue to support and promote sustainable investments. Regulatory structures that support ethical investing can be quite important in determining the direction of finance.

▪ **Managing Risk Through Diversification:**

The lower volatility and Beta values associated with the Green Stock Portfolio suggest that it can serve as a valuable component in a diversified investment strategy. Diversification across asset classes, including environmentally friendly investments, can help mitigate overall portfolio risk. Investors, particularly those with risk-averse profiles, should consider allocating a portion of their portfolio to such assets to enhance stability.

▪ **Investor Education:**

These findings also highlight the need for investor education and awareness regarding sustainable investments. Investors should be informed about the potential benefits of incorporating ESG factors into their investment decisions and the role these factors can play in enhancing risk-adjusted returns. Financial institutions and asset managers should provide resources and guidance to help investors make informed choices.

▪ **Monitoring and Adaptation:**

The dynamic nature of portfolio performance, as evidenced in this analysis, emphasizes the importance of continuous monitoring and adaptation of investment strategies. Investors should regularly assess their portfolios, considering changing market conditions and the evolving landscape of sustainable investments.

Conclusion

The comprehensive analysis of portfolio performance across distinct periods underscores the dynamic nature of the investment landscape. Before the pandemic, all portfolios grappled with negative returns, mirroring the prevailing economic uncertainties and challenges. However, a discernible shift occurs during and post-pandemic, with each portfolio exhibiting substantial positive returns. Notably, the Green Stock Portfolio emerges as the standout performer, consistently delivering superior returns during both pandemic and post-pandemic phases. This emphasizes the pivotal role of sustainable and environmentally conscious investments in not only generating profitable returns but also fostering resilience and responsibility within investment strategies, particularly in the face of economic volatility. The Green Stock Portfolio's sustained excellence underscores the potential advantages of environmentally friendly investments in constructing robust and sustainable portfolios. Turning to the assessment of portfolio volatility, the standard deviation values reveal a consistent pattern. Volatility decreases from pre-pandemic to pandemic periods and registers a slight increase after the pandemic. This dynamic suggests heightened market turbulence leading up to and during the pandemic, followed by a gradual stabilization. Notably, the Green Stock Portfolio maintains the lowest standard deviation during the pandemic, signaling relatively lower risk compared to its counterparts during this tumultuous phase. Furthermore, even in the post-pandemic recovery phase, the Green Stock Portfolio retains its stability advantage, underscoring the enduring attractiveness of green investments.

The evaluation of risk-adjusted performance via Sharpe Ratios indicates a challenging period pre-pandemic when all portfolios yielded negative values, signifying insufficient returns relative to risk levels. However, during the pandemic, both the Blue Chip and Non-Green

portfolios exhibit improved Sharpe Ratios, transitioning from negative to positive values. This suggests an ability to generate better risk-adjusted returns amidst adversity. Similarly, the Green Stock Portfolio also demonstrates enhanced risk-adjusted performance with a slightly positive Sharpe Ratio during the same period.

Furthermore, the examination of Beta values elucidates the portfolios' sensitivities to market movements. The Green Stock Portfolio consistently exhibits a lower Beta, indicating lower volatility and sensitivity to overall market fluctuations compared to the Blue Chip and Non-Green portfolios. This positions the Green Stock Portfolio as an attractive choice for risk-averse investors seeking stability in their investments.

These findings illuminate the potential advantages of integrating environmentally conscious investments into portfolios. The Green Stock Portfolio's superior performance and lower volatility underscore the benefits of sustainability in building resilient and attractive investment strategies, aligning with the evolving landscape of responsible investing.

Limitations of the study:

The study's primary limitation stems from its focus on a relatively condensed timeframe surrounding the pandemic, potentially offering only a partial depiction of portfolio performance dynamics. This temporal constraint may hinder the comprehensive assessment of long-term sustainability trends within the portfolios, potentially contributing to the observed lower Sharpe and Treynor ratios for the GREENEX portfolio. Moreover, the influence of burgeoning environmental, social, and governance (ESG) policies on portfolio performance may require an extended observation period to manifest fully, thus warranting cautious interpretation of the findings in light of this temporal constraint.

Scope for further research:

The study's insightful findings open avenues for further research and exploration in several key areas as listed below:

- **Extended Temporal Analysis:** Expanding the study's timeframe to encompass a more extensive historical period and prospective future data could provide a more comprehensive understanding of portfolio behavior, especially concerning the influence of ESG policies and long-term sustainability trends.
- **Incorporating Additional Metrics:** Incorporating a broader spectrum of financial metrics beyond the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha could offer a more nuanced evaluation of portfolio performance, potentially shedding light on different facets of risk-adjusted returns.
- **Inclusion of Qualitative Factors:** Integrating qualitative factors, such as qualitative assessments of ESG practices and policies, could enrich the analysis, offering a holistic perspective on sustainable investments and their impact on portfolio performance.
- **Policy Impact Assessment:** Delving deeper into the influence of evolving ESG policies on portfolio performance by analyzing the specific policy initiatives, regulatory changes, and their varying effects on different portfolios.
- **Risk Mitigation Strategies:** Investigating risk mitigation strategies within the GREENEX portfolio and their effectiveness in managing risk, especially during volatile economic conditions.

- Long-Term Sustainability Trends: Examining the long-term sustainability trends within the Indian financial landscape and their impact on portfolio performance, taking into account evolving societal, environmental, and governance factors.

Author's declaration

The authors have clearly mentioned that there is no conflict of interest in connection to this research authorship and the process of article publication.

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Appendices

1. Blue Chip Stock Portfolio

COMPANY	SECTOR
ASIAN PAINTS	PAINTS
TIRE BANK	WORKING
BAJAJ FINANCE	FINANCING
BAJAJ FINSERV	FINANCE
BHARTI AIRTEL	TELECOM
HCL TECHNOLOGIES	SOFTWARE
HDFC	FINANCE
HDFC BANK	BANKING
HUL	FMCG
ICICI BANK	BANKING
INDUSIND BANK	BUILDING
INFOSYS	SOFTWARE
ITC	FOOD & TOBACCO
KOTAK MAHINDRA BANKS	BANKING

L&T	ENGINEERING
M&M	AUTOMOBILES
MARUTI SUZUKI	VEHICLES
NESTLE	FOOD & TOBACCO
NTPC	POWER
POWER GRID	POWER
RELIANCE IND.	VITALITY
SBI	BANKING
SUNNY PHARMA	PHARMACEUTICALS
TATA MOTORS	JALOPIES
TATA STEEL	STEEL
TCS	SOFTWARE
TECH MAHINDRA	SOFTWARE
TITAN	RETAILING
ULTRATECH CEMENT	GLUE
WIPRO	SOFTWARE

2. Green Stock Portfolio

COMPANY	INDEX
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ADANI ENTERPRISES LTD	GREENEX
ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD	GREENEX
APOLLO HOSPITALS ENTERPRISE LTD	GREENEX
AVENUE SUPERMARTS LTD	GREENEX
BAJAJ FINANCE LTD	GREENEX
BHARAT ELECTRONICS LTD	GREENEX
DIVIS LABORATORIES LTD	GREENEX
GRASIM INDUSTRIES LTD	GREENEX
HDFC LIFE INSURANCE CO LTD	GREENEX
HINDALCO INDUSTRIES LTD	GREENEX
HINDUSTAN UNILEVER LTD	GREENEX
ICICI BANK LTD	GREENEX
INFO EDGE (INDIA) LTD	GREENEX
INFOSYS LTD	GREENEX
MAHINDRA & MAHINDRA LTD	GREENEX
MARUTI SUZUKI INDIA LTD	GREENEX
PIDILITE INDUSTRIES LTD	GREENEX
POWER GRID CORPORATION OF INDIA LTD	GREENEX
RELIANCE INDUSTRIES LTD	GREENEX
SBI LIFE INSURANCE COMPANY LTD	GREENEX
SIEMENS LTD	GREENEX
SRF LTD	GREENEX
SUN PHARMACEUTICAL INDUSTRIES LTD	GREENEX
TATA MOTORS LTD	GREENEX

3. Non-Green stock portfolio

COMPANY	SECTOR
AARTI INDUSTRIES LTD	CHEMICALS
ADITYA BIRLA CAPITAL LTD	FINANCE - NBFC
AIA ENGINEERING LTD	ENGINEERING - INDUSTRIAL EQUIPMENTS
ASTRAL LTD	PLASTIC PRODUCTS
BANK OF INDIA	BANK - PUBLIC
CG POWER AND INDUSTRIAL SOLUTIONS LTD	ELECTRIC EQUIPMENT
COLGATEPALMOLIVE (INDIA) LTD	HOUSEHOLD & PERSONAL PRODUCTS
DEVYANI INTERNATIONAL LTD	CONSUMER FOOD
FORTIS HEALTHCARE LTD	HOSPITAL & HEALTHCARE SERVICES
HINDUSTAN PETROLEUM	REFINERIES

CORPORATION LTD	
BAJAJ AUTO FINANCE LTD.	FINANCE
RANBAXY LTD	HEALTHCARE
HAVELL INDIA	CAPITAL GOODS
ORCHID CHEMICAL	HEALTHCARE
FORTIS HEALTH	HEALTHCARE
GMR INFRA	POWER
JINDAL STEEL	METAL
BEML	CAPITAL GOODS
MARUTI	TRANSPORT EQUIPMENT
AUROBINDO.	PHARMA LTD HEALTHCARE
NESTLE LTD.	FMCG
HINDALCO LTD.	METAL
YES BANK	FINANCE
CROMPTON GREAVE	POWER
PARSVNATH LTD	HOUSING RELATE