

Inflation, Exchange Rates and Stock Market Returns in India: New Evidence on Short- and Long-Run Dynamics amid COVID-19

Ajit Kumar Pagal^{1*}, Bishnu Charan Behera²

¹ P.G. Department of Economics, Berhampur University, Bhanja Bihar, 760007, Odisha

ajitkumarpagal2021@gmail.com, ORCID: 978-1000-978-1000

² P.G. Department of Economics, Berhampur University, Bhanja Bihar, 760007, Odisha

bcbeherabu@gmail.com, ORCID: 978-1000-978-1000

* Corresponding author

HOW TO CITE:

Ajit Kumar Pagal, Bishnu Charan Behera (2026). Inflation, Exchange Rates and Stock Market Returns in India: New Evidence on Short- and Long-Run Dynamics amid COVID-19. International Journal of Special Education, 41(24s), 978-1000

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

ABSTRACT:

Inflation, exchange rate movements and COVID-19 pandemic have substantially influenced stock market performance in emerging economies. This study investigates their short- and long-run effects on Indian stock market returns using monthly data from 2012M04 to 2023M07. The Autoregressive Distributed Lag (ARDL) model is employed with FMOLS and CCR estimators used to assess the robustness of the long-run estimates. According to ARDL estimates, inflation has a negative but statistically insignificant long-run effect on stock market returns, whereas exchange-rate depreciation exerts a negative and highly significant short-run effect and a marginally significant negative long-run effect. The COVID-19 period is associated with a significant negative short-run response but a positive long-run shift in stock-market returns, consistent with an initial pandemic-induced disruption followed by market adjustment and recovery. The positive long-run COVID-19 coefficient remains significant across the FMOLS and CCR estimators, while the negative exchange-rate coefficient remains consistent in sign but is statistically insignificant under these alternative estimators. The study provides relevant insights for policymakers, investors and financial regulators in managing macroeconomic risks and promoting financial market stability.

Keywords: inflation, exchange rate, stock market returns, COVID-19, macroeconomic uncertainty.

JEL Codes: C22, E31, F31, G12, G15

1. Introduction

The stock market is of vital importance for the proper mobilization of savings, capital formation, and promoting economic growth

through the effective allocation of financial resources in the economy (Salameh & Ahmad, 2022). Being a crucial part of the financial system, the stock market operates as a key indicator of economic performance and the confidence of

investors. However, the stock market performance is very sensitive to macroeconomic shocks, financial crises, economic uncertainty, and external shocks, which create substantial variations in stock prices (Suriani et al., 2024). In addition, rising globalization, financial integration, and capital mobility have increased the effect of domestic and foreign shocks on the financial markets (Aggarwal & Saradhi, 2025). Among the various macroeconomic variables, inflation and exchange rate have been extensively studied because of their notable influence on business profitability, investment decisions, and investor behaviour (Bhargava & Konku, 2023; Omran & Pointon, 2001). This is particularly relevant for emerging economies such as India, which are especially vulnerable to economic shocks.

To assess the dynamic relationship between macroeconomic conditions and stock market dynamics, different frameworks have been developed in financial economics. Under the Fisher hypothesis, stock returns could act as hedges against inflation, as the nominal returns are expected to change with the changes in price levels (Fisher, 1930). On the contrary, inflationary pressures may negatively impact stock market performance due to the economic uncertainties, low economic activity, and poor corporate performance they bring about (Bekaert & Engstrom, 2010; Fama, 1981). The flow-oriented (goods market) model further elaborates that variations in the exchange rates have an impact on stock prices by influencing the international competitiveness and performance of trade as well as cash flows of the companies (Bhargava & Konku, 2023; Dornbusch & Fischer, 1980). Similarly, the Portfolio Balance Approach indicates that there exists a connection between stock prices, exchange rates, and the movement of capital across borders due to the fact that investors allocate their resources between domestic and international financial assets based on the expected return and exchange rate changes (Frankel, 1983). Furthermore, under the Arbitrage Pricing Theory (APT), the return on an asset depends on its sensitivity to different factors. At the same

time, in practice, inflation and exchange rates were found to be significant proxies for macroeconomic sources of risk (Gopinathan & Durai, 2019; Ross, 1976). Thus, overall, these theories together allow us to understand how inflation, exchange rates, and external shocks affect stock prices.

Against this theoretical background, India, as a rapidly growing economy, provides an important empirical context for analysing the nexus of inflation, exchange rates, external shocks on stock returns. Since the economic reforms in 1991, India has undergone significant financial transformations (Misra, 2018). One of the major reforms was the repeal of FERA and its replacement by FEMA. The latter participated in improving the country's financial openness and attracting investments through free access to capital markets. As a result, combined with other capital market reforms, FERA's revocation led to increased market capitalization and more efficient markets (Sharan, 2008). Nevertheless, financial integration has also led to greater vulnerability of the Indian stock market to macroeconomic disturbances across domestic and international markets. Recent evidence from the Economic Survey 1978-1000 shows considerable volatility in foreign portfolio flows, highlighting the sensitivity of Indian equity and bond markets to global developments, while India's sound economic and corporate fundamentals continue to sustain the long-term attractiveness of its equity market to foreign investors (Ministry of Finance, 2025). Moreover, previous studies indicate that volatility in inflation, exchange rates, financial crises, and disruptions caused by pandemics has become a crucial factor in shaping stock market returns in India (Bhatia, 2026; Bora & Basistha, 2021). Hence, India is a suitable country to trace to investigate how macroeconomic conditions and external shocks on stock returns.

Apart from the traditional macroeconomic determinants, the COVID-19 crisis emerged as a unique global shock that disrupted the economy and financial markets worldwide (Ashraf, 2020; Hasan et al., 2021). Lockdowns, quarantine, social distancing, among other measures taken

for the containment of the virus, significantly affected production, trade, consumption, and investment, causing higher economic uncertainty and volatility in financial markets (Ashraf, 2020). The coronavirus pandemic triggered sharp fluctuations in stock prices, market volatility, and spillovers of volatility across sectors in India (Guru & Das, 2021; Sahoo, 2021). In addition, recent studies indicate that the pandemic heightened the sensitivity of stock market returns to inflation, exchange rate movements, and investor sentiment (Suriani et al., 2024). Thus, the COVID-19 can be viewed as a major exogenous shock for the Indian stock market.

Although theories suggest that inflation, exchange rates, external factors, and stock returns are closely intertwined, the study results are often mixed. Indeed, while some studies reveal that stocks are a hedge against inflation (Choudhry, 2001; Firth, 1979), indicating that inflation contributes positively to stock market performance, others show that inflation adversely affects stock market performance by increasing uncertainty and dampening economic activity (Fama, 1981; Omran & Pointon, 2001; Sreenu, 2023). Similarly, evidence regarding the relationship between exchange rates and stock markets is inconclusive since some researchers found a positive association (Chang et al., 2024; Chortareas et al., 2000; Koutmos et al., 1993; Mitra, 2017; Tian & Ma, 2010), an inverse relationship (Dahir et al., 2018; Ma & Kao, 1990; Solnik, 1987), mixed findings (Bashir et al., 2016), and no statistically significant relationship (Alagidede et al., 2011; Bartov & Bodnar, 1994). Recent studies also indicate that macroeconomic shocks such as the coronavirus have played an increasingly important role in the functioning of stock markets, especially in developing countries (Ashraf, 2020; Hasan et al., 2021; Okorie et al., 2021; Guru & Das, 2021; Moizz & Akhtar, 2024). Overall, the evidence regarding the dynamic interactions among stock market returns, inflation, exchange rates, and COVID-19 remains inconclusive and warrants further investigation.

Despite extensive research on macroeconomic determinants of the Indian stock market, limited

attention has been given to the return-based response of the S&P BSE Sensex to inflation, exchange-rate movements and pandemic-induced structural change. For instance, Moizz and Akhtar (2024) examine the NIFTY50 within a broader monetary-policy framework comprising WACR, WPI, M3 and exchange rate, while accounting for multiple structural breaks. However, evidence remains limited on whether these relationships differ when stock-market returns rather than index levels, CPI rather than WPI, and a focused pandemic-shock framework are considered. Moreover, the contrasting short- and long-run responses of the Indian stock market to COVID-19 remain an area for further investigation. These gaps motivate the following research question: To what extent do inflation and exchange-rate movements influence stock market returns in India, and how does the COVID-19 period affect these dynamics in the short and long run?

The novelty of this study lies in extending the existing literature by examining S&P BSE Sensex returns in relation to CPI-based inflation, exchange-rate movements and the COVID-19 shock using monthly data. Unlike Moizz and Akhtar (2024), who employ the Bai–Perron multiple-breakpoint approach, this study uses the Zivot–Andrews endogenous structural-break test to identify variable-specific structural changes and incorporates the March 2020 break into the ARDL framework. Further, the use of FMOLS and CCR as alternative long-run estimators provides an additional robustness dimension. Collectively, these features provide a focused empirical framework for examining the short- and long-run dynamics of Indian stock-market returns during a period encompassing the COVID-19 shock.

The study makes three principal contributions. First, it provides return-based evidence on the joint effects of inflation, exchange rate and the COVID-19 structural shift in the Indian stock market. Second, it identifies distinct short- and long-run responses, particularly an immediate negative COVID-19 shock followed by a positive long-run shift. Third, FMOLS and CCR estimates provide robustness for the long-run

relationships, strengthening the horizon-dependent effects of macroeconomic and pandemic-related shocks.

The structure of the rest of the paper is as follows. Section 2 provides a theoretical and empirical evidence on inflation, exchange rate, COVID-19 and stock market performance, and development of research hypotheses. Then, section 3 explains the data sources and variables used in the study, and research design, including the ARDL model and estimation technique. After that, section 4 reveals the study's results, including descriptive statistics, unit root tests, lag order determination tests, cointegration tests, long-run and short-run estimates, stability tests, diagnostic tests, robustness tests, and Hypotheses Testing. Finally, the last section concludes the paper and offers policy recommendations based on the findings, and describes the research's limitations and avenues for future research.

2. Theoretical basis and Hypothesis Development

2.1 Studies on Inflation and Stock Market Returns

The theoretical underpinnings of the inflation–stock return nexus remain a matter of debate. According to Fisher's hypothesis (Fisher, 1930), stocks are a hedge against inflation because their yield is adjusted according to the changes in price level. The opposite view, represented by the Proxy Hypothesis (Fama, 1981), states that there is an indirect relationship between inflation and stock prices, as inflation negatively affects the macroeconomy and, as a result, the stock prices.

Empirical evidence reveals mixed findings regarding the existence of this relationship. On the one hand, the United Kingdom, Latin America, Kenya, and China, using regression analysis, ARIMA/ARFIMA, fractional cointegration, and wavelet analysis approaches, respectively, documented a positive link between inflation and stock returns. In other words, stocks are capable of hedging against inflation (Firth, 1979; Choudhry, 2001; Otieno et al., 2019; Wang & Li, 2020). Contrary to this view, the United States, Egypt, India, Ghana, and a

number of developed and developing countries, using cointegration, VECM, ARDL, wavelet, and APARCH approaches, respectively, reported a negative impact of inflation on stock markets through various channels, namely, economic activity, volatility, and profit rates (Fama, 1981; Omran & Pointon, 2001; Durai & Bhaduri, 2009; Eldomiaty et al., 2020; Asravor & Fonu, 2021; Chiang, 2023).

Nevertheless, the inflation-stock relationship is controversial since the analysis of such connections at the level of cross-country studies shows that there are no unique patterns that describe relationships between stock returns and inflation rates. Kaul (1987), Davis and Kutan (2003), and Antonakakis et al. (2017) report different results that depend on the choice of countries, monetary systems, time intervals, and methods of analysis.

2.2 Studies on Exchange Rates and Stock Market Returns

The Flow-oriented model (Dornbusch & Fischer, 1980) suggests that exchange rates influence stock prices through the impact on the international competitiveness of firms, their exports, and cash flows. On the other hand, the Portfolio balance theory (Frankel, 1983) states that stock market fluctuations affect exchange rates by changing international capital flows and investors' portfolio distribution.

The available evidence regarding exchange rates and stock market returns is mixed because the reported associations vary across different contexts. The review of the literature reveals that papers using EGARCH, Johansen cointegration, VECM, ARDL, Cointegrating SVAR, nonlinear ARDL, and detrended cross-correlation analysis approaches and focused on Greece, Pacific Basin countries, China, European emerging markets, South Africa, and Latin America report a positive relation between exchange rates and stock market performance (Koutmos et al., 1993; Chortareas et al., 2000; Phylaktis & Ravazzolo, 2005; Tian & Ma, 2010; Ülkü & Demirci, 2012; Mitra, 2017; Bahmani-Oskooee & Saha, 2016; Bashir et al., 2016). In other words, positive exchange rate changes positively influence firms'

competitiveness, which, in turn, benefits stock returns. Meanwhile, papers employing regression, EGARCH, quantile regression, MGARCH, wavelet analysis, Cross-Quantilogram, and DCC-MIDAS-X methods and centered on developed countries, Ghana, Asian countries, Pakistan, Taiwan, China, and BRICS countries find that depreciation and exchange rate volatility negatively affect stock market performance (Solnik, 1987; Ma & Kao, 1990; Adjasi et al., 2008; Tsai, 2012; Wong, 2017; Dahir et al., 2018; Ali et al., 2020; Chang et al., 2024; Xiong et al., 2024).

The cross-country studies analyzing the US, Canada, Japan, Australia, UK, Switzerland, BRICS countries, and other developed countries using cointegration, causality, SUR, panel estimations, and Panel ARDL techniques generally find weak, insignificant, or time-varying relationships, implying that the exchange rate – stock market linkages depend on countries' characteristics, exchange rate regimes, time of analysis, and econometric specifications (Bahmani-Oskooee & Sohrabian, 1992; Bartov & Bodnar, 1994; Ajayi & Mougoue, 1996; Alagidede et al., 2011; Caporale et al., 2014; Zarei et al., 2019; Mroua & Trabelsi, 2020).

2.3 Studies on Inflation, Exchange Rate and Stock Market Returns

Studies conducted in Nigeria, India, Ghana, Saudi Arabia, the United Arab Emirates, and Sub-Saharan African countries using the ARDL, ECM, VECM, GARCH, copula, panel regression, and random effects generalized least squares techniques reveal that inflation and exchange rates have a significant impact on the stock market, although the channels differ across countries (Okorie et al., 2021; Kyereboah-Coleman & Agyire-Tettey, 2008; Kwofie & Ansah, 2018; Sreenu, 2023; Abusaba et al., 2025). Contrarily, the study in Mexico, Indonesia, Pakistan, Jordan, and Asian economies adopting the techniques of VAR, Johansen cointegration, Quantile ARDL, ARDL, and pooled ordinary least squares reveals that depreciation of the exchange rate and rise in inflation rate negatively affect stock market value (Delgado et al., 2018;

Vietha, 2019; Hashim et al., 2020; Hashmi et al., 2022; Alzoubi, 2022). However, the evidence on the subject matter is inconclusive due to varied country-specific conditions, time period of analysis, and statistical approaches used in different studies (Canova & Nicoló, 2000; Ratanapakorn & Sharma, 2007).

2.4 COVID-19 and Stock Market Returns

The spread of COVID-19 has created major uncertainty in global financial markets, resulting in a significant drop in stock market returns and increased volatility. According to the study by Phan and Narayan (2021) examined stock market responses to COVID-19 across 25 countries and reported significant effects associated with pandemic developments and government responses. Alexakis et al. (2021) applied the Dynamic Spatial Durbin Model and found that containment measures and pandemic outbreaks negatively influenced stock market returns through increased international spillovers of trade and finance. In emerging markets. Meanwhile, Ganie et al. (2022) employed the panel data regression approach and found that increased COVID-19 cases decreased stock returns and market volatility in emerging and developed countries. Guru and Das (2021) used the Diebold–Yilmaz Spillover Index and Generalized Forecast Error Variance Decomposition (GFEVD) to analyse the impact of the pandemic on the Indian stock market and found that COVID-19 significantly changed the volatility spillovers between sectors. Using the GARCH (1,1) model, Sahoo (2021) found that COVID-19 increased the volatility of the Indian stock market. Tan et al. (2022) reported that the negative effect of COVID-19 weakened over time, indicating progressive market adjustment, while Chang et al. (2021) analysed the stock markets of twenty (20) countries using the dynamic panel Difference Generalized Method of Moments (DGMM) and concluded that government response to the COVID-19 pandemic, including overall government response, containment and health, and stringency, had a positive relationship with stock market returns. Dharani et al. (2023) applied the panel data regression method and found that

COVID-19 cases and deaths decreased the stock market returns of various sectors, which indicates that the pandemic affected different industries differently in India. Suriani et al. (2024) also emphasised differences in sectoral vulnerability and resilience during the pandemic. More closely related to the present study, Moizz and Akhtar (2024) identified March 2020 as a significant structural break associated with COVID-19 and reported a negative effect on the NIFTY50. Overall, the literature predominantly documents an initial adverse impact of COVID-19 on stock-market performance, while emerging evidence points to subsequent adjustment and recovery.

2.5 Hypotheses

The following hypotheses are formulated in light of the existing literature.

H1: Inflation has a significant effect on Indian stock-market returns.

H2: Exchange-rate movements have a significant effect on Indian stock-market returns.

H3: The COVID-19 period is associated with a significant structural shift in Indian stock-market returns.

H4: Inflation, exchange-rate movements and the COVID-19 structural-shift have a long-run equilibrium relationship with Indian stock-market returns.

3. Methodology

3.1 Data and Source Description

This paper aims to investigate the effects of inflation, exchange rate and COVID-19 on

Indian stock market returns over the period from 2012M04 to 2023M07. The justification for conducting the analysis at a monthly level is to understand the short-run dynamics and interrelationships between the considered macroeconomic variables and stock market performance (Sharaf et al., 2025). The S&P BSE Sensex Index serves as a measure of stock market performance, from which monthly continuously compounded returns are calculated (Yadav et al., 2022). Inflation is proxied by the Consumer Price Index (CPI) (Sreenu, 2023; Yadav et al., 2022), and the exchange rate is measured in terms of Indian Rupees to U.S. Dollars (Gopinathan & Durai, 2019; Sreenu, 2023; Yadav et al., 2022). As per Tong et al. (2020), a logarithmic transformation was applied to stock market returns, inflation, and exchange rates to reduce heteroskedasticity. To capture the structural effect of COVID-19 on Indian stock market returns, a dummy variable was incorporated, taking the value of 0 before March 2020 and 1 onward. The selection of March 2020 is supported by the Zivot–Andrews structural-break test, which identifies a structural break in the stock market return series around this period. The dummy therefore captures a post-March 2020 regime shift in stock market returns rather than serving as a standalone measure of the causal effect of COVID-19. The definitions, measurements, and sources of all variables are presented in Table 1.

Table 1: Description of Variables

Variable Type	Variables	Symbol	Measurement	Source	Justification from Literature
Dependent	Stock Market Returns	LSMR	Logarithmic monthly returns of the S&P BSE Sensex Index	BSE	Yadav et al., 2022

Independent	Inflation Rate	LINF	Logarithm of Consumer Price Index	RBI	Sreenu, 2023
Independent	Exchange Rate	LEXR	Logarithm of Indian Rupees per U.S. Dollar	RBI	Gopinathan & Durai, 2019
Independent	COVID-19 Dummy	COVID19	Dummy variable taking 0 before March 2020 and 1 thereafter	Author's Construction	Topcu & Gulal, 2020

Source: Authors' compilation

3.2 Method

This study uses the ARDL model (Pesaran et al., 2001) to examine the dynamic nexus among LSMR, LINF, LEXR, and COVID19 in India. The use of the ARDL model is justified since it can be employed when variables are integrated at I (0), I (1), or both, but not at I (2). Moreover, this model is well suited to small samples and enables the simultaneous estimation of short-run and long-run dynamics within a single framework (Sharaf et al., 2025). The dynamic lag structure allows the ARDL framework to model temporal dependence and provides a flexible specification for distinguishing short-run dynamics from long-run relationships. Owing to these advantages, the ARDL approach is employed to examine the relationship among LSMR, LINF, LEXR, and COVID19.

3.2.1 Model Specification

The general functional relationship between the variables is expressed in equation 1:

$$SMR_t = f(INF_t, EXR_t, COVID19_t) \quad (1)$$

The equation (2) specifies the linear econometric form of the model.

$$SMR_t = \beta_0 + \beta_1 INF_t + \beta_2 EXR_t + \beta_3 COVID19_t + \mu_t \quad (2)$$

where: SMR_t denotes stock market returns, INF_t represents Consumer Price Index, EXR_t indicates Exchange rate, $COVID19_t$ reveals COVID-19 dummy variable and μ_t is the disturbance term, and $COVID19_t =$ is the

COVID-19 structural dummy variable defined as:

$$COVID19_t = \begin{cases} 0, & \text{Before March 2020} \\ 1, & \text{From March 2020 onwards} \end{cases}$$

Following previous empirical studies, logarithmic transformations were applied to stock market returns, inflation, and exchange rates to capture proportional and percentage changes in these variables. Logarithmic transformation also helps reduce heteroscedasticity and improve the normality properties of the time-series data (Sreenu, 2023; Yadav et al., 2022). Accordingly, the log-linear structure of the model is represented by equation (3):

$$LSMR_t = \beta_0 + \beta_1 LCPI_t + \beta_2 LEXR_t + \beta_3 COVID19_t + \mu_t \quad (3)$$

3.2.2 ARDL Model Specification

Equation (4) presents the ARDL (p, q) model.

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=0}^q \beta_j X_{t-j} + \varepsilon_t \quad (4)$$

Based on the variables utilized in this paper, equation (5) specifies the empirical ARDL.

$$LSMR_t = \alpha_0 + \sum_{i=1}^p \alpha_1 LSMR_{t-i} + \sum_{i=0}^{q_1} \alpha_2 LINF_{t-i} + \sum_{i=0}^{q_2} \alpha_3 LEXR_{t-i} + \sum_{i=0}^{q_3} \alpha_4 COVID19_{t-i} + \varepsilon_t \quad (5)$$

where: $LSMR_{t-i}$ represents lagged stock market returns, $LINF_{t-i}$ denotes lagged inflation, $LEXR_{t-i}$ depicts lagged exchange rate, $COVID19_{t-i}$ shows a lagged COVID-19 dummy variable, and ε_t represents the disturbance term.

3.2.3 Cointegration and Error Correction Model

The existence of a long-term relationship between $LSMR$, $LINF$, $LEXR$, and $COVID19$ is examined using ARDL Bounds Testing approach (Pesaran et al. 2001). The equation (6) describes the unrestricted ARDL ECM specification:

$$\begin{aligned} \Delta LSMR_t &= \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta LSMR_{t-i} \\ &+ \sum_{i=0}^{q_1} \alpha_2 \Delta LINF_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta LEXR_{t-i} \\ &+ \sum_{i=0}^{q_3} \alpha_4 \Delta COVID19_{t-i} + \lambda_1 LSMR_{t-1} \\ &+ \lambda_2 LINF_{t-1} + \lambda_3 LEXR_{t-1} \\ &+ \lambda_4 COVID19_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (6)$$

where: Δ indicates the first-difference operator, α_0 denotes the intercept, ε_t is the white-noise disturbance, p and q specify the optimal lag, and $\lambda_1 - \lambda_4$ are the coefficients on the lagged level terms used in the bounds test for cointegration. After establishing cointegration, equation (7) explains the long-term dynamic relationship.

$$\begin{aligned} LSMR_t &= \theta_0 + \theta_1 LINF_t + \theta_2 LEXR_t \\ &+ \theta_3 COVID19_t \\ &+ u_t \end{aligned} \quad (7)$$

where: $\theta_1, \theta_2, \theta_3$ denote long-run cointegrating coefficients, and u_t represents the long-run equilibrium error term.

Equations (8) and (9) present the null and alternative hypotheses for the cointegration test, respectively:

$$\begin{aligned} H_0: \lambda_1 &= \lambda_2 = \lambda_3 = \lambda_4 \\ &= 0 \end{aligned} \quad (8)$$

$$H_1: \lambda_i \neq 0 \quad (9)$$

When the computed F-statistic is greater than the upper critical bound, the null hypothesis of no cointegration is rejected, providing evidence of a stable long-run association among the variables (Pesaran et al., 2001). Following the confirmation of cointegration the ECM is specified in Equation (10).

$$\begin{aligned} \Delta LSMR_t &= \alpha_0 + \sum_{i=1}^p \alpha_1 \Delta LSMR_{t-i} \\ &+ \sum_{i=0}^{q_1} \alpha_2 \Delta LINF_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta LEXR_{t-i} \\ &+ \sum_{i=0}^{q_3} \alpha_4 \Delta COVID19_{t-i} + \phi ECM_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (10)$$

where ECM_{t-1} captures the previous period's equilibrium error, and ϕ reflects the speed of convergence to the long-run equilibrium. A negative and statistically significant estimate of ϕ suggests that the system possesses a self-correcting mechanism, whereby short-term disequilibrium gradually converges to the long-term equilibrium path (Engle & Granger, 1987).

3.2.4 Unit Root and Diagnostic Tests

As a preliminary step, the stationarity of each variable was evaluated using the Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979) and Phillips-Perron (PP) (Phillips & Perron, 1988) unit root tests to determine the order of integration of the variables. Equations (11) and (12) specify the equations for the ADF and PP unit root tests respectively.

$$\begin{aligned} \Delta Y_t &= \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} \\ &+ \varepsilon_t \end{aligned} \quad (11)$$

$$\begin{aligned} Y_t &= \alpha_0 + \beta Y_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (12)$$

The mathematical specification of the Zivot-Andrews (ZA) unit root test (Zivot & Andrews,

1992) is presented in Equation (13), which accommodates a single endogenously determined structural break in the intercept and trend.

$$\Delta Y_t = \mu + \beta t + \theta DU_t + \gamma DT_t + \alpha Y_{t-1} + \sum_{i=1}^k c_i \Delta Y_{t-i} + \varepsilon_t \quad (13)$$

Where DU_t and DT_t represent the intercept and trend break dummy variables, respectively.

The robustness of the long-run estimates is verified by applying Fully Modified Ordinary Least Squares (FMOLS) (Phillips & Hansen, 1990) and Canonical Cointegrating Regression (CCR) (Park, 1992). The validity of the model is evaluated through the Breusch-Godfrey LM, Jarque-Bera, Ramsey RESET, Breusch-Pagan-Godfrey, CUSUM, and CUSUMSQ tests (Godfrey, 1978; Jarque & Bera, 1987; Ramsey, 1969; Breusch & Pagan, 1979; Brown et al., 1975), confirming the adequacy and stability of the estimated ARDL model.

4. Results and Discussion

4.1 Descriptive Statistics

Table 2 reports a summary of the descriptive statistics for inflation (INF), exchange rate (EXR), and stock market returns (SMR) in India for the sample period spanning April 2012 to July 2023 (136 observations). The mean values of INF, EXR, and SMR are 5.91%, 67.97 INR per 1 USD, and 1.10%, respectively. Obviously, SMR has the largest dispersion, with values ranging from -23.23% to 14.79%. The other series also demonstrate significant variation, which becomes apparent from the large standard deviation values. The graphical depictions of the variables' behaviour over time, presented in Appendix (Figure A1, A2 and A3), reveal several trends typical of the entire sample period. Specifically, INF appears to show some cyclical behaviour, EXR seems to demonstrate a tendency to rise steadily (and so the value of the rupee falls), while SMR shows big swings, peaking in 2020. Thus, based on the graphical patterns indicate substantial variation and potential temporal co-movement among the series, motivating formal econometric investigation of their short- and long-run relationships.

Table 2. Descriptive Statistics

Category	INF	EXR	SMR
Mean	5.91036764	67.9728421	1.09734468
Median	5.53	67.274595	0.89268082
Maximum	11.16	82.60855	14.7914748
Minimum	1.46	51.8121	-23.233634
Std. Dev.	2.31713053	7.59064739	4.71789413
Observations	136	136	136

Source: authors' calculations.

4.2 Correlation Matrix

The Pearson correlations coefficients among the variables are shown in Table 3. LSMR is weakly and positively correlated with LINF (0.030) and COVID19 (0.060), and it is weakly and negatively

correlated with LEXR (-0.044). LINF has a moderate negative correlation with LEXR (-0.303), but it is weakly and positively correlated with COVID19 (0.136). COVID19 has a strong positive correlation with LEXR (0.748).

Table 3. Correlation Results

Variables	LSMR	LINF	LEXR	COVID19
LSMR	1.000000			
LINF	0.030262	1.000000		
LEXR	-0.044393	-0.303462	1.000000	
COVID19	0.059637	0.135982	0.747597	1.000000

Source: authors' calculations.

4.3 Unit Root Results

The ADF test results indicate that LINF and LSMR are stationary at I (0), whereas LEXR is stationary at I (1), as depicted in table 4. Similarly, the PP test results show that LSMR is stationary

at I (0), while LINF and LEXR are stationary at I (1). Therefore, the variables are integrated of order I (0) and I (1), but not I (2), satisfying the prerequisite for the ARDL bounds testing approach (Chaudhry et al., 2013; Hor, 2016; Pesaran et al., 2001; Sharaf et al., 2025).

Table 4. Stationarity Test

	ADF				Phillip-Perron			
	Levels		First difference		Levels		First difference	
	t-stats	p-value	t-stats	p-value	t-stats	p-value	t-stats	p-value
LINF	-2.8917	0.0490**	-	-	-2.4317	0.1350	-8.5335	0.0000***
LEXR	-1.5535	0.5035	-	0.0000***	-1.5239	0.5186	-	0.0000***
			12.8608				12.8638	
LSMR	-	0.0000***	-	-	-	0.0000***	-	-
	12.0623				12.1638			

Note: ** $p < 0.05$; *** $p < 0.01$.

Source: authors' calculations.

4.4 Structural Break Test

The Zivot–Andrews (ZA) test was employed to examine whether the individual series exhibited endogenous structural breaks (Zivot & Andrews, 1992). The ZA test identifies endogenous break dates for all three series: June 2017 for LINF, June 2013 for LEXR, and March 2020 for LSMR presented in Table 5. The estimated March 2020 break in LSMR coincides with the onset of the

COVID-19 shock in India and motivates the inclusion of a post-March 2020 structural-shift dummy. corresponding to the spread of COVID-19 and lockdown. Consistent with recent ARDL-based studies, a COVID-19 dummy variable was incorporated into the empirical model to account for this structural break and improve model specification (Zhang et al., 2025).

Table 5. ZA Results

Variable	Level Statistic	ZA p-value	First Difference ZA Statistic	p-value	Break Date	Order of Integration
LINF	-3.7736	0.2474	-9.7098	<0.01***	2017M06	I(1)
LEXR	-2.9286	0.7238	-13.5183	<0.01***	2013M06	I(1)
LSMR	-14.9376	<0.01***	—	—	2020M03	I(0)

Note: *** $p < 0.01$.

Source: Authors' calculations.

4.5 ARDL Model Selection

The AIC was employed to determine the optimal lag order for the ARDL model. As shown in Figure 1, the minimum AIC value (-3.932) was obtained for the ARDL (2, 0, 1, 4) specification. The AIC is widely used for lag selection because

it balances model fit and parsimony in model specification (Pesaran et al., 2001). In this regard, the current study utilizes the selected ARDL (2, 0, 1, 4) model to investigate the short-run and long-run relationship between LINP, LEXR, COVID19, and LSMR in line with recent studies (Gopika et al., 2026; Sarfraz et al., 2021).

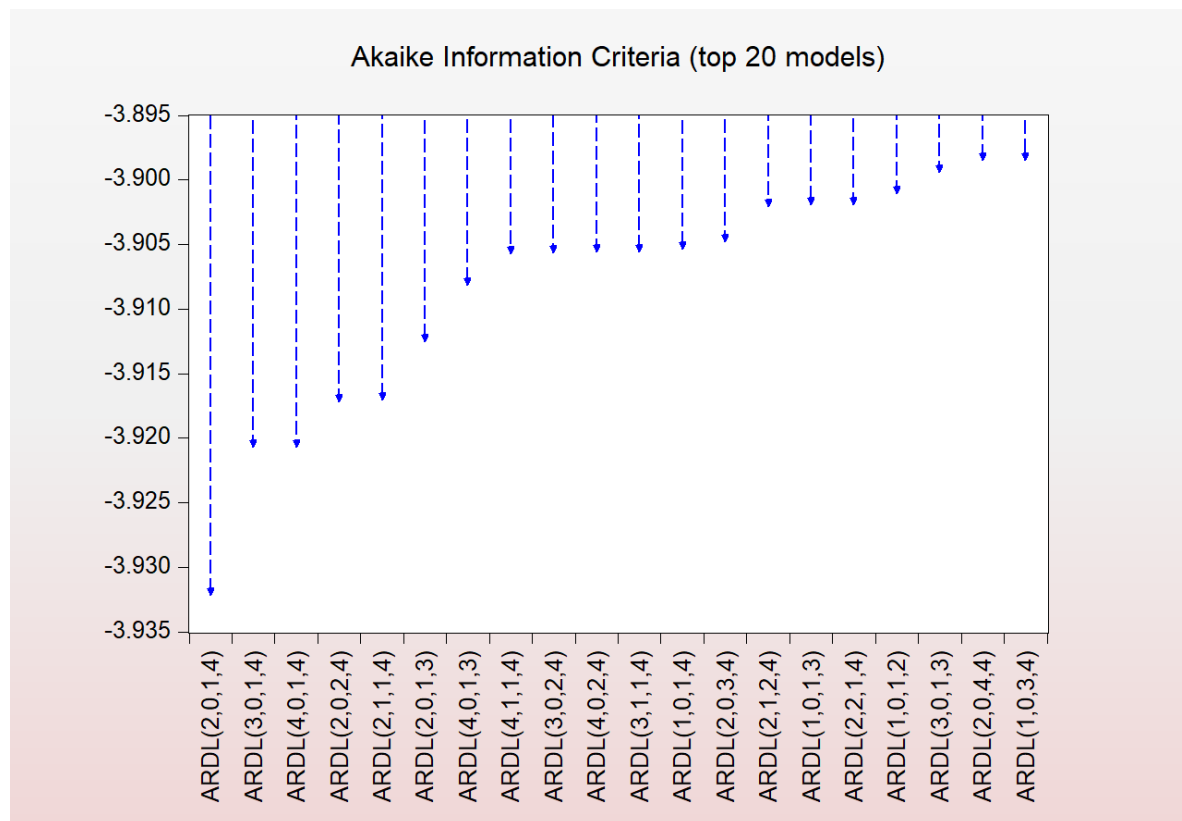


Figure1: Optimal Lag Selection Criteria

Source: Author's computation

4.6 Cointegration Test Results

Table 6 presents cointegration test results. Since the calculated F-statistic of 21.2341 exceeds the upper-bound critical value of 4.660 at the 1% significance level, the null hypothesis of no level

relationship is rejected (Pesaran et al., 2001). Therefore, there is a long-run relationship between LSMR, LINP, LEXR, and COVID19, and the long-run coefficients can be estimated using the calculated ECM.

Table 6. Cointegration Results

Test Statistic	Value	I (0) Lower Bound	I (1) Upper Bound	Decision
F-statistic	21.2341	2.370 (10%)	3.200 (10%)	Cointegration Exists
		2.790 (5%)	3.670 (5%)	
		3.650 (1%)	4.660 (1%)	

Source: authors' calculations.

4.7 ARDL Results

After establishing cointegration, the analysis proceeded to the long-run and short-run model estimate to determine the impact of LINF, LEXR, and COVID19 on LSMR in India. This model explained 79.27% ($R^2 = 0.7927$) of the variation in LSMR, yielding an adjusted R^2 of 0.7827, which suggests a satisfactory goodness of fit.

In the long run, LINF exerts a negative influence on LSMR but is statistically insignificant ($-0.00297, 0.7387$), indicating that a 1% increase in LINF is associated with a 0.003% decline in LSMR. This finding may be attributed to the gradual incorporation of inflation expectations into stock prices, which mitigates the long-term impact of LINF on LSMR. This finding is consistent with those of Antonakakis et al. (2017), Davis and Kutan (2003), and Kaul (1987). As LINF is excluded from the short-run specification, the results further indicate that it does not exert an immediate influence on LSMR.

LEXR displays a negative and marginally significant long-run impact ($-0.09425, 0.0714$), implying that 1% depreciation of the Indian rupee against the US Dollar, LSMR tends to 0.094% decrease. A weaker domestic currency results in higher input costs for companies that source raw materials from overseas, increasing production costs, reducing competitiveness, and limiting their ability to make long-term investments. These factors lead to a decline in stock prices. This finding supports the Flow-Oriented Model (Dornbusch & Fischer, 1980) and agrees with the findings of Chang et al. (2024), Dahir et al. (2018), and Sreenu (2023). LEXR also has an adverse and highly significant impact in the short run ($-1.17306, 0.01$), with a 1% increase in the exchange rate associated with a 1.173% decline in LSMR and suggesting that investors respond immediately to LEXR, making

LSMR more sensitive to short-term currency movements than to long-run changes.

The COVID-19 pandemic exhibits distinct short- and long-run effects on Indian stock market returns. The contemporaneous short-run effect is negative and highly significant ($-0.21204, 0.01$), while the alternating signs of the subsequent lagged coefficients indicate dynamic and oscillatory adjustment following the initial shock. This immediate adverse effect is consistent with Dharani et al. (2023), Ganie et al. (2022), Tan et al. (2022), and Ozili and Arun (2022), who document significant negative stock-market responses to COVID-19-related shocks and heightened uncertainty. However, the positive first-lag effect and subsequent adjustment in the present study are consistent with evidence of recovery reported by Dharani et al. (2023) and the weakening of the initial adverse effect over time documented by Tan et al. (2022). In the long run, the COVID-19 coefficient is positive and statistically significant ($0.02649, p = 0.0304$), implying an approximately 2.68% positive shift in stock market returns. This contrasts with Moizz and Akhtar (2024), who identify March 2020 as a significant structural break and characterise COVID-19 as having a negative effect on the NIFTY50. Thus, while the existing literature predominantly emphasises the immediate adverse consequences of the pandemic, the present findings provide evidence of an initial contraction followed by dynamic adjustment and a positive long-run association, highlighting the temporal evolution of the Indian stock market response to COVID-19.

The ECT coefficient is negative and statistically significant ($-1.09309, p < 0.01$), confirming a valid error-correction mechanism. Its magnitude indicates that approximately 109.3% of the previous month's disequilibrium is corrected within one month, implying overshooting adjustment toward the long-run equilibrium.

Table 7. ARDL Results

Long-Run				
Variable	Coefficient	Std. Error	t-Statistic	p-value
LINE	-0.002972	0.00889	-0.3344	0.7387
LEXR	-0.09425	0.05181	-1.8192	0.0714*
COVID19	0.026487	0.01209	2.19047	0.0304**
Constant	0.409991	0.22491	1.82289	0.0708*
Short-Run				
Δ LSMR (-1)	0.168193	0.07247	2.32093	0.0219**
Δ LEXR	-1.173061	0.1474	-7.9583	0.0000***
Δ COVID19	-0.212042	0.03317	-6.3927	0.0000***
Δ COVID19(-1)	0.119008	0.03889	3.05995	0.0027***
Δ COVID19(-2)	-0.096452	0.03904	-2.4705	0.0148**
Δ COVID19(-3)	0.071042	0.03329	2.13384	0.0348**
ECT (-1)	-1.093091	0.10437	-10.473	0.0000***
R ²	0.7927			
Adjusted R ²	0.7827			

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Δ is the 1st difference.

Source: authors' calculations.

4.8 Diagnostic Test Results

Table 8 presents the diagnostic test results for the ARDL model. The Breusch–Godfrey LM test (0.0415, 0.9794) confirms the absence of serial correlation. The Jarque–Bera test (0.5163, 0.7725) provides no evidence against the normality. Likewise, the Breusch–Pagan–Godfrey test (12.0876, 0.2792) indicates that the residuals are homoscedastic, reflecting constant error variance. Furthermore, the Ramsey RESET test (0.5060, 0.4783) confirms the correct functional specification of the model. Therefore, the diagnostic results indicate that the estimated model is well-specified and provides reliable estimates for statistical inference.

Table 8. Diagnostic Results

Diagnostic Procedure	Statistic	p-value	Inference
Breusch–Godfrey LM Serial Correlation Test	0.0415	0.9794	Residuals are free from serial correlation
Jarque–Bera Test for Normality	0.5163	0.7725	Residuals satisfy the normality assumption
Breusch–Pagan–Godfrey Heteroskedasticity Test	12.0876	0.2792	Constant error variance
Ramsey RESET Specification Test (F-statistic)	0.5060	0.4783	Model specification is appropriate

Source: authors' calculations.

4.9 Stability Test Results

The CUSUM and CUSUMSQ tests were employed to evaluate the stability of the ARDL model. The results shown in Figures 2 and 3 reveal that neither statistic crosses the 5% critical bounds, reflecting stable parameter estimates and no evidence of structural instability. Hence, the estimated ARDL coefficients provide consistent evidence of the short- and long-run relationships between LINF, LEXR, COVID19, and LSMR (Brown et al., 1975).

4.10 Robustness Analysis

FMOLS and CCR are employed as alternative estimators to test the robustness of the ARDL long-run estimates (Tan et al., 2020; Okoye et al., 2022; Tursoy & Faisal, 2018). Table 9 summarises the long-run estimates of the coefficients from the ARDL, FMOLS, and CCR models. All three models yield very similar results, with the signs of the coefficients and their magnitudes being consistent across all estimators

(Park, 1992; Phillips & Hansen, 1990). The influence of LINF on LSMR is negative for all estimators, but it is statistically insignificant across all three. The influence of LEXR is negative but only marginally significant for the ARDL model and insignificant for FMOLS and CCR. The estimated coefficient of COVID19, however, remains positive and significant across all three models, indicating that the long-run estimated recovery effect is robust across alternative cointegration estimators.

4.11 Hypotheses Testing

The results support H2, H3, and H4, but not H1, as reported in Appendix Table 1A. Inflation is insignificant ($p=0.7387$), while exchange-rate movements negatively affect returns in the short run ($p<0.001$) and at the 10% level in the long run ($p=0.0714$). COVID-19 has a significant negative short-run effect ($p<0.001$) but a positive long-run shift ($p=0.0304$). The bounds-test F-statistic (21.2341) confirms long-run cointegration, supporting H4.

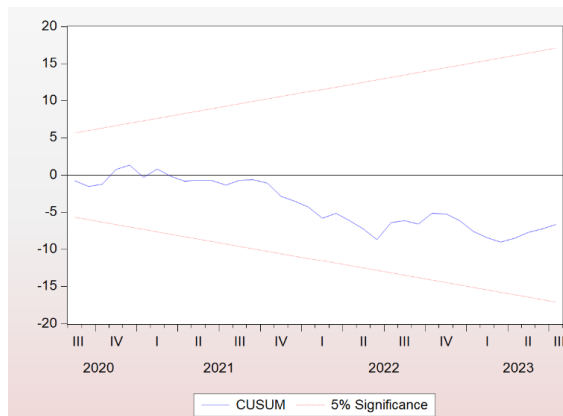


Figure 2: CUSUM Test.

Source: Author's computation.

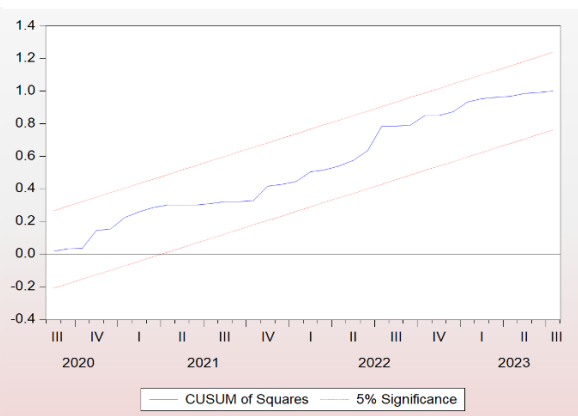


Figure 3: CUSUMSQ Test.

Source: Author's computation.

Table 9. Robustness Results

Variable	ARDL Coeffi- ent	t-value	p- value	FMOLS Coeffi- ent	t-value	p- value	CCR Coeffi- ent	t-value	p- value
LINF	-0.002972	-0.334367	0.7387	-0.004323	-0.486857	0.6272	-0.004041	-0.451639	0.6523

LEXR	-0.09425	- 1.8191 71	0.0714 *	-0.08221	- 1.6542 55	0.1005	- 0.08037 3	- 1.6244 79	0.1067
COVID 19	0.02648 7	2.1904 73	0.0304 **	0.02446 3	2.1239 72	0.0356 **	0.02443 5	2.1269 04	0.0353 **

Note: * $p < 0.10$; ** $p < 0.05$.

Source: authors' calculations.

5. Conclusion

This study examines the effects of inflation, exchange-rate movements, and the COVID-19 period on Indian stock-market returns using monthly data from April 2012 to July 2023 and an ARDL bounds-testing framework. The outcomes establish a long-run equilibrium relationship among the variables and marked horizon-dependent effects. Inflation has a negative but statistically insignificant long-run effect, whereas exchange-rate movements exert a strong negative short-run effect and a marginally significant negative long-run effect on Indian stock-market returns. The COVID-19 period produces a significant negative short-run shock, followed by a positive and significant long-run shift, indicating a transition from immediate market disruption to subsequent adjustment.

The long-run estimates are broadly consistent in sign across ARDL, FMOLS, and CCR, with the positive COVID-19 coefficient remaining statistically significant across all three estimators. In contrast, the long-run significance of the exchange-rate coefficient is not robust to the alternative estimators. Overall, the findings indicate that exchange-rate movements and pandemic-related shocks are more consequential for Indian stock-market returns than inflation, with their effects varying across adjustment horizons.

5.1 Policy Implications

The findings have important implications for financial-market policy. Given the strong short-run sensitivity of stock-market returns to exchange-rate movements, policymakers should promote orderly foreign-exchange market conditions and limit excessive currency volatility. The RBI can strengthen macroeconomic and

foreign-exchange stability through appropriate liquidity and market-management measures, while SEBI can enhance market resilience through effective risk-management and investor-protection mechanisms. For investors, the results underscore the importance of incorporating exchange-rate risk and pandemic-related shocks into portfolio assessment and risk-management strategies.

5.2 Limitations

Although the current research provides insightful empirical evidence, there are several limitations that should be noted. Firstly, this work considers India, it might not be entirely generalisable to other emerging and developed markets. Secondly, inflation, exchange rate, and COVID-19 are incorporated into the analysis to examine their impact on the Indian stock market; however, other variables, such as crude oil prices, interest rates, industrial production, money supply, foreign institutional investors, and financial uncertainties, are excluded from consideration. Thirdly, as COVID-19 is taken into account by a binary post-March 2020 dummy, its impact is accounted for whether during the pandemic period or not. While the ARDL model identifies short- and long-run relationships, it fails to capture their dynamic nature. In other words, time-varying behaviour due to different forces driving the association between variables and nonlinearities cannot be captured with the ARDL model. The latter is especially evident with the COVID-19 variable that was captured by a dummy variable that cannot capture for the heterogeneous effects of the pandemic. Finally, the use of alternative long-run estimators such as FMOLS and CCR strengthens the robustness of the coefficient estimates but does not eliminate potential

concerns related to omitted variables, measurement choices or structural changes beyond those identified in the analysis.

5.3 Future Scope

More specifically, several areas for future studies could be proposed, based on the current research. Firstly, the study could be expanded upon by including both emerging and developed market countries in the analysis in order to detect more accurately the effect of the various macroeconomic variables on stock returns. Secondly, the research could be built further upon by additionally including various macro and financial factors in the analysis, such as, for example, interest rates, oil prices, economic policy uncertainty, geopolitical risk, and foreign capital flows. Thirdly, instead of using a simple Covid-19 dummy variable, different uncertainty indices (EPU index, VIX, pandemic severity index, etc.) could be used in future related studies. Lastly, future research could employ advanced econometric approaches, including NARDL, threshold models, regime-switching

models, time-varying parameter models, quantile regression, wavelet analysis, and machine-learning techniques to capture nonlinearities, asymmetric responses, structural changes, and heterogeneous effects of macroeconomic shocks on stock-market returns.

6. Acknowledgements: Ajit Kumar Pagal is thankful to the Odisha State Higher Education Council for providing a Ph.D. fellowship under Mukhyamantri Research and Innovation Programme (MRIP) 2023 (1357/240/OSHEC).

7. Author Declaration

- Originality of work: The author confirms that this manuscript is an original work. All sources and materials used in the study have been appropriately acknowledged and cited.
- Conflicts of interest: Both authors declare that they have no financial or non-financial interests or conflict that could influence the findings reported in this paper.

References

- Abusaba, A. B., Seif, M., & Gabriel, K. (2025). Impact of macroeconomic variables on stock market prices in sub-Saharan Africa. *International Journal of Finance*, 10(1), 978-1000. <https://doi.org/10.47941/ijf.2467>.
- Adjasi, C., Harvey, S. K., & Agyapong, D. A. (2008). Effect of exchange rate volatility on the Ghana stock exchange. *African journal of accounting, economics, finance and banking research*, 3(3). <https://ssrn.com/abstract=1534178>.
- Aggarwal, K., & Saradhi, V. R. (2025). A study on the co-movement and influencing factors of stock markets between India and the other Asia-Pacific countries. *International Journal of Emerging Markets*, 20(8), 978-1000. <https://doi.org/10.1108/IJOEM-978-1000-0965>.
- Ajayi, R. A., & Mougoué, M. (1996). On the dynamic relation between stock prices and exchange rates. *Journal of Financial Research*, 19(2), 978-1000. Retrieved from: <https://doi.org/10.1111/j.978-1000.1996.tb00593.x>.
- Alagidede, P., Panagiotidis, T., & Zhang, X. (2011). Causal relationship between stock prices and exchange rates. *The Journal of International Trade & Economic Development*, 20(1), 978-1000. <https://doi.org/10.1080/09638199.2011.538186>.
- Alexakis, C., Eleftheriou, K., & Patsoulis, P. (2021). COVID-19 containment measures and stock market returns: An international spatial econometrics investigation. *Journal of Behavioral and Experimental Finance*, 29, 100428. <https://doi.org/10.1016/j.jbef.2020.100428>.
- Ali, R., Mangla, I. U., Rehman, R. U., Xue, W., Naseem, M. A., & Ahmad, M. I. (2020). Exchange rate, gold price, and stock market nexus: A quantile regression approach. *Risks*, 8(3), 86. <https://doi.org/10.3390/risks8030086>.
- Alzoubi, M. (2022). Stock market performance: Reaction to interest rates and inflation rates. *Banks and Bank Systems*, 17(2), 189. [http://dx.doi.org/10.21511/bbs.17\(2\).2022.16](http://dx.doi.org/10.21511/bbs.17(2).2022.16).
- Antonakakis, N., Gupta, R., & Tiwari, A. K. (2017). Has the correlation of inflation and stock prices changed in the United States over the last two centuries? *Research in International Business and Finance*, 42, 978-1000. <https://doi.org/10.1016/j.ribaf.2017.04.005>.

- 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>.
- Asravor, R. K., & Fonu, P. D. D. (2021). Dynamic relation between macroeconomic variable, stock market returns and stock market development in Ghana. *International Journal of Finance & Economics*, 26(2), 978-1000. <https://doi.org/10.1002/ijfe.1925>.
- Bahmani-Oskooee, M., & Saha, S. (2016). Do exchange rate changes have symmetric or asymmetric effects on stock prices?. *Global finance journal*, 31, 978-1000. <https://doi.org/10.1016/j.gfj.2016.06.005>.
- Bahmani-Oskooee, M., & Sohrabian, A. (1992). Stock prices and the effective exchange rate of the dollar. *Applied economics*, 24(4), 978-1000. <https://doi.org/10.1080/00036849200000020>.
- Bartov, E., & Bodnar, G. M. (1994). Firm valuation, earnings expectations, and the exchange-rate exposure effect. *The Journal of Finance*, 49(5), 978-1000. <https://doi.org/10.1111/j.978-1000.1994.tb04780.x>.
- Bashir, U., Yu, Y., Hussain, M., & Zebende, G. F. (2016). Do foreign exchange and equity markets co-move in Latin American region? Detrended cross-correlation approach. *Physica A: Statistical Mechanics and Its Applications*, 462, 978-1000. <https://doi.org/10.1016/j.physa.2016.06.090>.
- Bekaert, G., & Engstrom, E. (2010). Inflation and the stock market: Understanding the "Fed Model". *Journal of Monetary Economics*, 57(3), 978-1000. <https://doi.org/10.1016/j.jfamoneco.2010.02.004>.
- Bhargava, V., & Konku, D. (2023). Impact of exchange rate fluctuations on US stock market returns. *Managerial finance*, 49(10), 978-1000. <https://doi.org/10.1108/MF-978-1000-0387>.
- Bhatia, M. (2026). Stock market efficiency and COVID-19 with multiple structural breaks: Evidence from India. *Global Business Review*, 27(3), 978-1000. <https://doi.org/10.1177/09721509221110372>.
- 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), e2623. <https://doi.org/10.1002/pa.2623>.
- Breusch, T. S., & Pagan, A. R. (1979). A Simple Test for Heteroscedasticity and Random Coefficient Variation. *Econometrica*, 47(5), 1287–1294. <https://doi.org/10.2307/1911963>.
- Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 37(2), 978-1000. <https://doi.org/10.1111/j.978-1000.1975.tb01532.x>.
- Canova, F., & De Nicrolo, G. (2000). Stock Returns, Term Structure, Inflation, and Real Activity: An International Perspective. *Macroeconomic Dynamics*, 4(3), 978-1000. Retrieved from: <https://doi.org/10.1017/S1365100500016047>.
- Caporale, G. M., Hunter, J., & Ali, F. M. (2014). On the linkages between stock prices and exchange rates: Evidence from the banking crisis of 2007–2010. *International Review of Financial Analysis*, 33, 978-1000. <https://doi.org/10.1016/j.irfa.2013.12.005>.
- Chang, C. P., Feng, G. F., & Zheng, M. (2021). Government fighting pandemic, stock market return, and COVID-19 virus outbreak. *Emerging Markets Finance and Trade*, 57(8), 978-1000. <https://doi.org/10.1080/1540496X.2021.1873129>.
- Chang, H. W., Chang, T., & Wang, M. C. (2024). Revisit the impact of exchange rate on stock market returns during the pandemic period. *The North American Journal of Economics and Finance*, 70, 102068. <https://doi.org/10.1016/j.najef.2023.102068>.
- Chaudhry, N. I., Mehmood, A., & Saqib Mehmood, M. (2013). Empirical relationship between foreign direct investment and economic growth: An ARDL co-integration approach for China. *China Finance Review International*, 3(1), 978-1000. <https://doi.org/10.1108/20441391311290767>.
- Chiang, T. C. (2023). Real stock market returns and inflation: Evidence from uncertainty hypotheses. *Finance Research Letters*, 53, 103606. <https://doi.org/10.1016/j.frl.2022.103606>.
- Chortareas, G. E., McDermott, J. B., & Ritsatos, T. E. (2000). Stock market volatility in an emerging market: Further evidence from the Athens Stock Exchange. *Journal of Business Finance & Accounting*, 27(978-1000), 978-1000. <https://doi.org/10.1111/978-1000.00342>.

- Choudhry, T. (2001). Inflation and rates of return on stocks: evidence from high inflation countries. *Journal of International Financial Markets, Institutions and Money*, 11(1), 978-1000. [https://doi.org/10.1016/S978-1000\(00\)0978-1000](https://doi.org/10.1016/S978-1000(00)0978-1000).
- Dahir, A. M., Mahat, F., Ab Razak, N. H., & Bany-Arifin, A. N. (2018). Revisiting the dynamic relationship between exchange rates and stock prices in BRICS countries: A wavelet analysis. *Borsa Istanbul Review*, 18(2), 978-1000. <https://doi.org/10.1016/j.bir.2017.10.001>.
- Davis, N., & Kutan, A. M. (2003). Inflation and output as predictors of stock returns and volatility: international evidence. *Applied Financial Economics*, 13(9), 978-1000. <https://doi.org/10.1080/09603100210139429>.
- Delgado, N. A. B., Delgado, E. B., & Saucedo, E. (2018). The relationship between oil prices, the stock market and the exchange rate: Evidence from Mexico. *The North American Journal of Economics and Finance*, 45, 978-1000. <https://doi.org/10.1016/j.najef.2018.03.006>.
- Dharani, M., Hassan, M. K., Huda, M., & Abedin, M. Z. (2023). Covid-19 pandemic and stock returns in India. *Journal of Economics and Finance*, 47(1), 978-1000. <https://doi.org/10.1007/s1978-1000-0978-1000>.
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, 74(366a), 978-1000. <https://doi.org/10.1080/01621459.1979.10482531>.
- Dornbusch, R., & Fischer, S. (1980). Exchange Rates and the Current Account. *The American Economic Review*, 70(5), 960–971. <http://www.jstor.org/stable/1805775>.
- Durai, S. R. S., & Bhaduri, S. N. (2009). Stock prices, inflation and output: Evidence from wavelet analysis. *Economic Modelling*, 26(5), 978-1000. Retrieved from: <https://doi.org/10.1016/j.econmod.2009.04.005>.
- Eldomiaty, T., Saeed, Y., Hammam, R., & AboulSoud, S. (2020). The associations between stock prices, inflation rates, interest rates are still persistent: Empirical evidence from stock duration model. *Journal of Economics, Finance and Administrative Science*, 25(49), 978-1000. <https://doi.org/10.1108/JEFAS-978-1000-0105>.
- Engle, R. F., & Granger, C. W. J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55(2), 251–276. <https://doi.org/10.2307/1913236>.
- Fama, E. F. (1981). Stock Returns, Real Activity, Inflation, and Money. *The American Economic Review*, 71(4), 545–565. <http://www.jstor.org/stable/1806180>.
- Firth, M. (1979). The Relationship Between Stock Market Returns and Rates of Inflation. *The Journal of Finance*, 34(3), 743–749. <https://doi.org/10.2307/2327440>.
- Fisher, I. (1930). *The Theory of Interest: As Determined by Impatience to Spend Income and Opportunity to Invest It*. Macmillan.
- Frankel, J. A. (1983). Estimation of portfolio-balance functions that are mean-variance optimizing: The mark and the dollar. *European Economic Review*, 23(3), 978-1000. [https://doi.org/10.1016/978-1000\(83\)9978-1000](https://doi.org/10.1016/978-1000(83)9978-1000).
- Ganie, I. R., Wani, T. A., & Yadav, M. P. (2022). Impact of COVID-19 outbreak on the stock market: an evidence from select economies. *Business Perspectives and Research*, 22785337211073635. <https://doi.org/10.1177/22785337211073635>.
- Godfrey, L. G. (1978). Testing Against General Autoregressive and Moving Average Error Models when the Regressors Include Lagged Dependent Variables. *Econometrica*, 46(6), 1293–1301. <https://doi.org/10.2307/1913829>.
- Gopika, C. G., Biju, A. V., Sasidharan, A., & Sarpong-Kumankoma, E. (2026). Government-led design and growth of India's UPI ecosystem: a time series analysis of associated factors. *Journal of Science and Technology Policy Management*, 978-1000. <https://doi.org/10.1108/JSTPM-978-1000-0284>.
- Gopinathan, R., & Durai, S. R. S. (2019). Stock market and macroeconomic variables: new evidence from India. *Financial Innovation*, 5(1), 29. Retrieved from: <https://doi.org/10.1186/s4978-1000-978-1000>.
- Guru, B. K., & Das, A. (2021). COVID-19 and uncertainty spillovers in Indian stock market. *MethodsX*, 8, 101199. <https://doi.org/10.1016/j.mex.2020.101199>.

- Hasan, M. B., Mahi, M., Hassan, M. K., & Bhuiyan, A. B. (2021). Impact of COVID-19 pandemic on stock markets: Conventional vs. Islamic indices using wavelet-based multi-timescales analysis. *The North American Journal of Economics and Finance*, 58, 101504. <https://doi.org/10.1016/j.najef.2021.101504>.
- Hashim, S. L. M., Komarsamy, L., Singaveloo, J., & Laily Md Hashim, S. (2020). Interest, exchange, and inflation rate and stock price in Asia countries. *European Proceedings of Social and Behavioural Sciences*, 100. <https://doi.org/10.15405/epsbs.2020.12.05.68>.
- Hashmi, S. M., Chang, B. H., Huang, L., & Uche, E. (2022). Revisiting the relationship between oil prices, exchange rate, and stock prices: An application of quantile ARDL model. *Resources Policy*, 75, 102543. <https://doi.org/10.1016/j.resourpol.2021.102543>.
- Hor, C. (2016). Analysis of the impact of determinant factors on foreign direct investment in Cambodia: The ARDL bounds testing approach. *Journal of Administrative and Business Studies*, 2(4), 978-1000. <https://doi.org/10.20474/jabs-2.4.4>.
- Jarque, C. M., & Bera, A. K. (1987). A Test for Normality of Observations and Regression Residuals. *International Statistical Review / Revue Internationale de Statistique*, 55(2), 163–172. <https://doi.org/10.2307/1403192>.
- Kaul, G. (1987). Stock returns and inflation: The role of the monetary sector. *Journal of financial economics*, 18(2), 978-1000. [https://doi.org/10.1016/978-1000X\(87\)9978-1000](https://doi.org/10.1016/978-1000X(87)9978-1000).
- Koutmos, G., Negakis, C., & Theodossiou, P. (1993). Stochastic behaviour of the Athens stock exchange. *Applied Financial Economics*, 3(2), 978-1000. <https://doi.org/10.1080/758532830>.
- Kwofie, C., & Ansah, R. K. (2018). A study of the effect of inflation and exchange rate on stock market returns in Ghana. *International Journal of Mathematics and Mathematical Sciences*, 2018(1), 7016792. <https://doi.org/10.1155/2018/7016792>.
- Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Impact of macroeconomic indicators on stock market performance: The case of the Ghana Stock Exchange. *The Journal of Risk Finance*, 9(4), 978-1000. <https://doi.org/10.1108/15265940810895025>.
- Ma, C. K., & Kao, G. W. (1990). On exchange rate changes and stock price reactions. *Journal of Business Finance & Accounting*, 17(3), 978-1000. <https://doi.org/10.1111/j.978-1000.1990.tb01196.x>.
- Ministry of Finance. (2025). *Economic survey 2024–25*. Government of India. <https://www.indiabudget.gov.in/budget978-1000/economicsurvey>.
- Misra, P. (2018). An investigation of the macroeconomic factors affecting the Indian stock market. *Australasian Accounting, Business and Finance Journal*, 12(2). <https://doi.org/10.14453/aabfj.v12i2.5>.
- Mitra, R. (2017). Stock market and foreign exchange market integration in South Africa. *World Development Perspectives*, 6, 978-1000. <https://doi.org/10.1016/j.wdp.2017.05.001>.
- Moizz, A., & Akhtar, S. J. (2024). Dynamic linkages between the monetary policy variables and stock market in the presence of structural breaks: evidence from India. *Asian Journal of Economics and Banking*, 8(3), 978-1000. <https://doi.org/10.1108/AJEB-978-1000-0005>.
- Mroua, M., & Trabelsi, L. (2020). Causality and dynamic relationships between exchange rate and stock market indices in BRICS countries: Panel/GMM and ARDL analyses. *Journal of Economics, Finance and Administrative Science*, 25(50), 978-1000. <https://doi.org/10.1108/JEFAS-978-1000-0054>.
- Okorie, I. E., Akpanta, A. C., Ohakwe, J., Chikezie, D. C., Onyemachi, C. U., & Ugwu, M. C. (2021). Modeling the relationships across Nigeria inflation, exchange rate, and stock market returns and further analysis. *Annals of Data Science*, 8(2), 978-1000. <https://doi.org/10.1007/s4978-1000-0978-1000>.
- Okoye, L. U., Adeleye, B. N., Okoro, E. E., Okoh, J. I., Ezu, G. K., & Anyanwu, F. A. (2022). Effect of gas flaring, oil rent and fossil fuel on economic performance: The case of Nigeria. *Resources Policy*, 77, 102677. <https://doi.org/10.1016/j.resourpol.2022.102677>.
- Omran, M., & Pointon, J. (2001). Does the inflation rate affect the performance of the stock market? The case of Egypt. *Emerging markets review*, 2(3), 978-1000. [https://doi.org/10.1016/S978-1000\(01\)0978-1000](https://doi.org/10.1016/S978-1000(01)0978-1000).
- Otieno, D. A., Ngugi, R. W., & Muriu, P. W. (2019). The impact of inflation rate on stock market returns: evidence from Kenya. *Journal of Economics and Finance*, 43(1), 978-1000. <https://doi.org/10.1007/s1978-1000-978-1000>.

- Ozili, P. K., & Arun, T. (2020). Spillover of COVID-19: Impact on the global economy. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3562570>.
- Park, J. Y. (1992). Canonical Cointegrating Regressions. *Econometrica*, 60(1), 119–143. <https://doi.org/10.2307/2951679>.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 978-1000. <https://doi.org/10.1002/jae.616>.
- Phan, D. H. B., & Narayan, P. K. (2021). Country responses and the reaction of the stock market to COVID-19—A preliminary exposition. In *Research on pandemics* (pp. 978-1000). Routledge. <https://doi.org/10.4324/9781003214687>.
- Phillips, P. C., & Hansen, B. E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *The review of economic studies*, 57(1), 978-1000. <https://doi.org/10.2307/2297545>.
- Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *biometrika*, 75(2), 978-1000. <https://doi.org/10.1093/biomet/75.2.335>.
- Phylaktis, K., & Ravazzolo, F. (2005). Stock prices and exchange rate dynamics. *Journal of international Money and Finance*, 24(7), 978-1000. <https://doi.org/10.1016/j.jimonfin.2005.08.001>.
- Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 31(2), 978-1000. <https://doi.org/10.1111/j.978-1000.1969.tb00796.x>.
- Ratanapakorn, O., & Sharma, S. C. (2007). Dynamic analysis between the US stock returns and the macroeconomic variables. *Applied Financial Economics*, 17(5), 978-1000. <https://doi.org/10.1080/09603100600638944>.
- Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, 13(3), 341–360. [https://doi.org/10.1016/978-1000\(76\)9978-1000](https://doi.org/10.1016/978-1000(76)9978-1000).
- Sahoo, M. (2021). COVID-19 impact on stock market: Evidence from the Indian stock market. *Journal of Public Affairs*, 21(4), e2621. <https://doi.org/10.1002/pa.2621>.
- Salameh, S., & Ahmad, A. (2022). A critical review of stock market development in India. *Journal of Public Affairs*, 22(1), e2316. <https://doi.org/10.1002/pa.2316>.
- Sarfraz, M., Mohsin, M., Naseem, S., & Kumar, A. (2021). Modeling the relationship between carbon emissions and environmental sustainability during COVID-19: a new evidence from asymmetric ARDL cointegration approach. *Environment, Development and Sustainability*, 23(11), 1978-10006. <https://doi.org/10.1007/s1978-1000-0978-1000>.
- Sharaf, M. F., Shahren, A. M., & Binzaid, B. A. (2025). Estimating the causal relationship between external debt and inflation in Jordan: evidence from an ARDL and Toda–Yamamoto approaches. *Journal of Financial Economic Policy*, 17(1), 978-1000. <https://doi.org/10.1108/JFEP-978-1000-0148>.
- Sharan, V. (2008). Reforming Indian Foreign Exchange Market: A Survey. *Foreign Trade Review*, 43(1), 978-1000. <https://doi.org/10.1177/0015732515080104>.
- Solnik, B. (1987). Using Financial Prices to Test Exchange Rate Models: A Note. *The Journal of Finance*, 42(1), 141–149. <https://doi.org/10.2307/2328424>.
- Sreenu, N. (2023). Effect of Exchange Rate volatility and inflation on stock market returns Dynamics-evidence from India. *International Journal of System Assurance Engineering and Management*, 14(3), 978-1000. <https://doi.org/10.1007/s1978-1000-0978-1000>.
- Suriani, S., Correia, A. B., Nasir, M., Rita, J. X., Saputra, J., & Mata, M. N. (2024). Exploring the nexus between sectoral stock market fluctuations and macroeconomics changes before and during the COVID-19 pandemic. *Cogent Business & Management*, 11(1), 2336681. <https://doi.org/10.1080/23311975.2024.2336681>.
- Tan, C. T., Mohamed, A., Habibullah, M. S., & Chin, L. (2020). The impacts of monetary and fiscal policies on economic growth in Malaysia, Singapore and Thailand. *South Asian Journal of Macroeconomics and Public Finance*, 9(1), 978-1000. <https://doi.org/10.1177/2277978720906066>.

- Tan, X., Ma, S., Wang, X., Zhao, Y., Wang, Z., & Xiang, L. (2022). The dynamic impact of COVID-19 pandemic on stock returns: A TVP-VAR-SV estimation for G7 countries. *Frontiers in Public Health*, 10, 859647. <https://doi.org/10.3389/fpubh.2022.859647>.
- Tian, G. G., & Ma, S. (2010). The relationship between stock returns and the foreign exchange rate: the ARDL approach. *Journal of the Asia Pacific economy*, 15(4), 978-1000. <https://doi.org/10.1080/13547860.2010.516171>.
- Tong, T., Ortiz, J., Xu, C., & Li, F. (2020). Economic growth, energy consumption, and carbon dioxide emissions in the E7 countries: a bootstrap ARDL bound test. *Energy, Sustainability and Society*, 10(1), 20. <https://doi.org/10.1186/s1978-1000-0978-1000>.
- 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>.
- Tsai, I. C. (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), 978-1000. <https://doi.org/10.1016/j.intfin.2012.04.005>.
- Tursoy, T., & Faisal, F. (2018). The impact of gold and crude oil prices on stock market in Turkey: Empirical evidences from ARDL bounds test and combined cointegration. *Resources Policy*, 55, 978-1000. <https://doi.org/10.1016/j.resourpol.2017.10.014>.
- Ülkü, N., & Demirci, E. (2012). Joint dynamics of foreign exchange and stock markets in emerging Europe. *Journal of International Financial Markets, Institutions and Money*, 22(1), 978-1000. <https://doi.org/10.1016/j.intfin.2011.07.005>.
- Vietha, D. S. (2019). The correlation of exchange rate and inflation and its effect on stock markets. Case Study on Consumer Good Index Indonesia: 2004–2017. *Academic Journal of Economic Studies*, 5(2), 978-1000. <https://www.ceeol.com/search/article-detail?id=779196>.
- Wang, R., & Li, L. (2020). Dynamic relationship between the stock market and macroeconomy in China (1995–2018): new evidence from the continuous wavelet analysis. *Economic research-Ekonomska istraživanja*, 33(1), 978-1000. <https://doi.org/10.1080/1331677X.2020.1716264>.
- Wong, H. T. (2017). Real exchange rate returns and real stock price returns. *International Review of Economics & Finance*, 49, 978-1000. <https://doi.org/10.1016/j.iref.2017.02.004>.
- Xiong, Y., Shen, J., Yoon, S. M., & Dong, X. (2024). Macroeconomic determinants of the long-term correlation between stock and exchange rate markets in China: A DCC-MIDAS-X approach considering structural breaks. *Finance Research Letters*, 61, 105020. <https://doi.org/10.1016/j.frl.2024.105020>.
- Yadav, M. P., Khera, A., & Mishra, N. (2022). Empirical relationship between macroeconomic variables and stock market: Evidence from India. *Management and Labour Studies*, 47(1), 978-1000. <https://doi.org/10.1177/0258042X211053166>.
- Zarei, A., Ariff, M., & Bhatti, M. I. (2019). The impact of exchange rates on stock market returns: new evidence from seven free-floating currencies. *The European Journal of Finance*, 25(14), 978-1000. <https://doi.org/10.1080/1351847X.2019.1589550>.
- Zhang, R., Madni, G. R., Anwar, M. A., & Shahzad, A. A. (2025). Fourier ARDL Modeling of Natural Resources, Productive Capacities, Climate Resilience, and Green Innovations for Ecological Sustainability. *Natural Resource Modeling*, 39(1), e70024. <https://doi.org/10.1111/nrm.70024>.
- Zivot, E., & Andrews, D. W. K. (1992). Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis. *Journal of Business & Economic Statistics*, 10(3), 251–270. <https://doi.org/10.1080/07350015.1992.10509904>.

Appendix

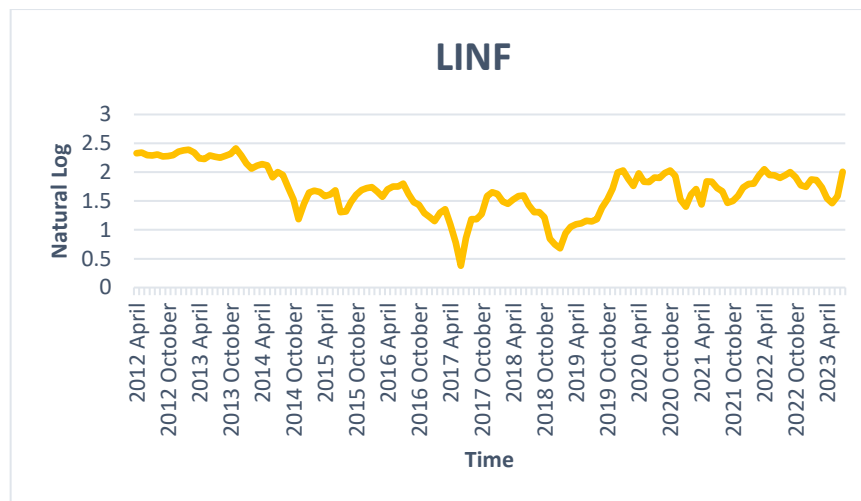


Figure A1: Trend of LNF

Source: Authors' compilation



Figure A2: Trend of LEXR

Source: Authors' compilation

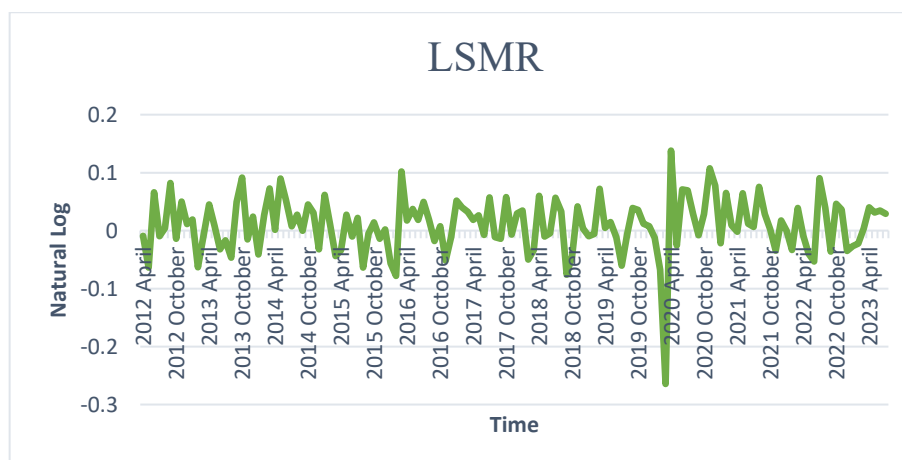


Figure A3: Trend of LSMR

Source: Authors' compilation

Table 1A: Hypotheses Testing

Hypothesis	Short run	Long run	Findings
H1: Inflation	Not significant in reported results	$-0.002972, p = 0.7387$	Not supported
H2: Exchange rate	$-1.173061, p < 0.001$	$-0.09425, p = 0.0714$	Supported
H3: COVID-19	$-0.212042, p < 0.001$	$+0.026487, p = 0.0304$	Supported
H4: Cointegration	—	$F = 21.2341 > \text{upper bound}$	Supported

Source: authors' calculations.