“Macroeconomic variables, COVID-19 and the Indian stock market performance”

AUTHORS	Vandana Bhama

ARTICLE INFO	Vandana Bhama (2022). Macroeconomic variables, COVID-19 and the Indian stock market performance. *Investment Management and Financial Innovations*, *19*(3), 28-37. doi:10.21511/imfi.19(3).2022.03
DOI	http://dx.doi.org/10.21511/imfi.19(3).2022.03
RELEASED ON	Tuesday, 12 July 2022
RECEIVED ON	Tuesday, 24 May 2022
ACCEPTED ON	Thursday, 07 July 2022

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
42	2	4

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Vandana Bhama (India)

MACROECONOMIC VARIABLES, COVID-19 AND THE INDIAN STOCK MARKET PERFORMANCE

Abstract

India witnessed the first major wave of COVID-19 in 2020. The second major wave during April 2021 caused a higher number of infected cases across the country. These waves of COVID-19, rising cases and lockdown announcements severely impacted the Indian economy. Moreover, huge volatility was observed in the prices of oil and exchange rates during the similar period. Thus, this study tests the effect of selected macroeconomic variables and the COVID-19 pandemic on the performance of the Indian stock market. Using co-integration and the vector error correction model on the NIFTY 100 firms, the findings suggest co-integration and long-term association among variables. The Indian stock market experienced an inverse connection with the exchange rate volatility; the coefficient value is 57.582. The exchange rates rose heavily (with a value of Indian rupee being 76.95 against US dollar) with the onset of COVID-19 cases. Further, these cases do hurt the sentiments of the stock market; however, the relationship is relatively infirm (the value is 0.22) as compared to that of the exchange rate. The accumulated major negative influence of COVID-19 on the economy had a weak impact on the stock market. In conclusion, it should be noted that after the first wave, businesses were more prepared and therefore incorporated the required changes that saw them through the second wave.

Keywords exchange rate, oil prices, COVID cases, stock market, multivariate cointegration, VECM

JEL Classification F31, E44, C32

Received on: 24th of May, 2022
Accepted on: 7th of July, 2022
Published on: 12th of July, 2022

Vandana Bhama, Assistant Professor,Finance & Accounting, FORE School of Management, New Delhi, India.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

In financial economics, the association between market performance and economy related risk is considered a pivotal point. Stock market investment decisions are contingent on several aspects with macroeconomic variables being one of them. The movements in the stock prices imitate the inclusion of macroeconomic indicators (Reddy et al., 2019). Hence, macroeconomic variables are considered as the key variables in the pricing of the stock market. Since 2020, the financial and economic prospects of economies have altered due to the unparalleled spread of the Corona virus also known as COVID-19. This led to the adoption of various mitigation and prevention strategies like lockdowns and transport limitations, which, as a result, had seriously impacted the economic activities and consumption patterns across products and services (Bora & Basistha, 2021). The Indian stock market saw a falling movement during the first lockdown in 2020. Thus, disease-related news impacted the stock market (Donadelli et al., 2016). Thereafter, it witnessed a progressive rising movement in 2021 due to the relaxation by the Indian government on various lockdown policies.

These observations called attention on the influence of both macroeconomic variables and COVID-19 on the Indian stock market performance. Since the studies are limited in the Indian context that measure together the impact of macroeconomic variables and pandemic

http://dx.doi.org/10.21511/imfi.19(3).2022.03

crisis on the stock market's performance, the current study comprehends the simultaneous effect of all factors, including exchange rate volatility, crude oil price, disease related cases and deaths, and stringency index on the stocks return performance.

1. LITERATURE REVIEW AND HYPOTHESES

Several studies have been accompanied in the recent past that emphasized the pandemic effect on economic performance. Since it started, the COVID-19 has taken diverse turns, resulting in different associated control measures or stimulus packages being launched by various nations (Shehzad et al., 2020). There were different ways in which firms reacted to the COVID-19 revenue shock, which, in turn, hurt the stock performance (Mazur et al., 2021) and due to upsurge in the daily cases caused by the pandemic impacted the performance of firms negatively (Al-Awadhi et al., 2020). Thus, markets responded quickly but adversely to news about the COVID-19 pandemic (Ashraf, 2020). The confirmation of more cases resulted in a fall in stocks returns. Thus, the market remained highly volatile, and the reaction was faster in the case of confirmed cases than deaths (Alber, 2020), indicating the negative impact of coronavirus in some countries.

The evidence presented by Yilmazkuday (2020) suggest that a 1% increase in cumulative daily COVID-19 cases led to a 0.03% decline in US stocks returns the following day, causing an adverse influence of pandemic news. Further, the news affected the stock markets worldwide and created negative returns for Asian countries (Liu et al., 2020). Thus, dangerous infectious disease news impacted the sentiments of stock market investors (Donadelli et al., 2016). As compared to the markets of Europe, the emerging Asian economies fell significantly due to the adverse effect of COVID-19 (Topcu & Gulal, 2020).

With reference to India, Mishra et al. (2020) compared how the stock market performed during the pandemic, and the demonetization, and Goods and Services Tax (GST) implementation years. Their findings revealed that the impact on the returns of the Indian stocks was more severe and negative during the pandemic. There were negative yields in the pre-lockdown phase, whereas investors reacted positively during the COVID-19 lockdown, which, in turn, created positive returns and improved the performance of the stock market (Alam et al., 2020). Bora and Basistha (2021) noted that the returns on stock indices seemed to be higher in the pre-pandemic phase than post-pandemic phase. Hence, following a consistent pattern, COVID-19 had a bearish impact on various industries of the Indian economy (Shankar & Dubey, 2021).

While emphasizing the underlying link between economy related dynamics and equity returns, numerous works in the past confirmed a connecting association between market performance and economic factors. For instance, Kewal (2012), Tripathi and Kumar (2018), and Cammilery et al. (2019) noted an association between equity yields and economic factors. Nayak and Barodawala (2021) noted a strong connection of money supply, foreign exchange reserve, wholesale price index and interest rate with the equity stocks' returns. Identifying the connection among gold prices, oil rates and currency volatility, Jain and Biswal (2016) observed a drop in the Indian currency and market returns due to a plunge in gold prices and oil rates. Ahmed (2008) noted that stock price movement is not only due to macroeconomic variables but it is due to other macro dimensions persisting in the economy.

A number of previous works inspected the association between oil rates and equity performance. Ray (2012) highlighted how surging international oil rates decreased equity yields. Similarly, O'Neill et al. (2008) noted a positive influence of higher oil rates on the equities of oil exporting economies, whereas, this hurt the equity performance of oil-consuming nations. Jesus et al. (2020) noted a positive association between oil prices and equity returns of oil-exporting nations. In the case of importing countries, there persists a negative relationship between oil prices and equities of developed economies. Aastveit et al. (2014) noted that the advent of oil market shocks brought down the economic activity in Europe and the United States to a larger extent as compared to countries in Asia and South America.

In the context of India, Devpura and Narayan (2020) measured the variations in oil rates during the pandemic. It was observed that the rates varied from 8% to 22% due to the rise in disease related cases and deaths. Prabheesh et al. (2020) noted a progressive association between oil rates and stocks performance in the similar time frame. The results further revealed that oil price reduction was associated inversely with the equities' performance (Sharma et al., 2018). Contradicting the theoretical expectations of negative relation, some studies have shown a direct association of oil prices with the equity stocks performance (Camarero & Tamarit, 2002; Rautava, 2002; Narayan & Narayan, 2010; Tursoy & Faisal, 2016; Ji et al., 2020).

Investigating the spillover from varying foreign exchange rates with stocks performance is quite vital. Olugbenga (2012) mentioned that exchange rate fluctuations influenced the Nigerian market and harmed the Malaysian stock market performance (Rahman et al., 2009). Suriani et al. (2015) observed no relationship between exchange rate and equity performance. Tsai (2012) observed an inverse association between currency fluctuations and equity returns for a group of six identified Asian countries. Similarly, Kim (2003) found that S&P 500 returns indicated an opposite connection with exchange rate, interest rate and inflation. Thus, it can be said that currency volatility has an inverse relation with the stock market (Ibrahim & Aziz, 2003; Korsah & Fosu, 2016). However, Tripathi and Kumar (2018) were of the view that currency depreciation could be favorable for an economy. This is in tune with the findings of Adebowale and Akosile (2018).

Despite the insights derived from previous research on various aspects, the literature has been silent on pandemic effects when other economy related factors have already been considered in the context of the Indian market. Therefore, the study intends to examine the relationship between macroeconomic variables such as crude oil price and foreign exchange rate, and COVID-19 related factors such as number of new COVID-19 cases and resultant deaths (new COVID-19 deaths) with the Indian stock market as reflected by the NIFTY 100. The following hypotheses are formulated for the purpose:

H_1: *Stock prices, crude oil price, exchange rates, new COVID-19 cases, new deaths and the stringency index have a unit root.*

H_2: *There is a cointegration between stocks performance, crude oil price, exchange rates, new COVID-19 cases, new deaths and the stringency index*

H_3: *Crude oil price, exchange rates, new COVID-19 cases, new deaths and the stringency index affect stock prices.*

2. METHODOLOGY

2.1. Data

Based on literature evidence, the study initially considered various macroeconomic variables such as foreign exchange rate, money supply, crude oil prices, wholesale price index, the index of industrial production, etc. However, it was pertinent to select those macroeconomic variables whose date was available at a daily frequency; daily COVID-19 cases and deaths were a major necessity for the study. As a result, money supply, wholesale price index and index of industrial production were eliminated from the above mentioned variables due to the lack of daily data variables.

This study incorporates the daily data of NIFTY 100 index closing prices, crude oil prices ($/barrel), foreign exchange rate ($/₹), new COVID-19 cases, COVID-19 deaths and the stringency index for the period between January 30, 2020 (when the first COVID-19 case was reported in India) and May 17, 2021. Moreover, it was during this period that the country experienced two waves of the virus, with the second one being far more perilous than the first one. The rationale for selecting the aforementioned variables is to examine the influence of selected macroeconomic variables and the Corona-virus pandemic on the Indian stock market performance.

The closing data of NIFTY 100 has been taken from the National Stock Exchange, crude oil prices (CL) from Thomson Reuters, and foreign exchange rate (ER) from the US Federal Reserve. Data on COVID-19 new cases (NC) and new deaths (ND)

http://dx.doi.org/10.21511/imfi.19(3).2022.03

were collected from the Centre for System Science and Engineering, John Hopkins University (CSSE, JHU). Data for the stringency index (SI) that assesses the strictness of a nation's policy reforms to combat the virus was taken from Our World in Data.

This research study has a conceptual framework comprising three phases: ADF test, cointegration test, and vector error correction model.

2.2. Unit root test – Augmented Dickey-Fuller (ADF) test

While analyzing time series data, the results could be false if values in the series are non-stationary. The reverting behavior of mean and variance indicates stationarity of data series, and it is expected to be constant over time. Moreover, the covariance among two periods should be contingent on the distance between the two time periods and not on the real-time computation. Unit root test is used predominantly for testing stationarity. The test results also help identify the order of integration required, i.e., the number of times the data point needs to be differenced. The study employs the Augmented Dickey-Fuller (ADF) test on all the variables to remove a unit root or a particular trend. Ray (2012) used a unit root test to analyze the relationship among variables. The comprehensive model, with terms such as intercepts and trends, is presented in equation (1):

$$\Delta Y_t = A_0 + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \ldots + \delta_{p-1} \Delta Y_{t-p+1} + e_t, \quad (1)$$

where A_0 indicates the intercept, δ is the coefficient of the lagged first difference, p is the lag length, and e_t is the error term.

2.3. Johansen's cointegration test

The cointegration test inspects the existence of any long-run relationship between the macroeconomic variables, the COVID-19 pandemic, and the Indian stock market. A necessary condition for the analysis though is that the ADF test results should indicate stationarity and all variables should be integrated in the same order. With cointegrated variables, there is no eventual drifting away from each other, as a result of which a long-run relation can be recognized.

The above-mentioned test can be represented in a vector autoregressive framework of order p as presented in equation (2):

$$X_t = A_0 + \sum_{j=1}^{p} B_j X_{t-j} + e_t, \quad (2)$$

where all variables are $n \cdot 1$ vectors except B $\left(n \cdot n \; matrix\right)$, X_t comprises variables at the first difference, A_0 comprises constants, p indicates the maximum lag length, B represents coefficient, and e_t is the error term.

2.4. Vector error correction model (VECM)

Following cointegration among variables, the analysis can proceed with administration of a vector error correction model that represents the feedback process and speed of convergence to the long-run steady-state equilibrium. It examines whether an error correction mechanism kicks in when some disturbance occurs. VECM also examines the long-run association among variables. Johansen's cointegration equation (2) can be transformed into VECM as follows:

$$\Delta X_t = A_0 + \sum_{j=1}^{p-1} \Gamma_j \Delta X_{t-j} + \Pi X_{t-p} + e_t, \quad (3)$$

where Δ indicates the first difference,

$$\Gamma_j = -\sum_{i=j+1}^{p} \mathrm{B}_j, \; \Pi = -I + \sum_{i=j+1}^{p} \mathrm{B}_j,$$

and I indicates $n \cdot n$ matrix.

3. RESULTS AND DISCUSSION

Descriptive statistics of all variables are presented in Table 1. The values indicate that COVID-19 cases and deaths in India reached a high level of 414,188 and 4,205 respectively in a single day. Exchange rate fluctuated with the rupee weakening to 76.95 during the same period. The volatility seems to be significantly higher with respect to new COVID-19 cases; this is followed by the NIFTY 100, which is little less volatile comparatively. Thereafter, the volatility is comparatively low for the rest of the variables. These results indicate that the COVID-19 pandemic impacted markets more as compared to other macroeconomic variables (Shankar & Dubey, 2021).

Table 1. Descriptive statistics

Variables	NIFTY 100	Crude Oil Price	Exchange Rate	New Cases	New Deaths	Stringency Index
Mean	12215.93	46.52	74.05	52452.10	591.32	70.37
Median	11843.03	44.37	73.83	22872.00	354.00	73.61
Maximum	15406.00	69.95	76.95	414188.00	4205.00	100.00
Minimum	7719.10	9.12	71.11	0.00	0.00	10.19
Std. Dev.	2040.35	13.67	1.28	84850.23	823.01	21.71
Skewness	-0.03	-0.30	-0.02	2.91	2.82	-1.48
Kurtosis	1.88	2.67	2.45	11.07	11.40	5.07

The trend of the selected factors has been shown in Figure 1. NIFTY 100 faced a major fall due to the pandemic, which shook the economy (Al-Awadhi et al., 2020; Bora & Basistha, 2021). It however moved upwards after a while with some variations. A similar kind of trend was observed for crude oil prices. Besides, the exchange rate had a steep rise with the onset of COVID-19 cases, falling gradually thereafter with a slighter volatile trend. New cases witnessed a sharp peak during the first wave of the pandemic followed by another much higher peak during the second wave (Alber, 2020). New deaths also had a similar trend. India's stringency index was high during the beginning of the pandemic, especially during the first wave, because of a high level of strictness by the government. On the whole, India's stringency index has remained close to or above 60 throughout the pandemic. From the graphs of all variables, it can be observed that NIFTY 100, new cases and new deaths were (and continue to be) the most volatile; this evidence is in tune with the results provided in Table 1.

Table 2 shows ADF to perform the unit root test in log levels and first differences to examine the univariate properties of series. It confirms the

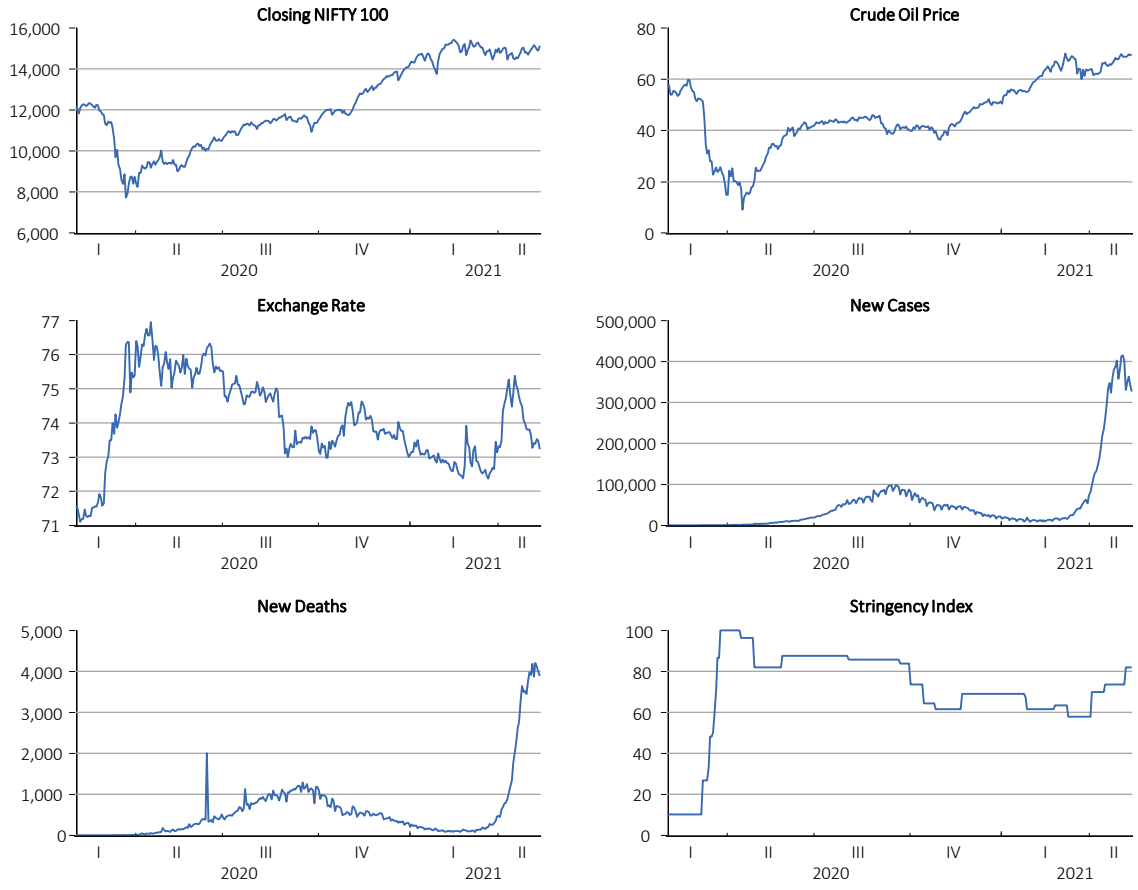

Figure 1. Trend of selected variables

http://dx.doi.org/10.21511/imfi.19(3).2022.03

Table 2. ADF unit root test

Variables	Level (*P*-Value)	First Difference (*P*-Value)	Order of Integration	Decision
NIFTY 100	0.1088	0.000***	I (1)	Accept H_2
Crude Oil Price	0.1719	0.000***	I (1)	Accept H_2
Exchange Rate	0.1629	0.000***	I (1)	Accept H_2
New Cases	0.8769	0.000***	I (1)	Accept H_2
New Deaths	0.8141	0.0049***	I (1)	Accept H_2
Stringency Index	0.0594*	0.0005***	I (1)	Accept H_2

Note: To get significance at 5%, all variables are integrated once. *** and * indicate significance level at 1% and 10%, respectively.

non-stationarity issue. The findings in Table 2 indicate log level non-stationary among all the variables, which is in line with the observation from Figure 1. This evidence does not accept the hypothesis that NIFTY 100, CL, ER, NC, ND and SI have a unit root. The results convey that the data has mean and variance reverting behavior and changes with time. This indicates that stock markets and other macroeconomic variables do change with positive and negative behavior. To transform the data into stationarity, the difference between each consecutive set of data points of a series was considered (1st difference column). All variables have stationarity at the first difference or order of integration. Therefore, the first difference of the series is integrated of order I (0). Overall, all variables were integrated at the order I (1), however, I (0) in the first difference.

Figure 2 confirms the observations of statistical results in Table 2 that there is a stationarity in the data series at the first difference level. The mean remains constant across all variables. The first difference stabilized the mean once the seasonality of data series was reduced. The stabilized mean helped to draw realistic observations and avoid spurious analysis.

The study further uses Johansen multivariate cointegration test that helps attest the existence of long-term relationships between variables as it examines whether the series are integrated or not. The results of the cointegration test are shown in Table 3. The number of cointegrating vector results for the given specification has been shown in the upper part of the table. These have been shown using trace statistics. Similarly, the second part of the table shows evidence based on the maximum eigenvalue test to define the cointegrating vectors. In each case of trace statistics, the null hypothesis (till $r \leq 5$) gets rejected based on both the p-values at 5% significance. In all cases, the trace statistic is greater than the critical value, which is significant at the 5% level. The trace test shows six cointegrating relationships among the variables.

Under Max-Eigen statistics, hypotheses at $r = 0$ and $r \leq 5$ are rejected based on the observation that both p-values are at 5% significance (Max-Eigen statistic > critical value). Thus, the value test indicates that there are six cointegrating equations. Based on the evidence, the hypothesis of cointegration among the variables is accepted, since there is a proof of cointegration. In essence, the data supports the evidence that there is a long-run relationship between the NIFTY and economic indicators such as crude oil, exchange rate, COVID-19 cases, new deaths and the stringency index.

With the existence of co-integrating relationships being confirmed, the next step is to move towards the Vector Error Correction Model (VECM). The VECM captures the relationship between multiple variables as they undergo fluctuations with time. In addition, VECM is specifically used in the case of variables having stationarity at the first difference.

The VECM evidence presented in Table 4 corroborates the fact that NIFTY 100 closing prices have a negative association with the exchange rate; the coefficient value is 57.482. As currency depreciates (higher ₹/$ exchange rate), there is an increase in import, thus causing greater cash outflows, as a result of which the profits and stock prices of domestic firms decline. Hence, countries like India that rely on exports experienced a negative connection between the exchange rate volatility and the performance of the stock market. This evidence is supported by the results of Kim (2003) and Tsai (2012).

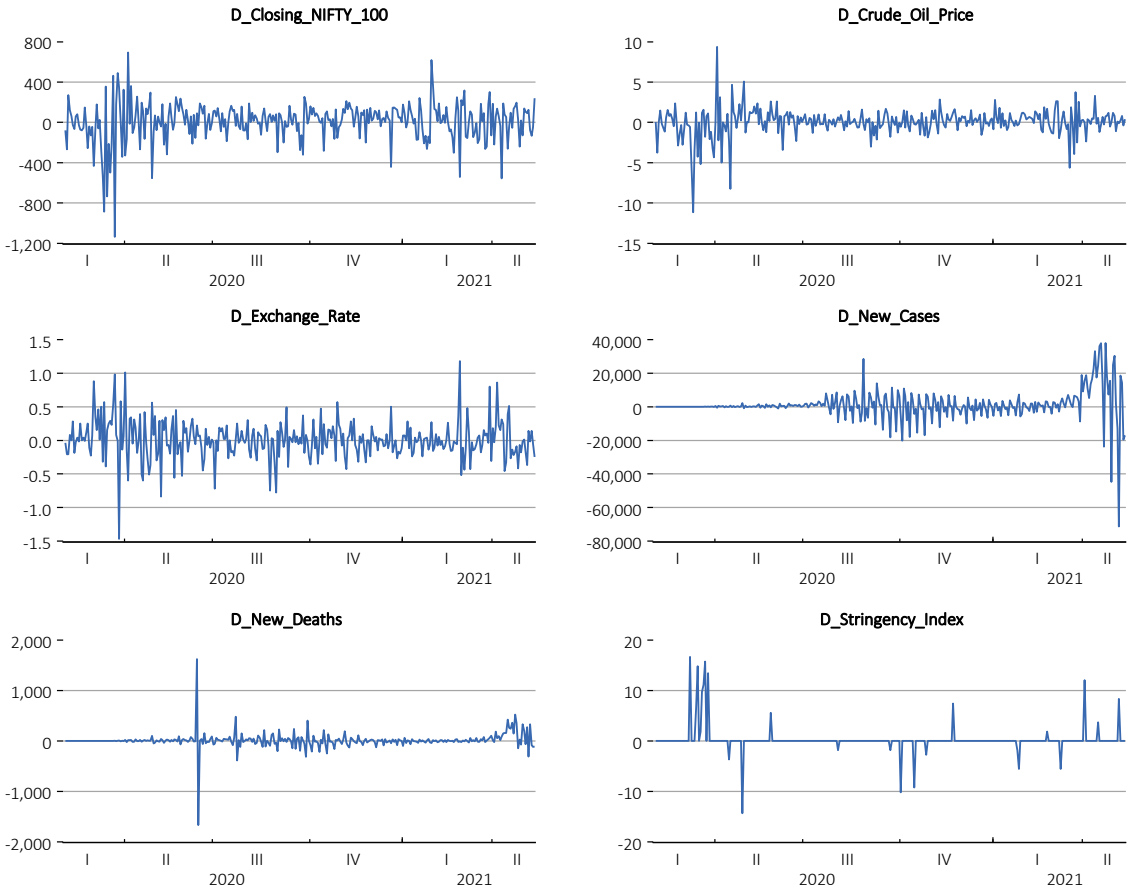

Figure 2. Trend of selected variables at first difference

Table 3. Johansen's cointegration test for cointegrating vectors

The Trace Test				
H_o	Eigen Value	Trace Statistics	5% critical value	Probability
r = 0**	0.146	137.268	107.345	0.000
r ≤ 1**	0.951	88.289	79.341	0.009
r ≤ 2**	0.068	57.32	55.246	0.033
r ≤ 3**	0.049	35.575	35.011	0.044
r ≤ 4**	0.045	19.86	18.398	0.031
r ≤ 5**	0.018	5.721	3.841	0.017
The Maximum Eigen Value Test				
H_o	Eigen Value	Max-Eigen Statistics	5% critical value	Probability
r = 0**	0.146	48.98	43.42	0.014
r ≤ 1	0.951	30.969	37.164	0.217
r ≤ 2	0.068	21.745	30.815	0.416
r ≤ 3	0.049	15.714	24.252	0.437
r ≤ 4	0.045	14.139	17.148	0.130
r ≤ 5**	0.018	5.721	3.841	0.017

Note: ** indicates significance level at 5%. r indicates the number of cointegrating vectors.

Table 4. Vector error correction model results

Variables	Normalized co-integrating coefficients			Coefficient of error correction terms		
	Coefficient	Std. Error	t-stat	Coefficient	Std. Error	t-stat
Crude oil price	12.167*	26.765	0.455	-0.000	0.000	-0.788
Exchange rate	57.482***	27.824	3.011	-0.000	0.000	-1.351
New Cases	0.224*	0.013	2.974	-0.795	0.388	-2.051
New Deaths	-2.327	1.331	-1.787	0.036	0.008	4.708
Stringency Index	3.961	17.358	0.228	0.000	0.000	0.977

Note: The significance level is at 1% and 10%.

http://dx.doi.org/10.21511/imfi.19(3).2022.03

It has also been observed that while new cases upset stock market sentiments, the relationship has been relatively less robust as compared to that with the exchange rate. The coefficient indicates a less (0.22), but still significant impact on the NIFTY 100. These results accept the hypothesis that stock prices are impacted by exchange rate volatility followed by crude oil price. The results seemed to be insignificant for new deaths and the stringency index.

The overall results of the study show the impact of macroeconomic variables and the COVID-19 pandemic on the performance of the Indian stock market. The hypotheses result also shows the presence of mean reverting behavior of data and the presence of cointegration among variables. The stock markets' return appeared to be highly volatile due to surge in the cases during the pandemic (Alber, 2020). The impact of new COVID-19 cases was however not as grave as anticipated. This is in contrast to the evidence presented by Al-Awadhi et al. (2020) that an increase in the daily confirmed cases and deaths impacted the performance of Nifty returns negatively. The Indian market was able to cope with the crisis on hand during the first wave and businesses were prepared to stay in operation with prior experience and knowledge of operating during lockdowns, demand shifts and burgeoning costs during the second wave.

Investigating the relationship of other variables with the stock market, the findings suggest a weak association between crude oil prices and the returns of the stock market. This evidence is similar to the observations made by Narayan (2021) that the relationship became less robust between oil prices and stocks performance during the pandemic. Further, VECM suggests a significant but negative impact of the exchange rate on the NIFTY 100 closing prices. This is in line with the theoretical expectations and similar to the evidence presented by Korsah and Fosu (2016), Tsai (2012), and Kim (2003). Depreciation of the rupee relative to the US dollar leads to a downward movement of the Indian stock exchange. This negative association would facilitate portfolio managers undertaking asset allocation decisions. Gains from investments can get magnified when investors consider these aspects.

CONCLUSION

The financial and economic outlook of economies have altered due to the unparalleled spread of COVID-19. This study intended to comprehend the impact of certain macroeconomic variables and the COVID-19 pandemic on the performance of the Indian stock market. ADF stationarity test and the multivariate cointegration test were used to test the presence of long-term relationships among the variables. Further, VECM was used to capture the underlying relationship as the variables underwent fluctuations.

The overall findings of the study suggest that volatility seemed to be higher across new cases and the Indian stock market; NIFTY 100, new cases and new deaths were the most volatile. The COVID cases do hurt the sentiments of the stock market, however, the association between new cases and the stock market was found to be relatively less robust as compared to that of new cases with the exchange rate. The ADF test shows that stock markets and other macroeconomic variables do change with positive and negative behavior. The results indicate an association between the NIFTY and economic indicators such as crude oil, exchange rate, COVID-19 cases, new deaths and the stringency index. Further, the results conveyed a negative relationship between exchange rate volatility and stock market performance. Exchange rates rose heavily with the onset of cases resulting in India experiencing a negative relationship between the exchange rate and the stock market. Thus, it is recommended that investors closely watch and make certain estimations regarding the exchange rate pattern before investing. This information can also be used when investors try to hedge against foreign exchange risk. In this regard, further studies can also extend the analysis by including more macroeconomic variables.

AUTHOR CONTRIBUTIONS

Conceptualization: Vandana Bhama.
Data curation: Vandana Bhama.
Formal analysis: Vandana Bhama.
Methodology: Vandana Bhama.
Project administration: Vandana Bhama.
Validation: Vandana Bhama.
Visualization: Vandana Bhama.
Writing – original draft: Vandana Bhama.
Writing – review & editing: Vandana Bhama.

ACKNOWLEDGMENT

The infrastructural support provided by the FORE School of Management, New Delhi in completing this paper is gratefully acknowledged.

REFERENCES

1. Aastveit, K. A., Bjørnland, H. C., & Thorsrud, L. A. (2014). What Drives Oil Prices? Emerging Versus Developed Economies. *Journal of Applied Econometrics, 30*(7), 1013-1028. https://doi.org/10.1002/jae.2406
2. Adebowale, E. A., & Akosile, A. I. (2018). Interest Rate, Foreign Exchange Rate, and Stock Market Development in Nigeria. *Binus Business Review, 9*(3), 247-253. https://doi.org/10.21512/bbr.v9i3.4941
3. Ahmed, S. (2008). Aggregate economic variables and stock market in India. *International Research Journal of Finance and Economics, 14,* 141-164.
4. Alam, M. N., Alam, M. S., & Chavali, K. (2020). Stock market response during COVID-19 lockdown period in India: An event study. *Journal of Asian Finance, Economics and Business, 7*(7), 131-137. https://doi.org/10.13106/jafeb.2020.vol7.no7.131
5. Al-Awadhi, A. M., Al-Saifi, K., Al-Awadhi, A., & Alhamadi, S. (2020). Death and contagious infectious diseases: impact of the COVID-19 virus on stock market return. *Journal of Behavioral and Experimental Finance, 27,* 100326.
6. Alber, N. (2020). *The Effect of Coronavirus Spread on Stock Markets: The Case of the Worst 6 Countries.* Retrieved from https://ssrn.com/abstract=3578080
7. Ashraf, B. N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance, 54,* 101249. https://doi.org/10.1016/j.ribaf.2020.101249
8. Bora, D., & Basistha, D. (2021). The outbreak of COVID-19 pandemic and its impact on stock market volatility: Evidence from a worst-affected economy. *Journal of Public Affairs, 21*(4), 1-10. https://doi.org/10.1002/pa.2623
9. Camarero, M., & Tamarit, C. (2002). Oil prices and Spanish competitiveness: a cointegrated panel analysis. *Journal of Policy Model, 24*(6), 591-605. https://doi.org/10.1016/S0161-8938(02)00128-X
10. Camilleri, S. J., Scicluna, N., & Bai, Y. (2019). Do Stock Markets Lead or Lag Macroeconomic Variables? Evidence from Select European Countries. *The North American Journal of Economics and Finance, 48,* 170-186. https://doi.org/10.1016/j.najef.2019.01.019
11. Devpura, N., & Narayan, P. K. (2020). Hourly oil price volatility: The role of COVID-19. *Energy Research Letters, 1*(2), 1-5. https://doi.org/10.46557/001c.13683
12. Donadelli, M., Kizys, R., & Riedel, M. (2016). Dangerous infectious diseases: Bad news for Main street, good news for Wall Street? *Journal of Financial Markets, 35,* 84-103. https://doi.org/10.1016/j.finmar.2016.12.003
13. Ibrahim, M. H., & Aziz, H. (2003). Macroeconomic variables and the Malaysian equity market. *Journal of Economic Studies, 30*(1), 6-27. https://doi.org/10.1108/01443580310455241
14. Jain, A., & Biswal, P. C. (2016). Dynamic linkages among oil price, gold price, exchange rate, and stock market in India. *Resources Policy, 49,* 179-185. https://doi.org/10.1016/j.resourpol.2016.06.001
15. Jesus, D. P. D., Bezerra, B. F. L. S., & Besarria, C. D. N. (2020). The non-linear relationship between oil prices and stock prices: Evidence from oil-importing and oil-exporting countries. *Research in International Business and Finance, 54,* 101229. https://doi.org/10.1016/j.ribaf.2020.101229
16. Ji, Q., Shahzad, S. J. H., Bouri, E., & Suleman, M. T. (2020). Dynamic structural impacts of oil shocks on exchange rates: lessons to learn. *Journal of Economic Structures, 9*(20), 1-19. https://journalofeconomicstructures.springeropen.com/articles/10.1186/s40008-020-00194-5

http://dx.doi.org/10.21511/imfi.19(3).2022.03

17. Kewal. (2012). Effect of Inflation, Interest Rate, exchange rate and GDP growth Against Composite Stock Price Index. *Journal Economic, 8*(1), 33-64.

18. Kim, K. (2003). Dollar exchange rate and stock price: evidence from multivariate cointegration and error correction model. *Review of Financial Economics, 12*(3), 301-313. https://doi.org/10.1016/S1058-3300(03)00026-0

19. Korsah, P., & Fosu, P. (2016). The Effects of Exchange Rates Movements on Stock Market Capitalisation in Ghana. *Journal of Applied Economics & Business Research, 6*(4), 312-327.

20. Liu, H. Y., Manzoor, A., Wang, C. Y., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health, 17*(8), 1-19. https://doi.org/10.3390/ijerph17082800

21. Mazur, M., Dang, M., & Vega, M. (2020). COVID-19 and the March 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters, 38,* 101690. https://doi.org/10.1016/j.frl.2020.101690

22. Mishra, A. K., Rath, B. N., & Dash, A. K. (2020). Does the Indian Financial Market Nosedive because of the COVID-19 Outbreak, in Comparison to after Demonetization and the GST? *Emerging Markets Finance and Trade, 56*(10), 2162-2180. https://doi.org/10.1080/1540496X.2020.1785425

23. Narayan, P. K. (2021). COVID-19 research outcomes: An agenda for future research. *Economic Analysis and Policy, 71,* 439-445. https://doi.org/10.1016/j.eap.2021.06.006

24. Narayan, P. K., & Narayan, S. (2010). Modelling the impact of oil prices on Vietnam's stock prices. *Applied Energy, 87*(1), 356-361. https://doi.org/10.1016/j.apenergy.2009.05.037

25. Nayak, D., & Barodawala, R. (2021). The impact of macroeconomic factors on the Indian stock market: An assessment. *Arthshastra Indian Journal of Economics & Research, 10*(2-3), 27-40. http://dx.doi.org/10.17010/aijer%2F2021%2Fv10i2-3%2F167172

26. Olugbenga, A. A. (2012). Exchange rate volatility and stock market behaviour: the Nigerian experience. *European Journal of Business and Management, 4*(5), 31-39.

27. O'Neill, T., Penm, J. H. W., & Terrell, R. (2008). The role of higher oil prices: A case of major developed countries. *Research in Finance, 24,* 287-299. https://doi.org/10.1016/S0196-3821(07)00211-0

28. Prabheesh, K. P., Padhan, R., & Garg, B. (2020). COVID-19 and the oil price–tock market nexus: Evidence from net oil-importing countries. *Energy Research Letters, 1*(2), 13745.

29. Rahman, A. A., Sidek, N. Z. M., & Tafri, F. H. (2009). Macroeconomic Determinants of Malaysian Stock Market. African *Journal of Business Management, 3*(3), 95-106.

30. Rautava, J. (2002). *The role of oil prices and the real exchange rate in Russia's economy* (BOFIT Discussion Papers No. 3). Bank of Finland – Institute for Economies in Transition. http://dx.doi.org/10.2139/ssrn.1015696

31. Ray, S. (2012). Foreign exchange reserve and its impact on stock market capitalization: Evidence from India. Research *on Humanities and Social Sciences, 2*(2), 46-60.

32. Ray, S. (2012). Testing Granger Causal Relationship between Macroeconomic Variables and Stock Price Behaviour: Evidence from India. *Advances in Applied Economics and Finance, 3*(1), 470-481.

33. Reddy, Y. V., Ingalhalli, V. B., & Sahay, H. (2019). The impact of macroeconomic announcements on financial market volatility in India. *IUP Journal of Applied Finance, 25*(2), 65-90.

34. Shankar, R., & Dubey, P. (2021). Indian stock market during the COVID-19 pandemic: Vulnerable or Resilient? Sectoral Analysis. *Organizations and Markets in Emerging Economies, 12*(1), 131-159.

35. Sharma, A., Giri, S., Vardhan, H., Surange, S., Shetty, R., & Shetty, V. (2018). Relationship between Crude Oil Prices and Stock Market: Evidence from India. *International Journal of Energy Economics and Policy, 8*(4) 331-337.

36. Shehzad, K., Xiaoxing, L., & Kazouz, H. (2020). COVID-19's disasters are perilous than Global Financial Crisis: A rumor or fact? *Finance Research Letters, 36,* 101669. https://doi.org/10.1016/j.frl.2020.101669

37. Suriani, S., Kumar, M. D., Jamil, F., & Muneer, S. (2015). Impact of the Exchange Rate on Stock Market. *International Journal of Economics and Financial Issues, 5,* 385-388.

38. Topcu, M., & Gulal, O. S. (2020). The impact of COVID-19 on emerging stock markets. *Finance Research Letters, 36,* 101691. https://doi.org/10.1016/j.frl.2020.101691

39. Tripathi, V., & Kumar, A. (2018). Relationship between Macroeconomic Factors and Aggregate Stock Returns in BRICS Stock Market – A Panel Data Analysis. In *New Age Business Strategies in Emerging Global Markets* (pp. 104-123). Excel India.

40. Tsai, I. (2012). The relationship between stock price index and exchange rate in Asian markets: A quantile regression approach. *Journal of International Financial Markets, Institutions and Money, 22*(3), 609-621. https://doi.org/10.1016/j.intfin.2012.04.005

41. Tursoy, T., & Faisal, F. (2016). Causality between stock price and GDP in Turkey: An ARDL Bounds Testing Approach. *The Romanian Statistical Review, 4,* 3-19.

42. Yilmazkuday, H. (2020). COVID-19 effects on the S&P 500 index (Working Paper). Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3559860