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Macroeconomic Variables and Market Performance: A Case of Sustainability Criterial Companies

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Abstract

The demand for sustainability in human society comes from the basic defining feature of economics, i.e., scarcity. Sustainability indices are thematic stock market indices that evaluate the sustainability performance of listed companies. These indices help determine the impact of a company's operations with respect to its carbon footprint, recycling performance, sustainable R&D, societal upbringing, etc. This study analyses the impact of India's macroeconomic factors such as Inflation, GNI growth, HDI and Unemployment on the market performance of sustainability compliant companies included in NSE 100 ESG index. The Panel Vector Autoregressive (PVAR) method has been applied due to the absence of cointegration between the variables. The fixed effect panel regression results disclose that the monthly stock price of these companies have positive significant relationship with its own lag values and that of HDI, while the relation is insignificant for inflation and unemployment. For GNI, only the second lag shows a significant impact implying that it might have a delayed impact on the dependent variable as reflected in the later time periods, hence signifying a long run effect.

Keywords: Macroeconomic Factors, Sustainability, Indian Stock Market, Panel Vector Autoregression, NSE 100ESG Index

Introduction

The Cambridge dictionary defines the word "Sustain" as "to cause or allow something to continue for a period of time". The concept of sustainable development started to be widely used after its introduction in the Brundland report titled "Our Common Future" in 1987, published by the United Nations Brundland Commission. The same report defines the word "sustainability" as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." The demand for sustainability in human society comes from the basic defining feature of economics, which is scarcity, viz., unlimited human wants and needs to be fulfilled with limited resources. Sustainable growth is an umbrella concept that is all pervasive. One such concept is sustainability in the capital market. Sustainability in the capital market refers to the integration of environmental, social, and governance (ESG) factors into investment decision-making. It is about investing in companies that operate in a way that aligns with long-term sustainability goals and promotes sustainable development. In recent years, sustainability has become increasingly important in the capital market due to growing concerns about climate change, social inequality, and corporate governance. ESG determines how companies incorporate sustainability practices as a part of their primary business operations. In fact, researchers have argued that ESG is the next revolutionary step in the corporate world after CSR (Cini & Ricci, 2018).

Stock Market

The stock market plays a vital role in the economy. It serves as a mechanism for mobilising capital, an economic indicator, a job creator, a wealth creator, and a source of liquidity. The stock market provides benefits to investors, companies, and the overall economy. Many researchers have argued that the stock market is a leading indicator

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of economic growth as well as crisis (Comincioli, 1995), and its performance affects the economic growth of the country.

The Indian stock market is a major component of the Indian capital market. The two major open stock exchanges, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE), provide a platform for trading in millions of stocks each day. The NSE, founded in 1992, is now the largest stock exchange in India in terms of market capitalisation. Both the NSE and BSE play a significant role in the Indian stock market, and investors can trade in securities listed on both exchanges. However, the NSE is generally considered to be more technologically advanced and has a larger share of trading volumes, while the BSE is known for its history and tradition.

Sustainablity Indices

Sustainability indices are thematic stock market indices that are used to evaluate the sustainability performance of listed companies. The purpose of these indices is to determine the impact of a company's operations with respect to its carbon footprint, recycling performance, sustainable R&D, societal upbringing, etc. The Dow Jones STOXX Sustainability indices, launched in 1999, were the first indices of their type to measure the sustainability performance of European companies. There are several other international indices currently in the market, like the FTSE4Good Index, ECPI ESG Indices, MSCI ESG Leaders Index, etc. In India, the Bombay Stock Exchange (BSE) launched BSE Carbonex and BSE Greenex for measuring the carbon footprint and climate change risk practices of the BSE listed companies in 2010. NSE also launched the NIFTY 100 ESG, NIFTY 100 Enhanced ESG, and NIFTY 100 ESG Sector Leaders Index. This study deals with the companies listed in the NIFTY100 ESG index, analysing their impact on the growth and development of India's economy.

NIFTY100 ESG Index

The NIFTY100 ESG index was launched by the National Stock Exchange on March 27, 2018, with the base date being April 1, 2011. The index was created to track the performance of companies that meet certain Environmental, Social, and Governance (ESG) criteria. The score is calculated using various parameters such as carbon emissions, resource efficiency, labour standards, human rights, corporate governance, and diversity, among others. The Nifty 100 ESG index aims to promote sustainable investing and encourage companies to adopt ESG practices, as well as help investors identify companies that are committed to responsible business practices. Currently, there are 89 companies included in the index. Each stock is weighted as per its free, market capitalisation and ESG score. There is also a ceiling on the number of companies from the same sector to be included which is lower of 5 times the weight of the stock or 8%, whichever is lower. This makes the index well diversified. Companies engaging in the business of tobacco, alcohol, controversial weapons, and gambling operations, and those in the controversy category of 4 and 5 have been excluded from the index thus maintaining the integrity of the ESG score. As of March 2023, some of the renowned blue chips stock included in the index are Infosys, Reliance Industries, Tata Consultancy Services, State Bank of India, Bajaj Finance, etc.

Literature Review

A similar study conducted by Kishan (2022) examined the impact of the macroeconomic- variables, GDP, Stock Market, Forex rate, Inflation, M3, Unemployment, IIP on sustainable stock investments of S&P BSE CARBONEX, S&P BSE GREENEX for the period of 2012 to 2021 using multi regression analysis. They concluded that GDP, stock market return, FOREX rate and unemployment has positive with the S&P BSE CARBONEX returns while in case of S&P BSE GREENEX, GDP, inflation, M3, Unemployment, and IIP have significant impact on the index.

Kaur and Chaudhary (2021) studied the relationship between the S&P BSE Carbonex index and various macroeconomic variables viz, Consumer Price Index (CPI), the exchange rate, foreign exchange reserves, and interest rate using cointegration, Vector Error Correction Model, and Variance Decomposition analysis. Their findings revealed a long-run equilibrium among the macroeconomic variables with sustainable stock prices.

A study done in the Brazilian stock market for the period of 5 years from 2005 to 2010 compared the sustainable

investment portfolio with that of market index and other sectoral indices using the liquidity level, risk and return indicators and Sharpe, Treynor, Sortino, and Omega performance measures. They showed that Sustainable investments have although helped in improving the liquidity and lowering the diversifiable risk but couldn't gain financial performance as was expected by them (Fogliano de Souza & Samanez, 2013).

Issah and Antwi (2017) in their work investigated the role of macroeconomic variables on UK firms' performance. They studied the relationship between Return on Assets (ROA) and 59 macroeconomic variables using Principal Component Analysis (PCA) and multiple regression. They concluded that while forecasting the firm's performance, it is important to take into account the macroeconomic variables since they improve the model's prediction capacity. They further concluded that a firm's performance is affected drastically by the lagged values of ROA as well as macroeconomic variables.

The research study of Abbas et al. (2018) was conducted on stock market data from the G-7 countries for the period of July 1985 to June 2015 focused on analysing the stock market volatility and the relationship between stock market returns and 7 macroeconomic variables namely Industrial production index, consumer price Index, broad money supply, treasury bill rate, exchange rate with respect to the US dollar and crude oil price in local currency. They used the GARCH and Vector Autoregressive models respectively for the purpose. They concluded that although the volatility at individual level of each country was weak but the collective influence are highly significant. VAR results reflect that except UK, all other G7 countries have a bi-directional causality between stock market volatility and macroeconomic volatility.

A study on the Korean stock market was conducted by Kwon (1998) to enquire about the effect of macroeconomic variables on the Korean Stock market. Macroeconomic variables used in the study were Foreign Exchange rate, trade balance, industrial production and M1 money supply. A cointegration test was used to analyse the data. In order to establish the causal relation between the stock market indices and macroeconomic variables, Granger Causality test was used. Vector Error Correction model was used to avoid differencing and ultimately loss of information. The findings on this study were surprisingly different from that of Fama (1991). In other words, the study suggested that except for the production index, all other macroeconomic variables are not majorly influenced by the stock market index.

The research paper of Chelawat and Trivedi (2016) attempted to analyse the influence of ESG performance of Indian companies on their financial performance using panel data regression model. Data was collected on NSE CNX 100 companies and they were classified into two groups of those that are in ESG index and their counterparts. Time frame of the study was 2009–2014. Financial performances of the companies were measured both from the accounting as well as market based perspective. For the former, variables like Return on Capital Employed, Return on Assets and Return on Net Worth were used, while in case of later they used Stock market return, Market volatility of the stocks and Tobin's Q. They found that the ESG has a significant impact on the return on capital and hence financial performance is boosted by superior ESG performance.

A similar research conducted on 65 Indian limited companies listed on the NSE ESG 100 for the period of 2015 to 2017 suggested that good ESG performance enhances financial performance. It was also suggested that India should adopt the concept of sustainability reporting including disclosure if ESG scores of the compliant firms (Dalal & Thakker 2019).

Asravor and Fonu (2021) used ARDL Cointegration test to study the long- and short-term relationship between the macroeconomic variables and Stock market returns of the Ghanaians economy for the period of 1992 to 2017 using the monthly data of GSE (Ghana stock exchange) index. They identified the existence of cointegration between macroeconomic variables and stock market returns and stock market development. Further they also found that the log of FDI and interest rate have a positive impact on stock market development.

López et al. (2007) tried to find evidence to prove that adoption of sustainability practices under the CSR initiative improves the corporate performance. For these purposes they used several accounting indicators like profit before tax, revenue growth, profit margin, capital employed, return on asset and cost of capital while controlling for total assets. They have left out market based returns since the latter can be noisier. They have used regression analysis and Mann-Whitney test

to undertake their study. Their findings seconded their hypothesis. They found that the firms that were CSR compliant performed differently than those that weren't. In other words, a negative impact was seen in the short term.

Mahali and Ansari (2024) used a panel data regression model to examine the link between income diversification and financial sustainability of microfinance institutions in India from 2016 to 2023. Their study findings revealed a lack of connection between expansion of income sources and financial self-sustainability. They argued that banks should give more preference to focused strategies than to income diversification.

Recent studies in the Indian stock market have proved that the NSE ESG 100 index have performed better than Nifty 50 index. One such study by Tiwari et al. (2022) used descriptive statistics and a paired t-test to compare the returns of both the indices from the period of 1st April 2011 to 22nd September 2022. During the period of COVID-19 and Russia-Ukraine war the former had a lesser negative impact than that of Nifty 50.

Zhou et al. (2020) in their research paper titled, "the Effect of Firm-Level ESG Practices on Macroeconomic Performance" have argued whether the ESG practices of individual firms of a country have an effect on the macroeconomic variables using panel data of 30 countries for a period of 15 years ranging from 2002 to 2017. They have used dynamic panel technique-generalised method of moment (GMM) estimator given by Arellano and Bond (1991) to remove time invariate fixed effect. The researchers found that the firm wise Environmental and governance performance increases the GDP per capita of developing countries only. Although in case of increased social performance, both the type of countries enjoy an increased GDP per capita.

Another study by Nanda et al. (2023) tried to find the relation between macroeconomic variables and stock market performance. They used Granger Causality VECM and OLS regression to establish the relation. They found strong link between the variables in the pre-COVID pandemic era.

A study on the Istanbul stock exchange by Yilmaz et al. (2020), for the period of 2014 to 2017, tried to find the impact of companies listing in the BIST Sustainability index (SI) on its stock price and total risk. The method of event study was involved. They concluded that the event of inclusion of the companies in the BIST SI has neither a strong positive nor a significant negative impact on its market return as well as market risk. They have employed the Wilcoxon test and t-test for this purpose.

Oberndorfer et al. (2013) performed an event study on German companies on their performance after being listed in sustainability stock indices DJSI STOXX and DJSI World. They further used the GARCH model to bypass any conditional variance in the stock returns. Their findings suggested that the firms that were listed on the two indices suffered from negative return for the next few days after being listed on the exchanges. Hence the companies were penalised for being listed on DJSI STOXX and DJSI World indices.

Malchev et al. (2024) examined the relationship between financial indicators and macroeconomic variables in North Macedonia and found a significant relation between unemployment rates and the financial performance of banks. They further forecast the annual unemployment rate for 2022–2026.

Objectives

Based on the above discussions, the following objectives of the study have been developed:

- To check whether Inflation rate has an impact on market performance of the companies included in NSE 100ESG.
- To check whether Gross National Income Growth Per Capita has an impact on the market performance of the companies included in the NSE 100 ESG.
- To check whether Human development index has an impact on market performance of the companies included in the NSE 100 ESG.
- To check whether unemployment has an impact on market performance of the companies included in the NSE 100 ESG.

Based on the objectives of the study, we have constructed the following hypothesis to determine the impact of India's macroeconomic indicators on the performance of companies that meet the ESG criteria:

Hypothesis 1: Inflation rate does not have an impact on stock price.

Hypothesis 2: Gross national income growth per capita does not have an impact on stock price.

Hypothesis 3: Human development index does not have an impact on stock price.

Hypothesis 4: Unemployment does not have an impact on stock price.

Research Methodology

The data used to conduct this study are secondary in nature which was collected from the websites of Money Control and World Bank Open Database.

The time period of the study is restricted to 5 years, from April 2017 to March 2022. The monthly closing prices of the 89 stocks included in the Nifty100 ESG have been used for the analysis hence summing up the number of observations to 5340. Macroeconomic variables included in the study are inflation rate, income growth per capita, GDP per capita, and Human Development Index.

For the purpose of the study, Panel Vector Autoregressive model (PVAR) has been applied. VAR models are applied in situations where macroeconomic analyses are required to be undertaken. Due to the interdependencies among the macroeconomic variables across sectors and markets, the VAR model is ideal to capture the dynamic interdependencies in the dataset. Integrating panel dimensions to the VAR model facilitates in taking into consideration the interdependencies of the variables while maintaining the heterogeneity among the cross sections. There are two types of panels, balanced and unbalanced panels. The dataset used in this study comprise of the later nature. The reason for this is the fact that some companies have been listed in the NSE after the beginning of the study period (i.e., April 2017). The PVAR models can be helpful in analysing the idiosyncratic shocks across horizontal units and vertical time dimensions (Canova & Ciccarelli, 2013). The basic structure of PVAR model is as follows:

$$Y_{it} = C_{it} + \sum_{j=1}^{p} \lambda_{ij} Y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it}$$

Where,

Y_{it} = dependent variable of ith cross section and time period t;

C_{it} = The constant term;

$X_{i,t}$ = vector of explanatory variable of the ith cross section and time period t;

λ_{ij} and δ_{ij} = coefficients of the group denoted by i cross sections across t time periods;

μ_i= Fixed effect heterogeneous error term;

ε_{it}= error term.

Before running the PVAR, it is crucial to examine whether the variables contain a unit root or are stationary at level. For this purpose, we employ the ADF-Fisher Chi Square test. Further, we check the cointegration of the data using Kao Residual Cointegration Test (1998). As the name suggests, it is a residual based test for checking the presence of cointegration in the data.
The Kao test has several advantages over other residual-based cointegration tests, such as the Engle-Granger test. It is more robust to serial correlation in the residuals, which can lead to spurious results, and it allows for the inclusion of exogenous variables in the regression, which can improve the accuracy of the test. The null hypothesis of the Kao test is that there is no cointegration between the variables, while the alternative hypothesis is that there is cointegration. If the null hypothesis is rejected, it can be concluded that there is cointegration between the variables.

While working with panel data, it is important to choose between the fixed effect and random effect model of panel. Hausman test has been conducted to determine whether a fixed-effects or random-effects model is more appropriate for the given dataset. The null hypothesis of the Hausman test is that the coefficients from the random effects model are consistent and efficient, while the alternative hypothesis is that the fixed effects model is to be preferred.

In order to assess whether the lag values of the exogenous variables jointly impact the endogenous variables, the Wald test for cointegration (Abrigo & Love, 2015) has been used. The null hypothesis of the test is that the lag values of exogenous variables do not jointly impact the endogenous variables. Thus, it can be written as follows:

$$NH: Xt-1 = Xt-2 = 0$$

$$AH: Xt-1 \neq Xt-2 \neq 0$$

Where X is the vector of exogenous variable and Xt-n is the lag value of X.

Apart from the above tests, descriptive statistics of the data are also reported in Table 1.

Table 1: Descriptive Statistics

	Monthly Closing Price	*Inflation Rate*	*GNI Growth Per Capita*	*HDI*	*Unemployment*
Mean	1720.849	4.550270	2.740000	0.64180	6.000000
Median	794.0500	3.938826	5.400000	0.64400	5.400000
Std. Dev.	3236.253	1.198176	5.544020	0.00453	1.033538
Skewness	4.690301	0.755974	-1.218370	1.28620	-1.298529
Maximum	29465.40	6.623437	7.700000	0.64500	8.000000
Minimum	26.96000	3.328173	-7.900000	0.63300	5.300000

Interpretation

This section presents the descriptive statistics of the dataset used in the study. The mean monthly closing price is relatively high at 1720.849 units, with a large standard deviation of 3236.253 units, indicating that there is a wide range of stock prices. The skewness value is positive, indicating that the distribution is positively skewed, meaning that there are some extremely high values. The maximum value of 29465.40 confirms this, which is significantly higher than the mean and median values. The mean inflation rate is 4.55%, with a standard deviation of 1.198%. The skewness value is positive, indicating a slightly skewed distribution towards higher values. The maximum value of 6.623437% is higher than the mean and median values, suggesting that there may have been a few instances of relatively high inflation. The mean GNI per capita growth is 2.74, with a standard deviation of 5.544020. The skewness value is negative, indicating that the distribution is skewed towards lower values. The minimum value of -7.9 is significantly lower than the mean and median values, indicating that there have been instances of negative GNI per capita. The mean value of HDI is 0.641800, with a standard deviation of 0.004535. The skewness value is positive, indicating that the distribution is slightly skewed towards higher values. In the case of unemployment, the mean rate is 6%, with a standard deviation of 1.033%. The skewness value is negative, indicating that the distribution is skewed towards lower values. The minimum value of 0.633% is significantly lower than the mean and median values, suggesting that there may have been instances of very low unemployment rates (Table 1).

Table 2: Unit Root Test

Variable	*At Level*		*At First Difference*	
	Fishers Chi-Square Statistic	*Prob. Value*	*Fishers Chi-Square Statistic*	*Prob. Value*
Monthly closing price	85.022	1. 0000	1838.84	0.0000
Inflation rate	120.297	0.9997	1762.29	0.0000
GNI growth per capita	147.121	0.956	1738.36	0.0000
HDI	11.1853	1.0000	1854.68	0.0000
Unemployment	149.726	0.9395	1740.1	0.0000

The Fishers Chi-square test based on the ADF test was conducted to check for the stationarity of series using the null hypothesis that the series contain unit root. As reflected by Table 2, the p-value of all the variables are far more than 0.05, thus meaning that we fail to reject the null hypothesis and declare that the series are non-stationarity at level but in case of first difference, we reject the null hypothesis and hence prove that the series are integrated at first order. Thus, we can proceed to apply the cointegration test.

Table 3: Kao Residual Cointegration Test

Null Hypothesis: No Cointegration		
	T-Statistic	*Prob.*
ADF	0.138964	0.4447
Residual variance	75664.89	
HAC variance	53784.42	

Table 3 presents the output of Kao Residual Cointegration Test. Based on the results, the null hypothesis of no cointegration between the series is not rejected at the 5% significance level, as the t-statistic is only 0.139 and the corresponding p-value is 0.445. Since the data is not cointegrated, we will conduct VAR model instead of VECM.

Table 4: Correlated Random Effects - Hausman Test

Test Summary	*Chi-Sq. Statistic*	*Chi-Sq. d.f.*	*Prob.*
Cross-section random	238.033085	10	0.0000

Based on the output provided in Table 4, the Hausman test was conducted to compare the fixed and random effects models in panel data. The output shows that the test statistic is 238.03 with 10 degrees of freedom and a probability value of 0.0000, which indicates that the null hypothesis is rejected at any reasonable level of significance. This suggests that the fixed effects model is preferred over the random effects model, as the random effects model is not consistent or efficient.

Table 5: Fixed Effect Model

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	-373.5254	2196.816	-0.170030	0.8650
MONTHLY_CLOSING_PRICE(-1)	0.893875	0.014688	60.85904	0.0000
MONTHLY_CLOSING_PRICE(-2)	0.038488	0.014693	2.619366	0.0088
INFLATIONRATE(-1)	-29.37857	42.31980	-0.694204	0.4876
INFLATIONRATE(-2)	43.88021	42.21585	1.039425	0.2987
INCOMEGROWTHGNIPERCAPITA(-1)	-16.63687	12.64296	-1.315899	0.1883
INCOMEGROWTHGNIPERCAPITA(-2)	24.59082	12.63368	1.946450	0.0517
HDI(-1)	-19001.50	9098.862	-2.088338	0.0368
HDI(-2)	19169.64	9099.632	2.106639	0.0352
UNEMPLOYMENT(-1)	-50.44798	81.31610	-0.620393	0.5350
UNEMPLOYMENT(-2)	102.1978	81.20493	1.258517	0.2083
R-squared	0.992832	Mean dependent var		1734.464
Adjusted R-squared	0.992683	S.D. dependent var		3235.863
S.E. of regression	276.7893	Akaike info criterion		14.10478
Sum squared resid	3.57E+08	Schwarz criterion		14.23801
Log likelihood	-33450.21	Hannan-Quinn criterion		14.15159
F-statistic	6653.157	Durbin-Watson stat		2.042067
Prob(F-statistic)	0.000000			

Table 5 depicts the fixed effect model of the study. The results of the model suggest that the monthly closing price has a positive and statistically significant relation with its lagged values since the p-value is less than 5%. Moreover, the monthly closing price is positively related to the lagged value of the independent variable, INFLATIONRATE, but this relationship is not statistically significant. The monthly closing price is also positively related to the lagged values of the independent variables INCOMEGROWTHGNIPERCAPITA and HDI, but the relationship is significant only for the latter. The lag values of UNEMPLOYMENT showed a contradicting result. The first lag showed that an increase in unemployment results in decrease in stock prices. While the second lag showed that increase in unemployment results in increase in stock prices. This result is in agreement with several researches in the past (Boyd et al., 2005, Gonzalo & Taamouti, 2017). The reason being that with an increase in unemployment, the interest rates are also increased, thus rational investors opt for stock market investment.

The high value of R-square of the model, i.e., 0.993, implies that the independent variables can explain 99.3% of the variability in the dependent variable. The F-statistic is significant at the 0.05 level, indicating that the overall model is significant. The Durbin Watson value is around 2, which suggests that there is absence of auto correlation.

Table 6: Wald Test

Exogenous Variables	*F-Statistic*	*Df*	*P-Value*
Inflation	0.736886	(2, 4659)	0.4787
Income Growth	3.009001	(2, 4659)	0.0494
Hdi	2.272690	(2, 4659)	0.1031
Unemployment	2.634262	(2, 4659)	0.0719

Table 6 shows the result of the PVAR causality test. For this purpose Wald test for Cointegration has been used. Overall, based on the test results and the null hypothesis being tested, it appears that among INFLATION, HDI and UNEMPLOYMENT none of their lag values jointly impact the monthly closing price since their p-value is more than the 5% significance level, as a result we fail to reject the null hypothesis. Although the same is not true for INCOME GROWTH where the p-value is below the level of significance (0.0494), there is strong evidence to reject the null hypothesis. So we can say that the lag values of INCOME GROWTH jointly impact the monthly closing price.

Conclusion

There are various aspects that have driven the incorporation of ESG into the investment decisions. Firstly, the exponential growth of technology that gave birth to several alternatives to traditional, untenable business activities. Secondly, change in the demography of non-institutional investors to the millennial population and their awareness of potential resource crisis. Thirdly, the rise in corporate scandals in the late 20th and early 21st century and finally, the rise income inequality, demand for improved living standards, labour standards, etc.

The study investigates the effects of selected macroeconomic variables on the market performance of companies included in NSE 100ESG. The Kao Cointegration test advocates for the absence of cointegration thus providing contradicting results as compared to previous researches in Indian stock market (e.g., Vardhan & Sinha, 2015). As there is no cointegration, it implies that there is a dearth of long-term relationships among the variables.

From Table 4, it is clear that both the lagged values of the monthly closing price as well as HDI have a strong and significant influence on the dependent variable. As HDI takes into account the education level, income level and standard of living, an increased HDI increases awareness of sustainable investing, although the same is not true for other exogenous variables. In case of unemployment and inflation rate, we fail to reject the null hypothesis signifying that both the variables have no impact on the monthly price. In the case of Income growth, only the second lag shows a significant impact. This means that it might have a delayed impact on the dependent variable, which is reflected in the later time periods, hence signifying a long run effect. The variables follow a pattern where the first lag has a negative impact while the second lag has a positive impact on the dependent variable. The former suggests a negative response to the deviation from long run equilibrium, while the later suggests a delayed adjustment in a long run. This kind of pattern is mostly seen in case of non-linear relationships between the dependent and independent variables. Since this study is limited to the PVAR model, other methodologies like ARIMA or nonlinear models can also be used in future research.

The companies listed in the stock market are influenced by a multitude of factors, both internal and external, though our research has focused specifically on the factors that work on a macroeconomic level. We have tried to identify several macroeconomic factors that are responsible for the performance of companies listed in the Nifty 100ESG and their relationship with the later.

It is worth mentioning that although the full capacity of the Nifty 100ESG index is 100 stocks, there are currently only 89 stocks included in the index even though as of December 2022 there are 2,113 companies listed on the NSE. There is still plethora of large cap companies which do not meet the ESG score criteria. India is expected to become a $7 billion economy by 2030. And there is a lot of potential for growth while abiding by the sustainability norms.

There are also challenges to incorporating sustainability into the stock market, including the lack of standardised reporting frameworks, the difficulty in measuring and quantifying ESG factors, and the potential for greenwashing or false sustainability claims. Hence, this paper would offer a recommendation to the government to introduce policies and guidelines for ESG reporting and penalise companies that do not abide by the ESG score through either taxes or fines. In conclusion, sustainability is becoming a critical consideration in the stock market. Because of the change in investor demographics, recognise the importance of ESG factors in creating long-term value. By incorporating sustainability into their investment strategies, investors can not only achieve financial returns but also contribute to a more sustainable and equitable future for all.

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