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Exploring The Nexus: A Systematic Literature Review On The Performance Of Sustainability Indices In The Indian Stock Market And Their Interplay With Macroeconomic Variables.

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Abstract:

Purpose –
This research paper presents a systematic literature review, providing an in-depth overview of the dynamic landscape of sustainability indices of the Indian stock market and exploring its intersection with that of macroeconomic variables. Sustainability indices have gained prominence as valuable tools for assessing the environmental, social, and governance (ESG) performance of listed companies and have become integral for investment decision making processes. As India undergoes economic growth and strives for sustainable development, understanding the sustainability indices becomes crucial. The study systematically reviews a diverse range of scholarly articles and research papers published in reputable journals.

Methodology and approach –The sources for this study were obtained from databases including Scopus and EBSCO. The key words used to search the articles were "Macroeconomic variables" and "Stock market" or "Stock market performance". The findings revealed a substantial increase in the volume of scholarly work within the field of stock market research. The analysis was conducted for each macroeconomic variable. Due to the large number of relevant articles, the authors initially reviewed the titles and abstracts of all publications to determine their relevance. The selected papers, covering the period from 1972 to 2023, were then assessed and organized using Excel.

Findings – Research on green investing and its financial implications has yielded mixed outcomes. Indian studies, such as those on the BSE-GREENEX and CARBONEX indices, highlighted both outperformance and investor skepticism. The study concludes that GDP exerts a positive effect on the stock market performance. Interest rates, by contrast, demonstrate a negative effect. Variables like inflation, money supply, and GDP show consistent impacts on both sectoral and broad market indices, whereas the influence of other macroeconomic indicators tends to vary across sectors.

Research Limitations and Scope for Future Research – While this review offers an in-depth overview of the performance of sustainability indices and its relationship between multiple macroeconomic indicators, further research is warranted. There is a extensive scope for future studies focussed on behavioural, thematic, strategy-based, and sector-specific indices. There is also potential to incorporate additional variables—such as bank deposit growth, nonperforming assets, the consumer confidence index, and investor sentiment—using high-frequency data over extended time periods. The paper highlights the importance of expanding inquiry into mid-cap, small-cap, and other market-specific indices.

Practical Implications –This study provides useful understanding for investors, academicians, and practitioners in economics and finance, by clarifying the impact of macroeconomic variables in shaping stock market trends. It may assist in developing more informed portfolio diversification strategies, particularly when analysing sector-specific indices. Additionally, the findings offer practical guidance to mutual funds and pension funds in managing risks and optimizing equity allocations.

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Keywords:
Sustainability indices, Indian stock market, Macroeconomic variables, Literature Review, Environmental social and governance (ESG) factors, Sustainable investing.

1. Introduction:

Literature reviews play an essential role in academic research to gather existing knowledge and to examine the current state of a field (Cropanzano, 2009; Kunisch et al., 2018). In the context of financial research, particularly studies involving capital markets, a clear understanding of stock exchanges is fundamental. The stock exchange is an electronic market where stocks, bonds and commodities derivatives, such as futures and options, are traded. The stock market is generally considered the growth indicator of a country's economy (Levine and Zervos, 1998). The decision to invest funds in the stock market is induced by the performance of the stock market. Stock market performance can be affected by different macroeconomic variables (Mukherjee and Atsuyuki, 1995; Agrawalla and Tuteja, 2008).In the contemporary landscape of global finance, the integration of sustainability considerations into investment strategies has gained prominence, driven by an increasing awareness of environmental, social, and governance (ESG) factors. As investors seek avenues that align financial goals with responsible business practices, sustainability indices have surfaced as one of the essential instruments for evaluating the ESG performance of listed companies. This paper embarks on a comprehensive exploration of the performance of sustainability indices, within the dynamic framework of stock market of India, with a particular emphasis on understanding their intricate interplay with macroeconomic variables.

The Indian financial ecosystem has witnessed a notable surge in interest and participation in sustainable investing, reflecting a broader global trend. Against the backdrop of India's economic growth and the imperative for sustainable development, the role of sustainability indices takes on heightened significance. These indices not only provide investors with a lens to assess companies' commitment to ESG principles but also serve as catalysts for fostering corporate responsibility and promoting long term value creation. On the other hand, the pace of gross domestic product (GDP) growth, fiscal status, inflation rate, debt position, exchange rate and money supply circulation are all important factors in the economy's growth (Pal and Mittal, 2011). The numerous macroeconomic variables used in the various papers from around the world have been identified in this review. Interest rate, inflation rate, exchange rate, money supply, inflation were some of the common variables used in the analysis. While reviewing the literature on macroeconomic variable relation with stock return (Gavin, 1989; Ibrahim, 1999; Naik, 2013; Humpe and Macmillan, 2009a) and many other articles, it becomes apparent that there is a scope to further investigate the relationship using unexplored broad market and sectoral indexes. While the literature has extensively addressed the performance of sustainability indices in various global contexts, a systematic examination specific to the Indian stock market and its association with macroeconomic variables is notably sparse. This research aims to bridge this gap by conducting a systematic literature review, synthesizing and analysing existing scholarly works to develop patterns and trends in the understanding of this relationship.

1.1. Research objectives:

The objectives of this research paper are twofold: firstly, to synthesize and analyse existing scholarly works which critically evaluate the performance of sustainability indices within the unique context of stock market in India, considering factors such as stock market returns and volatility. Secondly, to examine the multifaceted interplay between sustainability indices and macroeconomic variables. As the global financial community grapples with the challenges of balancing economic opulence with environmental and social responsibility; understandings derived from this research are assured to contribute to informed decision-making by investors, policymakers, and corporate leaders. By

amalgamating the present knowledge, this research paper intends to provide a robust foundation, for comprehending the implications of sustainability indices and their association with macroeconomic variables in the Indian financial landscape.
The review has been planned in the following manner.
The literature has been discussed in Section 2.
Section 3 explains the methodology (including research gap).
Section 4 contain the findings and discussions.
Section 5 conclusions and future implications.

2. Systematic Literature Review (SLR)

This systematic literature review draws upon a diverse array of scholarly works, to a comprehensive examination of evolving landscape of sustainable investing. The selected studies span various methodologies, regional contexts, and analytical perspectives, thereby enriching the analysis of the interplay between financial performance, macroeconomic variables, and Environmental, Social, and Governance (ESG) considerations.
The review begins by acknowledging foundational contributions by Fama and French (1995, 1996, 1998, 2014), whose multifactor models have significantly shaped modern finance theory, particularly in evaluating asset pricing and portfolio returns. It then incorporates recent perspectives, such as the risk-adjusted assessment of ESG portfolio returns by Bruno, Esakia, and Goltz (2022), and Cardoso's (2019) exploration of ESG's growing role in investment decisions. The Indian context is examined through the work of Chelawat and Trivedi (2016), who analyzed the business value of ESG performance, while Consolandi, Jaiswal-Dale, Poggiani, and Vercelli (2009) offer insights into global ethical stock indexes.
Within this broader context, sustainable investment is described by the integration of ethical, social, and environmental concerns alongside financial returns in investment decision-making (Tripathi and Bhandari, 2015). This approach lets investors match their financial objectives with broader societal values, making it an increasingly prominent strategy for responsible investing.
Before synthesizing the key patterns identified across studies, this review presents an overview of the sustainability indices used in the Indian context—namely, BSE Greenex and BSE Carbonex—along with a summary of the macroeconomic variables frequently incorporated in such analysis. These include interest rate, rate of inflation, foreign exchange rate, money supply, and national income, which serve as foundational indicators in assessing performance of stock market.
In response to global momentum toward sustainable investing, Bombay Stock Exchange introduced two major sustainability indices in 2010—BSE Carbonex and BSE Greenex. These indices were launched to assess the climate change risks, carbon emissions performance, and energy efficiency of listed companies, aiming to support environmentally responsible investing in the Indian capital market.
BSE Greenex was the first of its kind in India, developed collaboratively by BSE, IIM Ahmedabad, and gTrade Carbon Ex Ratings Services Pvt. Ltd. It benchmarks the 20 largest and most fuel-efficient companies from the BSE-100, focusing on firms demonstrating high levels of energy efficiency and low carbon emissions. Using a unique sector-specific algorithm, it compares companies within the same industry and reviews their performance biannually based on publicly disclosed energy and financial data (Swalih & Vinod, 2017). Notably, the index considers initiatives to offset carbon emissions, capping allowable offsets at two-thirds of a company's total emissions. As Sharma (2022) notes, BSE Greenex operates within a broader ESG investment framework that coincides with sustainable development goals, green finance, and climate policy transitions.
BSE Carbonex, on the other hand, evaluates the top 100 market-capitalized firms listed on the BSE, considering their climate strategies, disclosures, carbon performance, and risk mitigation initiatives. It is designed to be industry-neutral, meaning that transitioning a portfolio from the BSE-100 to the

Carbonex does not alter sector-wise exposure, making it attractive to investors seeking both sustainability and financial stability. By maintaining the risk-return profile of the BSE-100, Carbonex allows investors to continue participating across all industries while emphasizing environmental responsibility (Moneycontrol, n.d.).

The emergence of these indices reflects a significant transformation in the Indian financial ecosystem, which has evolved rapidly in terms of market capitalization, trading volumes, investor participation, and financial instruments (Singh, 2014). According to Kumar (2014), sustainability indices such as Greenex and Carbonex not only support environmentally conscious investment but also provide a gauge for policymakers to assess investor sentiment toward sustainable development.

Despite their growing prominence, academic investigations into the comparative performance of sustainability indices like Greenex and Carbonex against conventional benchmarks such as the BSE Sensex or BSE-100 remain limited. However, research interest in this area is growing. Scholars like Sharma (2022) emphasize the relevance of Greenex in ESG investing discussions, noting its foundation in concepts like green transitions, policies, and sustainable finance. Given this emerging focus, there is a pressing need for empirical analysis to understand how these indices perform relative to traditional market indicators, particularly in the context of macroeconomic influences and investor behavior.

Initially, the studies have explored different aspects of socially responsible investing. Rangotra Rahul (2016) compared socially responsible investing with traditional investments and found that there is no difference between the two investments, but there is one exception index (energy index) whose risk is significantly higher than the others. Giannarakis et al. (2016) examined 102 companies and saw the effects of environmental performance on disclosure of company's environmental score and found that a positive relationship exists between the performance and disclosure scores on the environment. Maji and Mondal (2015) analyzed that more than 50% of green companies under-performed and found that investment decisions of companies are not affected by its eco-friendly decisions.

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Early research in this domain primarily focused on the broader field of socially responsible investing. For instance, Rangotra (2016) compared socially responsible investing with traditional investments and found no significant difference in performance—except for the energy index, which exhibited higher risk. Similarly, Giannarakis et al. (2016), in a study of 102 companies, established a favourable correlation among environmental performance and disclosure scores, suggesting that stronger environmental practices tend to be reflected in company reporting. Maji and Mondal (2015) indicated that over fifty percent of the green companies they analyzed underperformed, and concluded that eco-friendly initiatives had minimal influence on corporate investment decisions.

Subsequent research has aimed to explore the linkage between green investing, financial performance, and risk. Some studies indicate that sustainable firms can generate superior returns compared to traditional counterparts (Chan & Walter, 2014; Bensen et al., 2010; Lesser et al., 2014), particularly when sustainability is integrated into long-term business strategy. However, other research indicates that green indices often underperform relative to market-wide benchmarks (Chang et al., 2012; Climent & Soriano, 2011; Silva & Cortez, 2016). Meanwhile, a set of studies report a neutral impact, arguing that investors earn similar returns regardless of whether they invest in green or traditional indices. These studies (Mallet & Michelson, 2014; Dixon, 2010) further contend that any higher returns from green investments are likely accompanied by increased risk, reflecting the evolving and complex nature of sustainable finance.

Rajib Bhattacharya (2013) explored the growing concerns of global investors regarding environmental sustainability. According to his research, modern investors increasingly prefer to allocate capital to firms that follow sustainable practices and adopt environmentally friendly technologies aimed at reducing carbon emissions.

Divya and Shirisha (2014) analysed the association between the NIFTY, GREENEX, and CARBONEX indices, focusing particularly on the performance of BSE-GREENEX in comparison to the BSE SENSEX and BSE 500. Their findings indicated that BSE-GREENEX outperformed both benchmarks, with consistently higher daily returns during the 2008–2012 period. The study concluded that investments in green equities tend to yield superior returns relative to traditional market indices.

Kumar et al. (2013) investigated the impact of carbon credits on the securities market and identified a skewed yet symmetric correlation between carbon credits and GREENEX. In a similar context, Bammi (2013) analyzed the stock price impact following a firm's inclusion in the BSE-GREENEX index. The study, based on daily return data, revealed that existing investors responded negatively to such inclusions, indicating skepticism about the index's signaling power within the Indian capital markets.

Additional studies by Ortas and Moneva (2011), Tripathi and Bhandari (2015), Lassala, Apetrei, and Sapena (2017), and Azmi et al. (2019) compared the performance of sustainable indices to traditional ones. Nevertheless, their findings were inconclusive, reflecting the mixed nature of empirical evidence in this domain. Similarly, Rangotra Rahul (2016) compared socially responsible investing with traditional investments and observed no substantial differences between the two approaches.

Heera S. Kumar (2021) studied the connection between price movements of the S&P BSE GREENEX and selected open-ended equity mutual fund categories in India. Employing econometric models such as dynamic lag vector autoregression, cointegration, Granger causality tests, and variance decomposition, the study concluded that GREENEX exhibited a strong price movement relationship with large-cap funds. In contrast, mid-cap funds demonstrated a marginal relationship, and small-cap funds exhibited a relatively weak linkage.

Seth and Singh (2022) further analyzed the integration and causal relationships between sustainable indices (GREENEX and CARBONEX) and the traditional BSE SENSEX index. Using a suite of econometric tools—including Unit Root Tests, Johansen's cointegration test, and Granger Causality tests—on daily data from January 1, 2016, to January 1, 2021, the research showed no evidence of cointegration. This lack of long-term equilibrium relationship among the indices suggests that green and traditional indices behave independently over time.

Numerous macroeconomic variables have been consistently used in empirical studies to assess their impact on sustainability indices. A brief overview of these variables is as follows:

- **Inflation Rate**: Inflation signifies the general increase in the price level of goods and services in any economy over time. It is measured using the Consumer Price Index. A rising inflation rate erodes purchasing power and may influence investment preferences and market returns.
- **Interest Rate**: This refers to the rate at which central bank lends to the commercial banks and pays interest on deposits held by them. Commercial banks, in turn, charge interest on loans and pay interest on customer deposits. Interest rates affect borrowing costs and investment decisions, thereby affecting overall economic activity.
- **Foreign Exchange Rate**: This is the value at which one country's currency can be exchanged for another. For instance, if 1 USD equals 80 INR, the exchange rate is INR 80/USD. Exchange rate fluctuations can affect trade balances, foreign investments, and the valuation of assets held in foreign currencies.
- **Money Supply (M3)**: Representing the total quantity of money circulating in the economy at a given time, money supply is regulated by the central bank. It serves as a tool for implementing monetary policy to foster growth and control inflation.
- **Gross Domestic Product (GDP)**: GDP is the total market value of all goods and services produced within a country's borders in a specific time period, usually a year. It is a key indicator of economic performance and growth.

Recent researches have explored how these macroeconomic variables interact with sustainability indices in the Indian context:

Sharma, Shrivastava, Rohatgi, and Mishra (2023) analyzed the influence of macroeconomic variables such as the Industrial Index, Wholesale Price Index (WPI), Money Supply (M3), Crude Oil Prices, and the Real Effective Exchange Rate (REER) on the S&P BSE GREENEX and S&P BSE CARBONEX. Utilizing the Autoregressive Distributed Lag (ARDL) model on monthly data from April 2012 to March 2021, the study examined both short- and long-term relationships between these variables and the sustainability indices.

Similarly, Sehrawat, Kaur, and Vij (2022) employed the ARDL approach along with the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to investigate cointegration and volatility clustering in the sustainability indices. Their analysis incorporated macroeconomic variables including GDP, WPI, and FOREX rates. The study concluded that improvements in economic growth, exchange rate stability, and inflation control could significantly reduce volatility and enhance sustainability in financial markets.

Barik and Mishra (2023) further examined the relationships between the stock market indices and macroeconomic fundamentals such as Money Supply (M3), Foreign Institutional Investments (FIIs), Exchange Rate, Inflation, and Crude Oil Prices. Analyzing monthly data over a twenty-year period (January 2001 to December 2020), the study applied the Augmented Dickey-Fuller (ADF) test, Correlation Matrix, and Granger Causality test. The findings underscored the significance of macroeconomic indicators in shaping stock market performance in India.

In the post-liberalization era, the Indian stock market has become increasingly sensitive to a range of dynamic influences, including legislative changes, macroeconomic conditions, and both company- and industry-specific factors. The capital market and the real economy function as two interdependent

pillars of national development—neither can effectively achieve growth objectives in isolation (Tripathi & Seth, 2014).

INFLATION

One of the critical macroeconomic variables affecting the stock market is inflation. An increase in stock prices is often perceived as an indicator of economic growth, leading to increased investor wealth and, consequently, a rise in the demand for money. This in turn influences interest rates. Higher interest rates, while potentially attracting foreign capital and causing currency appreciation, can also dampen domestic investment enthusiasm.

According to Verma and Bansal (2021), inflation, however, presents a notable challenge for investors. As inflation begins to rise, investor sentiment tends to deteriorate due to concerns about its adverse impact on corporate earnings and consumer purchasing power. This uncertainty often prompts investors to withdraw or withhold capital from the stock market, leading to a decline in equity prices. Fama (1981) famously posited a negative relationship between inflation and stock prices, arguing that inflation erodes the real value of future corporate earnings, thereby reducing stock valuations.

Nonetheless, alternative perspectives exist. Kessel (1956) and Ioannidis et al. (2004) suggested that under certain conditions, inflation could positively affect stock prices—particularly when unexpected inflation benefits firms that are net debtors by reducing the real value of their liabilities, thereby increasing their equity value.

Interest rates also feature prominently in this discussion. As noted by Nishant and Shaheen (2004), rising interest rates induce a substitution effect wherein investors shift their preference from equities to interest-bearing instruments, reducing demand for stocks. This inverse relationship is further supported by studies such as those by Alam and Uddin (2009) and Hsing (2004), who found that lower interest rates generally lead to reduced borrowing costs for firms, higher expected profits, and consequently, higher stock prices.

Empirical evidence from the Indian context supports these theoretical linkages. Gopinathan and Durai (2019) analyzed the interplay between macroeconomic indicators and the Indian stock market using data from 1994 to 2018. Their findings emphasized the significant role played by inflation and interest rates in shaping stock market movements. Similarly, Raghutla, Sampath, and Vadivel (2020), employing the Fama hypothesis with data from 1990 to 2016, found a positive correlation between real output and stock prices, while confirming a negative relationship between inflation and stock prices.

INTEREST RATES

Interest rate is one of the most influential macroeconomic variables in the financial ecosystem, directly affecting economic growth and the performance of capital markets. It is essentially the *cost of capital*—from the borrower's perspective, it denotes the price paid for using borrowed funds, whereas from the lender's standpoint, it is the return on investment for extending credit (Davidson, 1996). Interest rates influence investors' decisions, corporate borrowing, and ultimately stock prices.

Davidson (1996) highlighted the direct impact of interest rate movements on stock market behavior. Similarly, Kunt and Maksimovic (1996) asserted that countries with lower interest rates tend to have stronger stock market performance, especially in developed economies where interest rates are generally more stable and predictable.

Flannery and James (1984) observed that the effect of nominal interest rate changes on stock prices depends significantly on the maturity composition of firms' assets and liabilities, with a stronger effect seen in companies with higher proportions of long-term debt. Asprem (1989) found a negative relationship between interest rates and stock prices across ten European countries, reinforcing the conventional understanding that rising interest rates tend to depress stock market valuations.

A large number of empirical studies support this negative relationship. Geske and Roll (1983), Mukherjee and Naka (1995), Alam and Uddin (2009), and Hsing (2004) consistently reported an inverse relationship between interest rate movements and stock returns. The rationale is intuitive: rising interest rates increase borrowing costs, reducing corporate profitability and future cash flows, which in turn leads to lower stock prices. Additionally, investors may shift their funds from equities to fixed-income instruments, further exerting downward pressure on stock prices.

However, this relationship is not uniform across countries or time horizons. Nasseh and Strauss (2000) revealed a positive short-run relationship and a negative long-run association between interest rates and stock prices. Wongbangpo and Sharma (2002) discovered that interest rates positively impacted the stock markets in Malaysia and Indonesia but had a negative effect in Thailand, Singapore, and the Philippines. Similarly, Elyasiani and Mansur (2004) noted that volatility in long-term interest rates led to greater volatility in bank stock returns using the GARCH model.

Rapach et al. (2005) showed that interest rates are effective predictors of stock returns across 12 countries, suggesting a global consensus on their predictive power. However, country-specific dynamics exist: Kurihara and Nezu (2006) found the Japanese stock market to be more responsive to U.S. interest rates than domestic ones, and that Japanese equities were also influenced significantly by U.S. stock prices. Lael Joseph and Vezos (2006), in contrast, found no significant impact of interest and exchange rates on U.S. bank stock prices, even when high-frequency data was used.

Sectoral differences also emerged in the findings. Hyde (2007) observed that stocks in industrial sectors in France and Germany are more sensitive to interest rate changes than others. Kandir (2008) reported a negative relationship between interest rates and stock prices in the Istanbul Stock Exchange. Humpe and Macmillan (2009) compared the U.S. and Japan and confirmed a negative impact of interest rates on stock prices in both countries.

Tripathy (2011) explored multiple macroeconomic variables—interest rate, inflation, exchange rate, and trading volume—in relation to the BSE Sensex and found all except trading volume to have a significant impact. Issahaku et al. (2013) discovered a unidirectional causality running from stock prices to interest rates in the Ghana Stock Exchange.

Focusing on South Asia, Khan et al. (2015) found that interest rates had a negative impact on stock prices in India, Pakistan, Bangladesh, and Sri Lanka. Ajaz et al. (2017) and Chang and Rajput (2018) investigated the asymmetry of interest rate effects. They concluded that while a negative relationship exists, the impact is symmetric in the long run and asymmetric in the short run, particularly in the Pakistani market. Lee and Brahmasrene (2018) found no short-term effect of interest rate changes on Korean stock prices, indicating that not all markets are equally sensitive. Anwer et al. (2019) emphasized that in emerging Islamic equity markets, changes in policy rates have limited or negligible impact due to inefficiencies in policy implementation.

In the Indian context, Gopinathan and Durai (2019) and Barik and Mishra (2023) further validated the strong linkage between interest rate variations and stock market movements using data over multiple decades. Their findings confirmed that interest rates, among other macroeconomic indicators, significantly influence market volatility and investor sentiment. Moreover, interest rate changes driven by central bank policies—such as adjustments in the repo or reverse repo rates by the Reserve Bank of India (RBI)—serve as critical signals to investors. These policy shifts influence liquidity conditions, borrowing costs, and economic growth expectations, all of which are reflected in the equity markets' movements.

In conclusion, while the majority of literature supports a negative correlation between interest rates and stock prices, the strength and direction of this relationship can vary by country, sector, and time horizon.

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MONEY SUPPLY

Money supply is a crucial macroeconomic indicator used by central banks to control inflation, stimulate economic growth, and influence liquidity in the financial system. Its effect on stock market performance has been a widely studied topic across both developed and emerging economies.

The foundational work of Rogalski and Vinso (1977) identified a bidirectional causal relationship between stock returns and money supply, indicating that movements in one can influence the other. They found a positive relationship, suggesting that as the money supply increases, stock returns tend to rise. However, they also cautioned that excessive money supply may trigger inflation, which can adversely affect stock market performance.

Building on this, Pearce and Roley (1983) introduced the distinction between anticipated and unanticipated changes in money supply. Their findings showed that only unanticipated increases in money supply lead to negative stock price reactions, while unexpected decreases lead to positive reactions, emphasizing the importance of market expectations in determining stock behavior.

Using the Vector Error Correction Model (VECM), Mukherjee and Naka (1995) found a positive long-term relationship between money supply and stock returns in the Japanese context. Similarly, Brahmasrene (2007) supported this positive linkage in his analysis, strengthening the view that liquidity expansion tends to boost stock market performance.

On a broader international scale, Fifield et al. (2002) analyzed emerging markets—including India, South Africa, Mexico, Thailand, and others—and found that money supply influenced corporate profits and equity performance, although the magnitude and direction of this effect varied across countries. Chaudhuri and Smiles (2004) also highlighted that real money supply, along with other real activity indicators like GDP and oil prices, were significantly associated with long-term stock prices, underlining macroeconomic fundamentals' role in equity valuation.

Country-specific studies offer mixed results. For instance, Ahmed and Imam (2007) found no significant impact of money supply on stock prices in Bangladesh, while Kandir (2008) reported a lack of effect on non-financial firm portfolios in the Istanbul Stock Exchange. In contrast, Barakat et al. (2015) found a positive relationship in Egypt, with a causal direction running from the stock market to money supply, whereas in Tunisia, both exchange rate and money supply were found to Granger-cause stock market movements.

In Japan, Humpe and Macmillan (2009) found that money supply had a negative long-term impact on stock prices, contrasting with their findings for the U.S. In the context of Ghana, Issahaku et al. (2013) again found causality running from stock returns to money supply, indicating that stock market performance could influence monetary policy decisions in emerging economies.

More recent studies bring additional nuance. Lee and Brahmasrene (2018) investigated the Korean market from 1986 to 2016, establishing a long-run relationship between money supply and stock prices but failing to confirm this relationship in the short term at conventional significance levels. Tiryaki et al. (2019) explored asymmetric effects of monetary policy tools in Turkey, concluding that contractionary policies had a more substantial impact on stock markets than expansionary measures.

Etale and Eze (2019) studied Nigeria and found that money supply and exchange rate positively influenced the stock market in both the long and short run, whereas inflation and interest rates had a negative impact. This reinforces the idea that while money supply generally boosts liquidity and

market performance, its impact is conditioned by other macroeconomic variables and the structural characteristics of the economy in question. The body of literature suggests that stock markets are highly sensitive to monetary conditions, and central banks' monetary policies play a crucial role in shaping investor behavior and market dynamics.

FOREIGN EXCHANGE RATES

The exchange rate is a crucial macroeconomic variable that significantly affects stock market performance, particularly in open and globally integrated economies. Gavin (1989) argued that unanticipated aggregate demand shocks, often transmitted through exchange rate fluctuations, can negatively affect stock returns. Bahmani-Oskooee and Sohrabian (1992) studied the relationship between the real exchange rate and U.S. stock prices (S&P 500) using 186 monthly observations from 1973 to 1988. Their findings indicated bidirectional causality, although no long-term cointegration was established.

Mukherjee and Naka (1995), using a Vector Error Correction Model (VECM), found a positive relationship between the exchange rate and the Tokyo Stock Exchange, suggesting that currency appreciation can enhance stock market performance. Wongbangpo and Sharma (2002) analyzed ASEAN countries and observed that the exchange rate had a positive impact on the stock markets of Indonesia, Malaysia, and the Philippines, but a negative effect in Singapore and Thailand, highlighting country-specific sensitivities.

In the Indian context, Mishra (2004) found no causal relationship between the BSE Sensex and exchange rates using monthly data from 1992 to 2002. Similar findings were reported by Kurihara and Nezu (2006) for the Japanese stock market. Conversely, Lael Joseph and Vezos (2006) observed a positive exchange rate effect on U.S. banks' stock returns.

Hyde (2007) explored the exchange rate's impact at the industry level in France, Germany, Italy, and the UK, concluding that sectoral stock returns are significantly influenced by currency fluctuations. Brahmasrene (2007) found a negative relationship between exchange rates and stock prices in Thailand, while Brooks et al. (2010) reported a positive association for Australian sectoral portfolios. Tudor and Popescu-Dutaa (2012), using Granger causality analysis, found bidirectional causality between exchange rates and stock prices in Korea, while Amarasinghe and Dharmaratne (2014) identified unidirectional causality from stock returns to exchange rates in the Colombo Stock Exchange. Similarly, Issahaku et al. (2013) found causality from exchange rates to the stock market in Ghana.

Barakat et al. (2015) studied Egypt and Tunisia and reported a long-term positive relationship between exchange rates and stock indices in both countries. In India, Gurloveleen and Bhatia (2015) showed a significant impact of exchange rate movements on the closing prices of BSE 500 manufacturing firms. Bahmani-Oskooee and Saha (2015, 2016) found that while exchange rate changes can have short-run effects on stock prices (both positive and negative), no significant long-run relationship was evident. They also highlighted asymmetric effects of exchange rate changes in the short run.

Dahir et al. (2018), focusing on BRICS countries, reported positive medium- and long-term relationships for Brazil and Russia, but a negative one for India. They found two-way causality in South Africa and no significant relationship in China. Megaravalli and Sampagnaro (2018) examined data from 2008–2016 and concluded that exchange rates are positively linked with stock markets in India, China, and Japan. Effiong and Bassey (2018) identified asymmetric impacts of exchange rate changes on the Nigerian stock market in both the short and long term.

NATIONAL INCOME

The relationship between real economic activity and stock market performance has been widely explored in empirical literature. Mukherjee and Naka (1995) and Makan et al. (2012) found a positive association between stock prices and indicators of real economic activity, suggesting that economic

growth tends to enhance performance of stock market. Similarly, Naka et al. (1998) observed that the industrial production positively influences the stock prices in India.

Fifield et al. (2002) noted that macroeconomic variables influence equity returns, although the degree of impact varies across different markets. Chaudhuri and Smiles (2004) emphasized a long-run relationship between real economic activity and real stock prices, using indicators in real terms such as private consumption, money supply, oil prices, and GDP to measure the real activity.

In the context of Bangladesh, Ahmed and Imam (2007) found no significant long-term relationship between macroeconomic variables and the Dhaka Stock Exchange index. Kandir (2008), examining the Turkish stock market, reported that stock returns from the BIST 100 index tend to increase with a rise in the Industrial Production Index (IPI).

Yartey (2010) concluded that growth in stock market is affected positively by variables such as, GDP, and per capita GDP. Similarly, Singh et al. (2011) found GDP to have a significant impact on most portfolio returns, with the exception of those composed primarily of small-cap companies.

Marques et al. (2013), using Granger causality analysis, reported a bidirectional causal relationship between stock market performance and economic growth. Interestingly, they found that economic growth was independent of the banking system, but strongly tied to stock market development. In contrast, Kapaya (2020) found a unidirectional relationship running from the stock market to GDP.

Gurloveleen and Bhatia (2015), analyzing BSE 500 manufacturing firms from 2006 to 2015, found no significant relationship between macroeconomic variables and stock performance during that period. However, Tiryaki et al. (2019) reaffirmed the positive impact of industrial production on stock market returns.

3. METHODOLOGY:

The rationale for choosing this particular area is that the sustainable investment strategy gained considerable attention from the government, institutions, public, and individuals, especially after the financial crisis 2008. Also during the crisis period, the sustainable stocks generate higher returns as compared with the composite index (Tripathi and Bhandari 2012; and Murthy, Bhandari, and Pandey 2014). As this is a review paper on the performance of sustainability indices and their relationship between macroeconomic variables. On one hand, a number of research papers examining performance of sustainability indices were identified and on the other hand substantial papers examining various macroeconomic variables were identified. Numerous studies have explored the relationship between macroeconomic variables and stock market performance, employing diverse theoretical frameworks and methodological approaches. While some researchers have identified strong linkages between variables such as inflation, interest rates, exchange rates, and GDP with stock market indices, others have reported weak or inconsistent correlations. These inconsistencies in empirical findings have been attributed to differences in time periods, country-specific factors, and analytical techniques. Previous studies have utilized various econometric models, including Vector Autoregression (VAR), Cointegration techniques, and Granger causality tests, to uncover causal relationships and to examine both short- and long term dynamics. However, the outcomes remain varied, reflecting the complexity of macroeconomic influences on financial markets.

In the reviewed literature, the effects of macroeconomic factors have been studied extensively over the period from 1972 to 2023. A wide range of variables has been considered, including but not limited to inflation, interest rates, money supply, exchange rates, and industrial production. The rationale for the selection of variables are essentially based on existing financial theories (Chen et al., 1986, Mukharjee & Naka, 1995, McMillan, 2001) along with availability of data. Hence, the macroeconomic variables are Consumer Price Index (CPI as a measure of inflation), foreign exchange rate (USD/INR), Money supply (M3) in the economy, National income-GDP and interest rates are used here as seen in existing literature. The influence of these macroeconomic variables on stock returns was found to be mixed—some studies reported positive relationships, others identified

negative impacts, while several showed no statistically significant effects. These conflicting findings further underscore the heterogeneity in data, methodologies, and market contexts. A review of such diverse and often contradictory literature prompted a broader investigation into the field.

Accordingly, a wide range of papers from databases such as SCOPUS, EBSCO were examined. The key words used to search the articles were "Macroeconomic variables" and "Stock market" or "Stock market performance". To improve accuracy and efficiency, Boolean operators (AND, OR, NOT) were used to combine different concepts. An asterisk (*) was added to keywords to expand search parameters, capturing various term variations. After taking into consideration inclusion/exclusion criterions such as non-availability in English language ,being industry specific and relevancy based on time period and similar looking concepts, a final pool of 52 reviews were considered. Despite the growing body of work, limited attention has been devoted to integrating these analyses within the specific context of the Indian economy. Therefore, this study restricts its scope to identifying gaps in the existing literature concerning the Indian stock market. By highlighting inconsistencies and areas under-explored in prior research, it seeks to lay the foundation for more targeted future research. The study is does not account for global factors such as financial crises of 2008 or the COVID-19 pandemic.

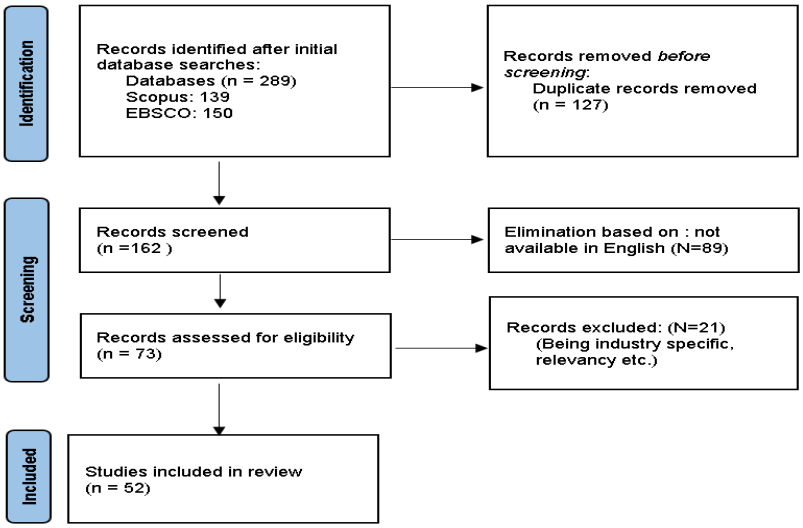

Figure 1 : PRISMA 2020 flow diagram for relevant systematic reviews

4. FINDINGS AND DISCUSSIONS

The review of literature reveals a complex and evolving relationship between green investing and stock market performance, marked by mixed empirical evidence. Early studies predominantly focused on the comparative performance of socially responsible or green investments against traditional financial instruments. Rangotra (2016), for example, found no significant difference in performance between socially responsible and conventional investments, except for the energy index, which demonstrated higher risk exposure. Similarly, Giannarakis et al. (2016) highlighted a positive correlation between environmental disclosure and performance, implying that companies with robust environmental practices are more likely to report them transparently. In contrast, Maji and Mondal (2015) noted that a significant portion of green companies underperformed and observed limited influence of green initiatives on corporate investment decisions.

Several studies have suggested that sustainable firms can deliver superior returns over time, especially when sustainability is embedded in long-term strategy. Chan and Walter (2014), Bensen et al. (2010), and Lesser et al. (2014) supported this view by presenting evidence that firms integrating environmental concerns tend to outperform their peers. Conversely, others reported that green indices may underperform relative to broader benchmarks. For instance, Chang et al. (2012), Climent and

Soriano (2011), and Silva and Cortez (2016) concluded that green investments often lag behind traditional market indices in terms of returns, possibly due to sectoral limitations or nascent stages of market maturity.

Some scholars maintained a neutral stance, arguing that while green investments may provide similar returns to conventional ones, they also carry unique risk profiles. Mallet and Michelson (2014) and Dixon (2010) suggested that while higher returns are possible, they are frequently offset by increased volatility due to uncertainties surrounding sustainable finance.From an investor behavior standpoint, Bhattacharya (2013) underscored a rising trend of environmentally conscious investing, with investors increasingly favoring companies that reduce carbon emissions and adopt eco-friendly technologies. In the Indian context, Divya and Shirisha (2014) observed that the BSE-GREENEX index outperformed both the BSE SENSEX and BSE 500 during the 2008–2012 period, indicating strong investor confidence in green equities. On the contrary, Bammi (2013) found that the inclusion of firms in GREENEX led to negative reactions from existing investors, perhaps due to skepticism about the credibility or signaling power of the index.

Further, Kumar et al. (2013) identified a skewed yet symmetric correlation between carbon credits and GREENEX, suggesting a nuanced but relevant association between environmental assets and stock market performance. More recent work by Kumar (2021) using dynamic lag vector autoregression and Granger causality revealed that GREENEX maintained a strong price movement relationship with large-cap equity mutual funds, a moderate relationship with mid-cap funds, and a weak linkage with small-cap funds.Finally, Seth and Singh (2022) used Johansen's cointegration and Granger causality tests to evaluate integration between sustainable indices (GREENEX and CARBONEX) and traditional indices like the BSE SENSEX. Their study found no long-term equilibrium relationship, implying that green and conventional indices move independently over time.

The relationship between inflation and stock market performance remains one of the most extensively studied yet debated areas in financial economics. A consistent theme across much of the literature is the negative impact of inflation on stock prices, largely attributed to the erosion of the real value of future corporate earnings and increased economic uncertainty. ama (1981) argued that inflation erodes the purchasing power of expected corporate cash flows, reducing stock valuations. Empirical studies, such as those by Raghutla, Sampath, and Vadivel (2020), confirm this negative relationship in the Indian market. However, some studies, including Kessel (1956) and Ioannidis et al. (2004), suggest that unexpected inflation can benefit debt-heavy firms by reducing the real value of their liabilities. This could, in turn, enhance equity values. Gopinathan and Durai (2019) also found that inflation significantly influenced stock market performance in India. Despite a general negative correlation, the relationship between inflation and stock prices is complex and may vary by firm characteristics and inflation expectations. Overall, inflation tends to be a detrimental factor, though its effects are not uniform across all market contexts.

The relationship between interest rates and stock prices is predominantly negative in the empirical literature. Studies such as those by Geske and Roll (1983), Mukherjee and Naka (1995), and Kandir (2008) consistently report that rising interest rates tend to depress stock prices. This is generally attributed to the higher cost of capital and the resulting decline in corporate profits and investment. However, exceptions exist. Nasseh and Strauss (2000) found a positive short-run relationship but a negative long-run relationship between interest rates and stock prices in European markets. Moreover, Kwon and Shin (1999) and Lee and Brahmasrene (2018) observed minimal or no significant influence of interest rates in some Asian economies, highlighting the influence of country-specific factors such as trade orientation and policy effectiveness.

Most studies indicate a positive relationship between money supply and stock market returns. Rogalski and Vinso (1977) and Mukherjee and Naka (1995) found that an expansionary monetary policy supports stock market performance, likely through increased liquidity and lower interest rates. However, this relationship appears to depend on whether changes are anticipated. Pearce and Roley

(1983) showed that only unanticipated money supply changes impact stock prices significantly. Additionally, results vary by region. For instance, Kandir (2008) and Ahmed and Imam (2007) found no significant impact in Turkey and Bangladesh, respectively. Tiryaki et al. (2019) emphasized that contractionary monetary policies tend to exert a greater influence than expansionary ones, pointing toward asymmetric effects.

The impact of exchange rates on stock markets is mixed and often country-specific. Several studies, such as Mukherjee and Naka (1995), and Wongbangpo and Sharma (2002), found a positive relationship between exchange rate appreciation and stock market growth in countries like Japan, Indonesia, and Malaysia. Conversely, negative relationships were reported for countries like Thailand and India (Dahir et al., 2018). Bidirectional and unidirectional causalities were also observed, indicating complex dynamic interactions. For example, Bahmani-Oskooee and Sohrabian (1992) found bidirectional causality in the U.S., while Amarasinghe and Dharmaratne (2014) identified unidirectional causality from stock returns to exchange rate in Sri Lanka. Asymmetric effects were found in both short- and long-run in several emerging markets (Bahmani-Oskooee & Saha, 2015; Effiong & Bassey, 2018), reinforcing the importance of policy context and investor expectations.

Real economic activity, particularly industrial production and GDP, is found to have a positive influence on stock market performance in most empirical studies. Mukherjee and Naka (1995), Naka et al. (1998), and Yartey (2010) documented that indicators of economic growth (e.g., industrial output, bank credit, per capita GDP) are strongly associated with rising stock prices. Marques et al. (2013) and Kapaya (2020) further supported this by identifying causal relationships—both bidirectional and unidirectional—between economic growth and stock market development. Nonetheless, some studies (e.g., Ahmed & Imam, 2007; Gurloveleen & Bhatia, 2015) found no significant long-run relationship, particularly in less developed or illiquid markets.

5. CONCLUSIONS AND FUTURE IMPLICATIONS

This review paper examined the performance of sustainability indices and the influence of macroeconomic variables on stock market performance by analyzing literature from various countries. The reviewed literature indicates a growing interest in green and sustainable investing, but with no clear consensus on its financial advantages. While some evidence supports the superior performance of green indices, especially during periods of market stress or among large-cap funds, other findings suggest neutral or even adverse effects. The lack of long-term cointegration between green and conventional indices implies limited integration, which may reflect differing investor bases, sectoral compositions, and sensitivity to macroeconomic shocks. Despite growing investor awareness and regulatory emphasis on sustainability, green investing remains a nuanced and evolving field.

An interesting finding was that during periods of economic crisis or downturns, the effects of certain variables were reversed. Verma and Bansal (2021) additionally, revealed sector-specific indices where impact of some variables was unique to particular sectors, while others affected all sectors. The paper suggests that further research could explore the relationship between specific sectors and macroeconomic factors. The analysis of macroeconomic variables is crucial for investors, businesses, and policymakers, especially as market cycles evolve over time. As a result, the application of multifactor analysis is essential. This approach involves incorporating a broader set of macroeconomic variables, such as revenue, investment levels, consumption, deposit growth rates, and nonperforming assets of banks, to gain a more comprehensive understanding of stock market performance. Identifying which variables are most relevant for investment decisions and policy formulation could help maximize returns and promote economic growth.

This research is beneficial for various types of investors, including retail and institutional investors (both domestic and foreign), as it provides insights into making informed investment choices. It also aids pension fund managers and mutual fund companies (Asset Management Companies) in the selection of stock portfolios and the hedging of funds. For long-term investments in the Indian stock

market, reviewing data over a period of more than a year is recommended. A comprehensive analysis of data spanning five to six years, or longer, prior to making investment decisions, as suggested by Pearce and Roley (1988), may yield more robust results and provide valuable insights for future research.

According to Anwer et al. (2019), the study can be extended using regression by including more countries and variables. Tusiime and Wang (2020) examined the impact of oil prices on Islamic stocks. It proposed further study in emerging economies. The following are key implications for future research in the area of macroeconomic variables and stock market performance:

As observed, economic recessions and financial crises significantly affect business development. Future research can analyze which industries are most affected by such crises, including events like the 2008 financial crisis, the Asian financial crisis, and the European debt crisis. This would help identify vulnerable sectors and develop strategies for mitigating risks during economic downturns.

Verma and Bansal (2021) stated that there exists an opportunity to examine the impact of macroeconomic variables on sectoral indices that have not yet been extensively studied, such as those in the metal, media, pharmaceuticals, and real estate sectors. In emerging economies like India, research could focus on thematic indices like Nifty Commodities and Nifty Dividend Opportunity, as well as exploring the effects on the Commodity Index, which could offer valuable insights for investors. Comparative studies between developed and developing markets could help in understanding regional dynamics of green finance. Exploring investor sentiment and behavioral biases toward green investments would enrich understanding of market responses.

Post-COVID Impact: Investigating whether the pandemic altered investment patterns in favor of sustainability could provide insights into long-term shifts in capital allocation.

Future studies should consider incorporating new macroeconomic variables that have not been extensively examined, such as nonperforming assets in banks, the consumer confidence index, the growth rate of bank deposits, the impact of goods and services tax (GST), weather patterns, trade openness, investor sentiment, and employment indicators like job growth and unemployment rates. These variables could provide a more comprehensive understanding of how macroeconomic conditions influence stock market performance.

During the preparation of this work, the author used Grammarly tool in order to assist with English language grammar checking and language refinement. After using this tool, the author reviewed and edited the content as needed and take full responsibility for the content of the publication.

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