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Dynamics between macro-economic variables and the stock market: Evidence from India

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ABSTRACT

The present paper examines the dynamics between macroeconomic variables and the stock market. The index of industrial production, inflation, gold price, oil price, and return from treasury bills have been used as proxy macroeconomic variables. The Indian stock market has been typified by the Sensex. Monthly observations have been analyzed from April 1993 to October 2022 through cointegration and the Granger causality test to examine possible long-run and short-run relationships, respectively. The results proclaim the presence of cointegration among variables. Further, the analysis of normalized cointegrating coefficients reveals that in the long run, changes in inflation and the rate of return from T-bills positively affect the stock market. While changes in gold and oil prices have a negative impact on the stock market. The Granger causality test implies that in the short run, the stock market is sensitive to changes in the index of industrial production, inflation, and oil prices. The results are expected to be fruitful for investors as well as traders when designing their investment and trading strategies. Since the results indicate that volatility in the stock market can significantly affect industrial production, inflation, and gold prices, regulators should be vigilant about perturbations in the stock market to mitigate adverse effects.

Contribution/Originality: The paper attempts to resolve the disagreement among researchers regarding dynamics of stock market and macroeconomic variables through a comprehensive study over a period of around three decades. Normalized cointegrating equations have been used to scrutinize the long-run relationship, and the Granger causality test has been used to explore the causal relationship.

1. INTRODUCTION

Numerous macroeconomic factors, including money supply, inflation rate, risk-free return, interest rate, gross domestic product, and industrial production, have a significant impact on the stock market. The favorable macro-economic environment builds a constructive environment for the growth of corporations. However, adverse changes in the environment deter the growth of the financial market. The Macroeconomic variables are a reflection of the economic conditions of a nation, as they represent the movements and trends that prevail in an economy. Various theories established the contiguity between stock market and macroeconomic variables. The efficient market theory given by Fama (1970) asserts that prices in the financial market reflect the contemporary scenario. Whenever there is any change in any domestic variable, information about the same is infused into the market. The infusion of this

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information (shock) affects market forces (i.e., demand and supply of securities), which in turn bring movement to the stock market.

Similarly, the Capital Asset Pricing Model proposed by Sharpe (1974) discussed how the price of a security is affected by systematic risk. According to this model, systematic risk can be of three types: Market Risk (caused by changes in market conditions like global financial crisis, the outbreak of COVID-19, or war between countries), and Interest Rate Risk (caused changes in interest rates). It primarily affects the market for fixed-income securities). Purchasing Power Risk (caused due to the rise in prices, i.e., inflation in the economy). That is the reason why. In the case of changes in macro-economic variables, the prices and expected returns of the sensitive sectors became highly volatile**.** The Arbitrage Pricing Model developed in 1976 by renowned economist Stephen Ross used a multifactor model to explain the role of macroeconomic variables in the determination of asset pricing. These variables may include inflation, the index of industrial production, the rate of interest, oil prices, the gold rate or exchange rate, foreign investments, foreign trade, etc.

Since the movements in macroeconomic variables often have some consequences for the functioning of the stock market, analysis of the behaviour of macroeconomic variables is essential to hedge investment risk. It is also useful to policymakers in formulating policies and strategies to ensure the smooth functioning of the capital market in India. Further, it is crucial for corporate houses in financial planning. The companies are always concerned about the ongoing trend of macroeconomic variables and the possible impact of this trend on the stock market. The primary reason behind this concern is that the success or failure of their financing activities (like the issue of an initial public offering to raise funds or the decision to form strategic alliances with other companies, etc.) largely depends upon the interaction between the stock market and macroeconomic variables.

Researchers have always been keen to explore the relationship between macroeconomic variables and the financial market due to the implications of this possible consanguinity between the two (Barnor, 2014; Lakmali & Madhusanka, 2015; Pete & Karnik, 2000). But the inferences drawn by the studies are highly sensitive to the study period, the stipulated financial market, and the variables selected to represent the macroeconomic conditions of the economy. This is why there is still a surmise about this relationship and no unanimous conclusion with reference to the impact (positive or negative) of selected variables on the stock market and also vice versa. Some researchers pronounce a positive relationship between inflation and the stock market (Kibria et al., 2014), while others discern a negative relationship (Ahuja, Makan, & Chauhan, 2012; Garg & Kalra, 2018; Ho, 2017; Romer, 2012; Venkatraja, 2014). Similarly, with reference to industrial production, one school of thought asserts that the rise in the index of industrial production leads to a bullish market because industrial growth results in increased profitability, better dividends, an increment in the demand for financial instruments, and consequently a rise in stock prices (Bekhet & Matar, 2013; Nwaolisa & Chijindu, 2016; Patel, 2012; Sahu & Bandopadhyay, 2020). But on the flip side, there is another school of thought that observes a negative pertinence between the two (Ramanujam, 2014). According to this ideology, more production may cause excess supply, which will pull down prices. A reduction in selling prices will cause operational losses, disinvestment, and a recession in the stock market. Further, there is a disagreement with reference to the direction of this causal relationship. Some studies discerned that changes in macroeconomic variables lead to changes in the stock market (Bekhet & Matar, 2013; Nwaolisa & Chijindu, 2016; Ramanujam, 2014), while others remarked that changes in the stock market lead to changes in macroeconomic conditions (Patel, 2012). Amidst these discords, the present study attempts to divulge possible sodality between the Indian stock market and macroeconomic variables over a period of around three decades, from 1993 to 2022. The study aims at investigating whether changes in macroeconomic variables can boost or submerge stock market development or not. Moreover, since in the short term macroeconomic variables can be affected by the stock market, the study tries to explore this possibility by referring to the Indian market. The results are expected to be beneficial for investors while designing investment strategies and for regulators to take timely actions to ensure economic growth.

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2. REVIEW OF LITERATURE

The present study aims at exploring the possible linkage of the Indian stock market with domestic macro-economic variables. It is pertinent to mention that understanding this relationship is very important in predicting market outcomes so that precautionary steps may be taken to protect the interests of investors, corporations, financial institutions, and other participants in the market. A minor change in macroeconomic variables may cause huge volatility in the stock market. Since the issue is crucial, many researchers have conducted studies to unravel the linkage between stock markets and their associated macroeconomic variables.

The financial economic theories as proposed by Markowitz (1952), Fama (1970), and Ross (1976) propone the pertinency between stock prices and different macroeconomic variables like gross domestic product, industrial production, inflation, money supply, national income, savings, rate of interest, available subsidies, taxation rate, foreign investments, exchange rate, gold price, oil price, unemployment rate, etc. Many researchers have put these theories to the test in real-world setting across various markets. With the exception of a few variables, researchers have observed a significant relationship between the stock market and most of the variables. A few variables have been identified as having a positive impact on the stock market, while others have been diagnosed as having a negative impact on the stock market.

Like with reference to the stock markets of the Association of Southeast Asian Nations (ASEAN) countries, Prowanta (2017) analyzed the data over a period of 10 years from 2006 to 2015 through regression analysis. The study examined the significant impact of four variables, viz., inflation, exchange rate, GDP, and rate of interest, on the selected stock markets. However, no significant impact was discerned for remaining three variables, i.e., current accounts, foreign exchange, and Net exports. Similar results were perceived by Jamaludin, Ismail, and Ab Manaf (2017). The study examined the impact of exchange rates, money supply, and inflation on the Islamic stock market and three ASEAN countries, namely Malaysia, Singapore, and Indonesia. The findings indicate a significant impact of exchange rates and inflation on stock market returns. However, no significant impact on the money supply was noted. The scrutiny of the causal relationship among oil prices, exchange rate, and stock market by Sharma (2017) revealed the absence of Granger causality between Oil prices and Stock Prices. However, the study reported unidirectional causality flowing from stock price to exchange rate.

But no causal association between macroeconomic variables and the stock market was observed for China, Japan, or India during 2008-16 (Megaravalli & Sampagnaro, 2018). The study analyzed the monthly data through Granger causality. Garg and Kalra (2018) examined the relationship of the Indian stock market with five variables: inflation, unemployment, gross domestic product (GDP), gold price, and Forex reserves. Inflation and unemployment were perceived to have a negative relationship with the Indian stock market, but other variables registered positive affluence. Chisti (2018) also conducted a study to explore the short-run causal relationship of the stock market with gross domestic product and inflation. The result indicated the absence of a causal relationship between the stock market and GDP.

Reddy, Nayak, and Nagendra (2019) anatomized the correlation of sectoral indices of the Bombay Stock Exchange of India with six macroeconomic variables, viz., silver price, gold price, crude oil price, rate of exchange, inflation, and interest rate. The results indicated a significant correlation between the variables. The results indicated a significant correlation between the variables. Gopinathan and Durai (2019) also reported a long-run relationship between macroeconomic variables (index of industrial production inflation, money supply, and exchange rate). Demir (2019) applied the autoregressive distributive lag bounds test to scrutinize the ramifications of macroeconomic variables on the Turkish stock exchange. The results pronounced the co-integrated long-run linkage among the macroeconomic variables and stock market. It was also noted that interest rates and crude oil prices negatively influence the stock market. Similarly, Banda, Hall, and Pradhan (2019) also reported the negative impact of interest rates on stock prices of shares listed on the Johannesburg stock exchange.

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With reference to the Malaysian market, Shamsudin, Rosmi, and Mohamed (2021) reported absence of any significant relationship between stock market and exchange rate. However, a negative relationship was observed between the Malaysian stock exchange and inflation. Com and Keihani (2021) examined the relationship between the Nifty and selected macroeconomic variables (viz., gross domestic product, inflation, oil price, and exchange rate). Data over a period from 2010 to 2020 was analyzed through Multivariate Regression analysis. The results suggested a negative relationship between inflation and the Indian stock market. However, there was a positive relationship between the Indian stock market and the GDP and oil prices. Nayak and Barodawala (2021) examined the long-run and short-run linkages of the Indian stock market with macroeconomic variables. The secondary data over a period of around eight years, from 2012 to 2020, was examined through the Autoregressive Distributed Lag method. The results evidenced a significant long-run relationship among the variables. Similarly, Bhama (2022) divulged the co-integration between the Indian stock market and macroeconomic variables. It was also noted that the exchange rate was having a negative impact on the Indian stock market. But the analysis of the Sri Lankan stock market by Balagobei and Bandara (2022) concluded that a positive influence of money supply and GDP was observed on stock exchange. The study applied the Pearson correlation coefficient and regression analysis to examine the relationship.

The review serve as an example of how eager researcher are to discover the connection between macroeconomic variables and the stock market. But there is a lack of consensus about this relationship among the researchers. Few studies accept this linkage, while others reject the notion of any significant linkage between the stock market and macroeconomic variables. Even among the researchers who accept the claim of a relationship between the stock market and macroeconomic variables, there is disagreement. Some studies concluded the positive impact of changes in macroeconomic variables on the stock market, while others discerned the negative impact of the same variable on the stock market. The huge disagreement among researchers with respect to almost each of the commonly used macroeconomic variables motivated the present study to aim at exploring the dynamic linkage between the Indian stock market and macroeconomic variables.

3. RESEARCH METHODOLOGY

The present study analyses secondary data to investigate linkage between domestic macroeconomic variables and the Indian stock market. To proxy the Indian stock market, the closing prices of the leading Indian stock index, i.e., the Sensex, have been used. With reference to macro-economic variables, based on the data availability and previous studies (Ahmad, Abdullah, Sulong, & Abdullahi, 2015; Demir, 2019; Garg & Kalra, 2018; Kotha & Bhawna, 2016; Lee & Brahmasrene, 2018; Megaravalli & Sampagnaro, 2018), five macro-economic variables have been selected. The selected variables are the Index of Industrial Production (IIP), Inflation, Gold Price, Oil Price, and Return from Treasury Bills (T-Bills). In order to capture the minor deviations, efforts have been made to collect the data over the shortest possible frequency interval. To ensure the maximum possible inclusion of observations, monthly data has been collected from April 1993 to October 2022. The data for all domestic macro-economic variables has been collected from the websites of the Reserve Bank of India and indiastas.com.

To proceed with the analysis, descriptive statistics, normality of distribution, and stationary data have been examined. The descriptive statistics briefs describe the basic characteristics of the studied variable, and the normality of distribution guides describe the distribution pattern of the selected variable. The stationarity check gives an idea about the variance pattern of the data, and it is inevitable to check data stationarity as stationarity is a pre-condition for many statistical tests like ordinary least squares regression. The Jarque-Bera Test has been applied to examine the distribution pattern. The test examines the null hypothesis of a normal distribution of the selected variable. Since the results of the Jarque-Bera Test recommend the rejection of the null hypothesis, the Phillips-Perron unit root test has been applied to test the stationarity of the data, which is a non-parametric test that can be applied to a non-normal distribution. The test examines the null hypothesis of the presence of a unit root (i.e., non-stationarity) in the data. The results of the unit root test indicate that none of the selected variables is stationary, i.e., their mean and variance

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change over a time period. Since data is non-stationary, the possible influence of macro-economic variables on the stock market in long-run and short-run has been anatomized through Johansen cointegration and Granger causality tests, respectively. The selection of an appropriate time lag to conduct these tests has been done with the help of information criteria, viz., Akaike Information Criteria (AIC), Schwraz Information Criteria (SIC), Hannan-Quinn Criterion (HQC), and Final Prediction Error (FPE).

The Johansen co-integration test asserts that if the deviations of time series from equilibrium level have a zero mean and the two time series cannot drift apart, they are said to be co-integrated. Such series cannot wander off in opposite directions for a very long time. The variables have to revert back to the mean distance eventually. Thus, if the results pronounce cointegration, a long-run relationship will be assumed between macroeconomic variables and the stock market. The Johansen co-integration test can be applied only to those non-stationary variables that became stationary at the same level of integration. In the present paper, as discerned from the unit root test, all selected variables were non-stationary at their original level and turned to be stationary at their first differences; therefore, a cointegration test has been applied and the normalized coefficients have been used to test the null hypothesis that, in the long run, the selected macro-economic variable does not have any significant impact on the stock market.

The Granger causality test examines the effect of a change in one or more variables on the other variable. It is also known as the causality test, which concludes whether changes occurring in one variable during a short period are potential enough to cause changes in another variable or not. The test computes Chi-square statistics to examine the null hypothesis that one variable does not Granger cause ($\nrightarrow$) another variable. The acceptance or rejection of the null hypothesis depends upon the test statistics and the concerned probability. If the test statistic is less than the critical value (or the probability is greater than 0.05), the null hypothesis is accepted, and it will be deduced that the selected independent variable has no significant impact on the dependent variable. Since the test can be administered only on the stationary variables, the first differenced values of each variable have been considered for the same.

4. RESULTS AND DISCUSSIONS

The descriptive statistics of daily observation of selected variables and the results of the unit root test for selected variables have been summarized in Table 1.

Table 1. Descriptive statistics and results of unit root test.

Particular	Sensex	IIP	Inflation	Gold price	Oil price	T-bills
Average	17067.19	79.92	81.02	17754.05	52.58	7.06
Maximum	60746.59	148.80	155.0	52917.19	140.00	12.97
Minimum	2122.30	22.07	33.14	3995.00	11.22	2.93
Standard deviation	15082.26	35.95	32.30	14476.98	29.52	2.20
Coefficient of variation (%)	88.37	49.98	39.86	81.54	56.14	31.16
Skewness	1.08	0.09	0.24	0.79	0.46	0.39
Kurtosis	3.42	1.56	-1.21	2.46	2.14	3.20
Jarque-Bera test (H0: Data is normally distributed)						
Test statistics & Probability	72.06 (0.00)	31.18 (0.00)	24.32 (0.00)	41.28 (0.00)	23.48 (0.00)	9.42 (0.00)
Test result	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
Unit root test at original values (H0: There is a unit root in the data i.e., data is not stationary)						
Test statistics & Probability	2.00 (0.99)	-1.03 (0.77)	1.55 (0.99)	1.49 (0.99)	-2.10 (0.24)	-2.55 (0.10)
Test result	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted
Unit root test at first differenced values (H0: There is a unit root i.e., data is not stationary)						
Test statistics & Probability	-19.10 (0.00)	-65.23 (0.00)	-21.29 (0.00)	-15.57 (0.00)	-14.83 (0.00)	-18.60 (0.00)
Test result	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

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Table 1 shows that the Sensex has the highest coefficient of variation (88.37%), and gold prices are second (81.5%). The high variation implies a higher dispersion of the variables around the average value of the same. The return from T-bills has the lowest coefficient of variation (31.16%), which makes it suitable for risk-averse investors. The Skewness, Kurtosis, and Jarque-Bera statistics clearly indicate that none of the selected variables follow a normal distribution.

On this not normally distributed data, the Phillips-Perron unit root test has been applied, which examines the null hypothesis of unit root (non-stationarity) in the data. As revealed from Table 1, at the original level, the probability is more than 5%. Therefore, the null hypothesis is accepted, and it can be concluded that all variables have a unit root, i.e., are non-stationary at the original level. However, at first, the differences in probability observed was less than 5%. Thus, it can be concluded that all variables turned out to be stationary at their first difference. As discussed in methodology, to select the appropriate lag length, four information criteria, viz., AIC, SIC, HQC, and FPE, have been applied. Table 2 depicts the results of criterion values at different lags. The minimum value of each criterion has been highlighted by an asterisk. The lag length corresponding to the minimum criterion value will be the recommended lag length for that criterion.

Table 2. Values under different lag length criterions.

Lag	AIC	SIC	HQC	FPE
0	68.87	68.93	68.89	3.27e+22
1	50.57	51.04*	50.76	3.70e+14
2	50.37	51.24	50.72*	3.03e+14
3	50.29	51.55	50.79	2.79e+14
4	50.34	52.01	51.01	2.95e+14
5	50.22*	52.28	51.04	2.61e+14*
6	50.28	52.74	51.26	2.77e+14
7	50.35	53.21	51.49	2.99e+14
8	50.30	53.56	51.60	2.85e+14

Note: *indicates lag order selected by the criterion.

As shown in Table 2, the two criteria (AIC and FPE) recommend five as an appropriate lag length. Thus, lag five has been considered for investigating the dynamics between the stock market and macroeconomic variables. The long-run integration has been examined through the Johansen co-integration test, and the results are depicted in Table 3.

Table 3. Co-integration test's results.

D	Trace value test			Max-Eigen value test		
Hypothesized number of Co-integrated equation(s)	Test statistics	Critical value	Probability	Test statistics	Critical value	Probability
None*	105.72	95.75	0.01	52.52	40.07	0.00
At most 1	53.18	69.81	0.50	23.29	33.87	0.51
At most 2	29.89	47.85	0.72	14.28	27.58	0.80
At most 3	15.62	29.79	0.74	8.57	21.13	0.87
At most 4	7.05	15.49	0.57	6.49	14.26	0.55
At most 5	0.56	3.84	0.46	0.56	3.84	0.46

Note: * Hypothesis rejection at 5% significance level.

The results, as depicted in Table 3, indicate the presence of cointegration among the selected variables, making them converge in the long-run. It implies that in the long-run, stock market and macroeconomic variables follow a common trend and are driven by some common force. In other words, even if initially the variables move far away from each other, over time the selected variables will return to an equilibrium path. Results are aligned with previous studies like Bekhet and Matar (2013), Mohanamani and Sivagnanasithi (2014), Kotha and Bhawna (2016), and Alam (2017). The normalized co-integrating coefficients of different macroeconomic variables have been used to test the

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null hypothesis of no significant impact of selected variables on the stock market in the long-run. The null hypothesis will be accepted if the absolute value of t-statistics is less than 1.96. The results of the same have been reported in Table 4.

Table 4. Normalized co-integrating coefficient of macro-economic variables.

Particulars	IIP	Inflation	Gold price	Oil price	T-bills
Coefficients	-2687.05	8865.73	- 12.68	- 1560.27	18722.45
Standard error	1424.2	2329.01	2.54	474.16	4665.40
t-statistics	-1.89	3.81	-4.99	-3.29	4.01
Null hypothesis: No significant impact on stock market in long-run	Accepted	Rejected	Rejected	Rejected	Rejected

The results of normalized co-integrating equation indicate that the impact of the index of industrial production is not significant at the 5% level of significance, but the rest of the variables have a significant impact on the Indian stock market in the long-run. The results are in consensus with the findings of Ray (2012), Kumar (2013), Parmar (2013), Ramanujam (2014), Vardhan and Sinha (2015), Gurloveleen and Bhatia (2015), Garg and Kalra (2018), Reddy et al. (2019), Sahoo, Patnaik, and Satpathy (2020), and Bhama (2022). The coefficients of normalized co-integrating equations reported that there is a positive impact of inflation and returns from Treasury bills on the stock market. Further, a negative impact of the gold and oil prices on the stock market has been observed.

As revealed from the co-integration test, in the long-run macroeconomic variables affect the stock market, but in the short-run, these variables can get affected owing to the fluctuations in stock market. To investigate the same, the Granger Causality Test has been applied. The test investigates whether lagged values in one time series have any significant explanatory power for another time series. The causality tends to exist between the two variables, if one variable gets affected by the lag of another variable. Granger causality examines the null hypothesis that one variable does not Granger cause ($\nrightarrow$) another variable through chi-square statistics. The null hypothesis is accepted if the respective probability value for the null hypothesis is greater than 0.05. The results of the Granger Causality Test have been reported in Table 5.

Table 5. Granger causality test's results.

Null hypotheses	Chi-square statistics	Probability	Result	Conclusion
IIP $\nrightarrow$ Sensex	11.27	0.02	Rejected	Bi-directional causality
Sensex $\nrightarrow$ IIP	43.39	0.00	Rejected	
Inflation $\nrightarrow$ Sensex	9.56	0.049	Rejected	Bi-directional causality
Sensex $\nrightarrow$ Inflation	14.45	0.006	Rejected	
Gold $\nrightarrow$ Sensex	7.78	0.09	Accepted	Uni-directional causality
Sensex $\nrightarrow$ Gold	17.36	0.00	Rejected	
Oil $\nrightarrow$ Sensex	14.67	0.00	Rejected	Uni-directional causality
Sensex $\nrightarrow$ Oil	8.06	0.08	Accepted	
T-bills $\nrightarrow$ Sensex	2.48	0.64	Accepted	No causality
Sensex $\nrightarrow$ T-bills	2.21	0.69	Accepted	

Note: $\nrightarrow$ Implies that one variable does not granger cause another variable.

The results indicate that during a short period, the Indian stock market had bidirectional causality with IIP and inflation. Thus, the volatility of the stock market affects the index of industrial production and inflation in the country. Similarly, it is subject to changes in the index of industrial production and inflation. With reference to IIP, the changes in industrial production led to changes in profitability, stock market returns, demand for financial security, and stock prices. The findings are in consensus with Sahu and Bandopadhyay (2020).There is a bidirectional causality in the context of inflation, meaning that the turbulence in the stock market also has an impact on inflation.. The results are in consensus with the findings of previous studies like (Garg & Kalra, 2018; Latha, Gupta, & Kumar, 2016; Venkatraja, 2014).

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It has a Unidirectional Causal relationship with gold and oil prices. With reference to gold prices, the results indicate that Granger causality is flowing from the stock market to the gold price, i.e., a change in the stock market index (increase or decrease) brings changes in the total investment in gold, which results in changes in the gold prices. However, there are some contradictory results, as one school of thought opines that the stock market and the gold price in the economy do not cause each other (Al-Ameer, Hammad, Ismail, & Hamdan, 2018; Narang & Singh, 2012). Few studies have observed a bidirectional causal relationship between the stock market and gold prices (Choudhry, Hassan, & Shabi, 2015).

With reference to oil prices, the results indicate that Granger causality is flowing from Oil Prices to the Stock Market. In other words, if there is any change in oil prices, it has a direct impact on the cost of production, which results in a change in profitability, a return from the stock market, a change in stock prices, and a change in the stock index. Results are supported by studies like (Alamgir & Amin, 2021; Ray, 2012), but they contradict the findings of Singh and Sharma (2018), which proclaim the impact of stock volatility over oil prices. Further, a few studies, like Jammazi, Ferrer, Jareño, and Shahzad (2017) observed a bidirectional causal relationship between the stock market and the oil price.

The results of the Granger causality test discern that there is no causal relationship between the stock market and returns from Treasury bills. In other words, returns on T-bills will not be influenced by volatility and fluctuations in the stock market. The results are in consensus with Ray (2012), Tripathi and Seth (2014), Kotha and Bhawna (2016), and Alamgir and Amin (2021), but in contrast to Abbas, Bhowmik, Koju, and Wang (2017), and Remzi and Cankal (2020). The findings are expected to be fruitful for investors, regulators, and policymakers.

5. POLICY IMPLICATIONS

The present study analyzed different variables over a period of around 30 years to unveil the dynamic between the stock market and the economy's growth, monetary policy, fiscal policy, and the commodity market. The results are expected to be fruitful for anticipating possible changes in the stock market (bearish or bullish trend) due to domestic changes in the economy. The results are presumed to serve as a useful guide for financial analysts to understand market behaviour and for investors to make investment and disinvestment decisions. Further, it will serve as a guide for regulators and policymakers to protect the interests of investors and economic agents.

6. LIMITATIONS AND FUTURE RECOMMENDATIONS

The present study is subject to the limitations of data availability. Some of the important variables (like GDP, taxation, foreign investments, etc.) have been skipped owing to the non-availability of monthly data for the study period. Further, the structural breakdown, impact of major events that occurred during the selected period, and impulse responses of the variables have not been studied. Since the relationship between macroeconomic variables and the stock market is very complex and fangled, a detailed study encompassing more variables with respect to different time intervals may be carried out to gain a better understanding of this consociation. Further, a comparative study of different countries will be an interesting attempt to apprehend the dynamics between macroeconomic variables and the stock market.

7. CONCLUSION

The present study analyzed the monthly data from 1993–2022 to comprehend the possible association between macro-economic variables and the stock market. All of the chosen variables have long-run co-integration, as the Johansen co-integration test indicates. The analysis of the normalized co-integrating equation reveals that except for IIP, all other variables (inflation, gold price, oil price, and returns from T-bills) have a significant impact on the stock market in the long run. The results of the Granger causality test indicate the bidirectional causality of the stock market with IIP and inflation and the unidirectional causality with gold and oil prices. The present study is expected

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to be helpful in predicting the trend in the stock market (bullish or bearish) due to the changes in macro-economic variables. The results are expected to be fruitful for traders and investors in predicting markets and devising investment strategies. The results are expected to be useful to policymakers and regulators to ensure sustainable growth in the economy.

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