

An Empirical Analysis Of The Impact Of Macroeconomic Variables On Stock Market Volatility In India

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Abstract

Nowadays, the financial market is vital in assessing a nation's economic health. The relationship between stock market and macroeconomic variables has long been a subject of debate in both developed and developing countries. The central goal of this investigation is to empirically examine the impact of macroeconomic variables on stock price volatility in the Indian stock market, using the auto-regressive distributed lag model (ARDL) for cointegration testing and the error correction term (ECM) for short-run dynamics. The data spans from 1991 to 2021 on an annual basis and includes macroeconomic variables such as exchange rates, GDP growth rates, inflation rates, oil prices, and unemployment rates. The study utilizes the BSE-100 index as a proxy for stock prices and obtains secondary data from the BSE Stock Market, World Bank Indicators Statistical Data, and Reserve Bank of India (RBI) Bulletin. The results indicate that macroeconomic variables significantly affect stock price volatility in both the long run and short run. Specifically, the inflation rate and oil prices exhibit a negative effect on stock prices, although the coefficients are statistically insignificant at the 5% level. Conversely, exchange rates, GDP, and unemployment rates positively influence stock price volatility in the long run, with statistically significant coefficients at the 5% level. Additionally, in the short run, unemployment rates negatively impact stock price volatility. The study recommends implementing deflationary fiscal policies and stabilizing exchange rates to create a better financial environment and promote economic stability in India.

Keywords- Stock Market, Macro-economic Variables, BSE-100, ARDL, ECM, Time series Analysis, India.

1.Introduction

The stock market stands as a pivotal institution in the global economy, playing a vital role in facilitating investment, capital allocation, and economic growth on a worldwide scale. As a platform where investors buy and sell securities, including stocks and bonds, the stock market provides opportunities for wealth creation, risk management, and participation in the broader financial system. where interconnectedness of global financial markets and the increasing integration of economies across borders have enhance the sensitivity of stock markets to macroeconomic developments worldwide.

The stock market helps companies get money for the long pull by bringing together funds from many investors. This helps businesses grow. It also gives investors different options for where to put their extra money. Investors keep an eye on how well the stock market is doing by looking at something called the composite market index before they decide where to invest. This index shows how the stock market has done in the past and helps people compare different options. The stock market helps gather people's savings and puts them into good use to help the economy grow better.

Moreover, a deeper understanding of the interplay between macroeconomic factors and stock market volatility can inform the design of more effective policy frameworks aimed at fostering stability, efficiency, and confidence in the global financial system. (Oseni & Nwosa, 2011). Governments can

manage the economy better by handling important macroeconomics factors.

Economists, policymakers, financial analysts, and business experts are really interested in studying how the ups and downs of the stock market affect the overall economy of a country. Finance experts say that changes in the stock market are closely connected to various big-picture economic factors. Among these factors, exchange rates, GDP, inflation, oil price and unemployment are thought to be especially important because they can have a big impact on how stable or volatile the stock market is. More and more research is looking into how changes in stock prices are connected to big-picture economic factors in both advanced and developing countries (Garg & Kalra, 2018), (Thakur & sangeeta,2024), (Oseni & Nwosa, 2011), (Baker et al., 2016), (Omorokunwa & Ikponmwosa, 2014) and (pole & Cavusoglu 2021) have investigated various factors of different countries. These studies show that stock prices can go up or down because of changes in these economic factors. However, the exact relationship might not be the same in every study. Various economic factors can impact how unpredictable the stock market behaves, but one of the most significant factors is exchange rates, which have garnered attention from economists, policymakers, and investors alike over the years (Kutty, 2010).

This study focuses on understanding how macroeconomic factors affect the volatility of the Indian stock market. It also explores the

relationships between these macroeconomic variables. The data ranging from 1991 to 2021, and we used a model called ARDL developed by **(Pesaran et al., 2001)**. Additionally, we employed ECM to analyze the short-term dynamics between dependent and independent variables. We specifically looked at five macroeconomic variables: BSE stock price, exchange rate, inflation rate, oil price, and unemployment rate. Our goal was to empirically examine how these macroeconomic variables impact stock market volatility. The study shows that when the GDP, exchange rate, and unemployment rate go up, stock prices also tend to rise. However, when oil prices and inflation rates increase, stock prices tend to go down. The study is divided into several sections for clarity. Firstly, the Literature Review (Section 2) provides an overview of existing research related to the topic. Following this, in Section 3, we detail the Research Methodology and Data Sources, explaining how the study was conducted and where the necessary data was obtained. Section 4, the Theoretical Framework, outlines the theories and concepts that guided our analysis of the data.

Moving on to Section 5, Empirical Findings, this part presents the results of our analysis based on the collected data. Finally, Section 6, Conclusion and Policy Recommendations, serves as the concluding section of the study. Here, we summarize the findings from our analysis and suggest potential policy actions based on these findings. This structured approach ensures a systematic and comprehensive exploration of the impact of macroeconomic variables on stock market.

2. Review of Literature

(Garg & Kalra, 2018) obtained the secondary data from 1991 to 2017, to analyze the impact of macroeconomic factors on Indian stock market. They used descriptive statistics and correlation to find the relationship between dependent and independent variables. By taking macroeconomics variables like unemployment rate, average inflation rate, gold price, gross domestic product, exchange rate and foreign reserve. The study revealed that there is negative impact of unemployment rate and average inflation rate on stock market performance and positive impact of other variables on it. **(Thakur & sangeeta, 2024)** studied how macroeconomics factors affect the Indian Stock market volatility. On the basis of secondary data taken from journals, books and websites etc. The study found that various factors are responsible for change in stock market volatility which are inflation, economic crisis, social and political factors, change in economy policy and economic indicators. Another finding made **(Oseni & Nwosa, 2011)** to analyze the asymmetric relationship between stock market volatility in Nigeria from the period (1980-2010) using time series data. They used EGARCH and VAR to figure out

the outcomes. They found there was bidirectional causality between stock market volatility and real GDP volatility and also examined that no relationship exists between stock market volatility with interest rate and inflation rate.

(Angel et al., 2013) used a new technique to measure the stock market volatility and macroeconomic activity by using a new class of component model that helps to study the short run and long run movements of the stock market that creates a new finding for us to measure stock market volatility. The results found that model with a long-term component driven by industrial inflation, industrial production and growth by taking past 50 years data. Another new method generalizing autoregressive conditional heteroscedasticity mixed data sampling (GARCH MIDAS) used by **(wang et al., 2024)** to analyze the Chinese stock market volatility and economic uncertainty on the long run. the study found that negative impact is highly related with uncertainty. They suggested to the policy maker we can mitigate all kind of uncertainty problem by directly communicating with people and give him some advice for the market uncertainty. The economic development of a country based upon the stock market growth which is directly related to uncertainty and risk **(Baker et al., 2016)**.

by **(pole & Cavusoglu, 2021)** found that money supply and industrial aggregate products positively affect the stock market and some other macroeconomic variables negatively affect the stock market volatility. the data taken from secondary sources over the period (1998- 2019). according to **(Pramod Kumar et al., 2011)** by taking five macroeconomic variables over the period (1994-2011) They observed that stock price positively affects to the money supply and industrial production but adversely related with inflation.

on the other hand **(Ilahi et al., 2013)** found that there is weak relationship between macroeconomics variables and stock market volatility. they studied macroeconomics variables inflation rate, exchange rate, interest rate on Karachi stock market Pakistan. Secondary data was collected from the period 2007-2012, the study based on the multiple linear relation analysis. Similarly, **(Mumo, 2017)** examined that the stock market volatility and macroeconomics variables based on Kenya National Bureau of Statistics the period from 1992-2016. the variables like Inflation, money supply, exchange rate, interest rates are used to study the NSE -20 share index. Johnson co-integration and ECM methodology were used to analysis the data. The study concluded that inflation rate increases for any increment of money supply so money supply and interest rate negatively affect the stock market and exchange rate as well as interest rate positively affect to the stock price.

However, after reviewing the literatures, we found there is no studies have been conducted on recent data to test the impact of macroeconomics variable

on Indian stock market volatility and we used ARDL bound test as a new method to find the outcomes. In this study we included some new variables like GDP growth rate, oil price and unemployment rates has not been studied in Indian context. This study contributes to examine these new aspects through time series analysis in India.

3. Objectives of The Study

- ❖ To measure how macroeconomics variables affect the Indian stock market volatility.
- ❖ To provide the insight full information to the policy makers to stabilize the stock market volatility.

4. Macroeconomics Variables

- Dependent variable
BSE stock price
- Independent variables
GDP
Exchange rate
Inflation rate
Unemployment rate
Crude oil price

5. Research Methodology and Data Description

Research methodology is an important aspect of research work that shows how a researcher is going to conduct the research work. The study completely based on quantitative research design. The paper examined the impact of macroeconomics variables during 1991 to 2021 on stock market volatility. The secondary data has been employed to analyze the relationship by using ARDL model to observe the stock price volatility. This study obtained the macroeconomics variables like BSE stock price, foreign exchange rate, GDP, inflation rate, crude oil price from secondary sources. It uses BSE-100 as a proxy of stock market performance. This study based on the time series analysis that shows trend and co-relation among the variables. Generally, macroeconomics variables are followed some kind of trend or stochastic process, before using these variables to get the results there is need to check the stationarity of these variables by taking the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) of unit root test. To obtained the long run equilibrium this study used ARDL bound test and ECT for short run dynamics adjustment.

5.1 Data Sources

The study gathered data from various secondary outlets from 1991 to 2021. These data sourced from the (RBI bulletin, World Bank Indicators and the Bombay Stock Exchange) ensuring a comprehensive and robust analysis over the specified timeframe.

6. Theoretical Explanation of The Model

The main goal of the present study suggests a framework for econometrically analyzing how stock market performance relates to variables such as

exchange rates, GDP, inflation rates, oil rents, and unemployment rates among the many macroeconomics variables within a time series analysis.

BSE STOCK PRICE =

f (EXCHANGE RATE, GDP, INFLATION RATE, OIL RENT, Unemployment Rate) (1)

We can fit it in econometric model

$$BSP_t = \alpha_0 + \alpha_1 EXCH_t + \alpha_2 GDP_t + \alpha_3 INF_t + \alpha_4 OIL_t + \alpha_5 UN_t + \mu_t \quad (2)$$

We changed the simple linear model into a logarithmic-linear one because it delivers more effective outcomes and helps steer clear of non-sense regressions compared to the original setup. Additionally, converting variables in this manner allows for elasticity estimates presented as coefficients, which researchers can easily interpret for policymaking.

For instance, using the logarithmic format enables us to directly measure how responsive a company's returns are to changes in exchange rates. So, our structural model, with all variables analyzed, can be represented in equation 3 like

$$LnBSP_t = \alpha_0 + \alpha_1 LnEXCH_t + \alpha_2 LnGDP_t + \alpha_3 LnINF_t + \alpha_4 LnOIL_t + \alpha_5 LnUN_t + \mu_t \quad (3)$$

Where,

$LnBSP_t$ is a log of the BSE stock price or BSE top 100, $LnEXCH_t$ is a log of the exchange rate or Indian rupee per U.S. dollar

$LnGDP_t$ is a Log of annual GDP growth rate

$LnINF_t$ is a log of inflation rate

$LnOIL_t$ is a log of annual average oil price

$LnUN_t$ is a log of unemployment rate

α_0 is a constant term or intercept

α_i is slope coefficient of the independent variables

μ_t is error term or stochastic disturbances term

6.1 ARDL Bound Test

The method used for empirical investigation in this paper is called ARDL (Autoregressive Distributed Lag) or bound cointegration approach. This approach helps us understand the long-term relationships between variables like stock market performance exchange rates, GDP, inflation rates, oil price and unemployment rates.

We applied the Auto-regressive Distributive Lag (ARDL) model to accommodate the stationary characteristics of the variables under study. The ARDL model was formulated as follows

$$\Delta LnBSP_t = \alpha_0 + \beta_1 LnBSP_{t-1} + \alpha_1 LnEXCH_{t-1} + \alpha_2 LnGDP_{t-1} + \alpha_3 LnINF_{t-1} + \alpha_4 LnOIL_{t-1} + \alpha_5 LnUN_{t-1} + \sum_{i=0}^k \Delta \alpha_{1i} LnEXCH_{t-i} + \sum_{i=0}^k \Delta \alpha_{2i} LnGDP_{t-i} + \sum_{i=0}^k \Delta \alpha_{3i} LnINF_{t-i} + \sum_{i=0}^k \Delta \alpha_{4i} LnOIL_{t-i} + \sum_{i=0}^k \Delta \alpha_{5i} LnUN_{t-i} + \mu_{t-1} \quad (4)$$

In applied econometrics, cointegration is a vital concept for understanding if variables are in a long-term equilibrium relationship. It's especially crucial when dealing with non-stationary data. If the

variables being studied don't have a cointegration relationship, run.

6.2 Long Run Cointegration

The long-run co-integrating relationship will be estimated using the following specification

$$\Delta \text{LnBSP}_t = \alpha_0 + \beta_1 \text{LnBSP}_{t-1} + \alpha_1 \text{LnEXCH}_{t-1} + \alpha_2 \text{LnGDP}_{t-1} + \alpha_3 \text{LnINF}_{t-1} + \alpha_4 \text{LnOIL}_{t-1} + \alpha_5 \text{LnUN}_{t-1} + \mu_t \quad (5)$$

The ARDL bound test helps us check if certain variables in a study are connected in the long term. To test for cointegration using the ARDL methodology, we refer to critical values provided by **(Pesaran et al. 2001)**. The null hypothesis assumes there's no long-term equilibrium connection between the variables, while the alternative hypothesis suggests the presence of such a relationship. Next, we move on to conduct an F-test, comparing calculated F-statistics with lower and upper critical bounds provided by **Pesaran and Pesaran (1997) or Pesaran et al. (2001)**.

we look at the lagged error correction term (ECT) to understand the long-term connections between different variables. Once we figure out these long-term connections, we can then investigate how these variables behave in the short term. Based on the extent literature review $\alpha_1, \alpha_2, \alpha_3, \beta_1 > 0$, & $\alpha_4, \alpha_5 < 0$.

6.3 Short Run Dynamics

The short-run dynamics model we can specify with error correction term

$$\Delta \text{LnBSP}_t = \alpha_0 + \sum_{i=0}^k \beta_{1i} \text{LnBSP}_{t-i} + \sum_{i=0}^k \Delta \alpha_{1i} \text{LnEXCH}_{t-i} + \sum_{i=0}^k \Delta \alpha_{2i} \text{LnGDP}_{t-i} +$$

$$\sum_{i=0}^k \Delta \alpha_{3i} \text{LnINF}_{t-i} + \sum_{i=0}^k \Delta \alpha_{4i} \text{LnOIL}_{t-i} + \sum_{i=0}^k \Delta \alpha_{5i} \text{LnUN}_{t-i} + \omega \text{ECM}_{t-1} + \mu_{t-1} \quad (6)$$

The presence of an Error Correction Term (ECT) indicates that changes in the explained variable (like changes in prices) are influenced by both the deviations from long-term equilibrium and changes in other independent variables. This term helps us understand how quickly the explained variable adjusts towards its long-run equilibrium path over time. It indicates convergence, or movement towards equilibrium. For instance, if the coefficient is one, it means the variable adjusts completely within one period.

7. Empirical Results and Discussion

Here we examine our results the effect of macroeconomics variables on stock price volatility in the Indian stock market the data obtained from 1991 to 2021. ARDL approach is used to test the long run relations among the variable

7.1 Collinearity Testing

To assess multicollinearity among the variables, the literature suggests conducting a correlation analysis. Multicollinearity happens when two or more independent variables in a multiple regression model are strongly related in a linear way. Usually, if the correlation between two independent variables is higher than 0.8, it shows significant multicollinearity. This analysis helps us understand how closely two variables move together. The sign of the Pearson correlation coefficient (PCC) shows the type of relationship, while its value measures how strong the relationship is between the paired correlations. The table below shows the results of the correlation test.

TABLE 2: RESULT OF CORRELATION

Symbol	LnBSP	LnEXCH	LnGDP	LnINF	LnOIL	LnUNE
LnBSP	1.0000	0.8555	0.4152	-0.3079	-0.4392	0.3824
LnEXCH	0.8555	1.0000	0.4216	-0.5673	-0.5565	0.4010
LnGDP	0.4152	0.4216	1.0000	-0.2113	-0.2786	0.4150
LnINF	-0.3079	-0.5673	-0.2113	1.0000	0.3201	-0.2559
LnOIL	-0.4392	-0.5565	-0.2786	0.3201	1.0000	0.2777
LnUNE	0.3824	0.4010	0.4150	-0.2559	0.2777	1.0000

Source- Author's Estimation

The data shows that the BSE stock price is affected by various factors. Inflation rate and oil prices tend to decrease the BSE stock price, while exchange rates, GDP, and unemployment rates impact it positively. According to the rule of thumb, there's no issue of multicollinearity because the correlation

coefficients of all the independent variables are less than 0.8.

In terms of relationships between these factors, inflation rate and oil prices are negatively linked with exchange rates. On the other hand, GDP growth rate and unemployment rate are positively

associated with exchange rates. Inflation rate and unemployment rate also have a negative correlation, meaning when one goes up, the other tends to go down. Similarly, oil prices are negatively correlated with the BSE stock price, exchange rates, and GDP growth rate, while inflation rate and unemployment rate show a positive correlation.

7.2 Stationarity Testing

To ensure reliable estimates and accurate forecasting, it's imperative that the variables in an economic model exhibit stationary behavior. Detecting the stationary properties of a series marks the initial step in many time series investigations.

Among the various of tests available in time series econometrics, unit root test is one of the best methods for assessing stationarity (Gujarati, 2004) with the Dickey-Fuller (DF), Phillips-Perron (PP), Ng-Perron, and Augmented Dickey-Fuller (ADF) tests being prominent examples.

The ADF test, in particular, garners widespread usage due to its ability to relax the assumption of autocorrelation among residuals. If a series is found to be stationary in its original form, it's termed as integrated of order zero, denoted by $I(0)$. Conversely, if a series appears non-stationary in its original form but exhibits stationarity upon differencing once, it's categorized as integrated of

order one, denoted by $I(1)$. This distinction in the order of integration holds significance in determining the appropriate approach for analyzing long-run relationships among variables, particularly in the context of cointegration.

In table 3, each variable's ADF test statistic and Philips perron is compared against critical values at 5% level of significance.

The null hypothesis

H0: the series has unit root

H1: the series has stationary

The rule of thumb

$P > 0.05$ (cannot reject the null hypothesis)

$P < 0.05$ (reject the null hypothesis)

TABLE 3: Result of Unit Root Test

Unit Root Test				
	At Level	First difference		
variables	ADF	ADF	Philips	Order of integration
LnBSP	-3.48 (0.0597)	-7.14(0.00)	-8.39(0.000)	$I(1)$
LnEXCH	-2.738(0.2295)	-4.824(0.003)	-4.814(0.003)	$I(1)$
LnGDP	-12.145(0.00)			$I(0)$
LnINF	-2.55(0.30)	-6.59(0.00)	-6.66(0.00)	$I(1)$
LnOIL	-2.322(0.10)	-5.66(0.04)	-8.9110(0.00)	$I(1)$
LnUNE	-4.08(0.01)			$I(0)$

Source- Author's Estimation

From above table 3, GDP and unemployment rate are stationary at level, which means it is integrated order zero $I(0)$. and the other hand BSE stock price, exchange rate and inflation, and oil rent is stationary at first difference $I(1)$, so the above result shows some variables are stationary at level and some variables are stationary at first difference. as a consequence it leads to run the ARDL bound test to estimate the cointegration (Pesaran et al., 2001).

7.3 Lag Length Criteria

The ARDL bounds test methodology, pioneered by (Pesaran et al., 2001), underscores the necessity of selecting an appropriate lag length to counteract any serial correlation present in the dataset. Empirical findings concerning the long-term relationships among variables are notably influenced by the chosen lag length in the econometric model

(Bahmani-Oskooee & Bohl, 2000). Determining the optimal lag length involves assessing the first difference of the conditional Error Correction Model (ECM) of time series ARDL. Several criteria exist for selecting the suitable lag length, with the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) being particularly vital. In this study, we opt for the lag length that minimizes the AIC value, indicating a better model fit according to this criterion. It's worth mentioning that the F-statistic calculated for the ARDL model can change a lot depending on which lag order is chosen in the economic model. By picking the right lag order, researchers can make sure their conclusions from the data are fair, accurate, and reliable. The detailed results will be explained more in the next parts of the paper.

TABLE:4 Results of Lag length Criteria

VAR Lag Oder Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-6.6653	NA	1.03e-07	0.9381	1.2261	1.0238
1	119.9971	187.6481	1.34e-10	-5.7775	-3.7618*	-5.1781
2	175.0780	57.1210*	5.11*	-7.1909*	-3.4474	-6.0778*

*Indicates lag order selected by the criteria

Source- Author's Estimation

From the above table 4, we can decide second lag should be considered in the data set before going to estimate the long run relationship among the variables in the model.

7.4 Long Run Cointegration

In econometrics, there are many ways to test if variables are linked in the long term. We used the

ARDL bounds test and applied the unrestricted OLS technique, following a specific equation (Equation 5), to calculate the F-test statistic. This helps us see if there are any long-term relationships among the variables. In Table 5, we present detailed results from this test.

H0: No long run relationships

H1: Long run relationships exist among variables

Table 5: ARDL bounds test

Test Statistics	VALUE	K
F- Statistics	4.69	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Source- Author's Estimation

In Table 5, we observe the calculated F-statistic alongside its critical values at various significance levels (1%, 2.5%, 5%, and 10%) for both levels (0) and first differences (1). The empirical analysis reveals that the computed F-statistic value (4.69) exceeds the upper bound I (1) and surpasses the F-test critical value of 3.38 at a 5% significance level, as provided by **Pesaran et al. (2001)**. Consequently, we reject the null hypothesis. This result indicates the presence of cointegration among the variables under examination, implying

that the stock market index is cointegrated with the exchange rate, GDP, inflation, oil rent, and unemployment rate. Hence, it is reasonable to suggest that this study variables move together in the long-run bound test

Cointegration between two or more time series variables suggests they share a long-term relationship or equilibrium. In Table 5, we present the empirical findings regarding the long-term relationships among the predictors in the proposed ARDL model (1,2,1,0,1,2) using the Schwarz Bayesian Criterion (SBC).

Table 6: ARDL Long Run Coefficient

Dependent Variable = LnBSP				
Selected Model: ARDL (1,2,1,0,1,2)				
Variable/Regressor	Coefficient	Standard Error	t-Statistics	Probability
Constant	-8.3198	1.9462	-4.2747	0.0008*
LnEXCH _t	1.1540	0.3850	2.9970	0.0096*
LnGDP _t	1.6503	0.2661	6.2010	0.0000*
LnINF _t	-0.2321	0.2216	-1.0470	0.3128
LnOIL _t	-9.2137	10.3981	-0.8860	0.3905
LnUNE _t	13.6792	10.6738	1.2815	0.2208
Note: *indicate significant level at 5%				

Source- Author's Estimation

The above table 6, shows that exchange rate is positive and significantly affect to the stock price in the long run this indicates that 1% increase in foreign exchange rate will lead to an increase in stock market volatility about 1.5% significantly. That shows exchange rate affects the stock price in long

run. The effect of GDP in stock market is positive ,it shows that 1% rise in GDP leads to an increase in stock price by 1.65% in the long run at 1% and 5% level of significance .Finally the coefficient of inflation rate and oil price is negatively affect to the stock price which is comparatively smaller and insignificant, it means 1% change of inflation rate leads to an decrease of stock market price by 0.23%. Similarly 1% change oil price negatively affect to the stock price about 9.21%, whereas the co efficient of unemployment rate positively affects to

the stock price, but it is significant. It reveals 1% change of unemployment rate leads to an increase of stock price about 13.67%, So it clearly proves that exchange rate, GDP and unemployment rate positively affect the stock price while oil price and inflation rate negatively affect to the stock market performance.

CointegrationEquation=LnBSP-

(1.1540*LnEXCH+1.6540*LnGDP-0.2321*LnINF-

9.2137*LnOIL+13.6792* LnUNE-8.3199)

7.5 Short Run Dynamics

The Error Correction Model (ECM) introduced by Engle and Granger helps to analyze how a variable behaves in the short term compared to its long-term behavior over time. When economic variables are found to have a long-term relationship, we can use the errors from the long-term regression to create an Error Correction Model (ECM). This helps us look at both the long-term and short-term impacts of economic variables and see how quickly adjustments happen. Below, in the table, are the specific results from applying the error correction version of the suggested ARDL model, based on equation 6.

Table 7: ARDL Short Run Coefficient

Explained Variable = ΔLnBSP_t				
Selected Model: ARDL (1,2,1,0,1,2)				
Variable/Regressor	Coefficient	Standard Error	t-Statistics	Probability
ΔLnEXCH_t	2.0308	0.5855	3.4684	0.0038*
ΔLnGDP_t	0.8099	0.0999	8.1020	0.0000*
ΔLnOIL_t	-2.0638	2.7788	-0.7427	0.4699
ΔLnUNE_t	-19.6989	4.3211	-4.5587	0.0004*
ECM _{t-1}	-0.8637	0.1260	-6.8533	0.0000*
Note: *indicate significant level at the 5%				

Source- Author's Estimation

From the above table 7, in short run exchange rate and GDP are the most relevant economic variables responsible for upward trend in the stock price at 5% level of significance. The result shows that rise in exchange rate positively affects the stock market price, for instance 1% increase in exchange rate leads to stock price by 2.03% and similarly GDP positively affects stock price significantly. It reveals 1% increase in GDP leads to increase of stock price by 0.80%. The short run impact of oil price on the stock price is negative and statistically insignificant whereas unemployment rate negatively affects to the stock price significantly in the short run at 5% level of significance. Finally exchange rate and GDP growth rate positively affect to the stock price whereas unemployment rate and oil rent negatively affect to the stock price in the short run.

The coefficient on the lagged error correction term tells us how quickly adjustments occur. If the lagged error correction term is negative and significant, it means the series is not explosively moving away from its equilibrium, and it can eventually reach a stable long-term state. Essentially, the lagged error correction term (ECMt-1) shows how fast the variable adjusts to changes in other factors before settling at its balanced level. The findings shows that the lagged ECM (ECMt-1) remains negative and is highly statistically significant at the 1% level. This suggests there's a valid connection among the specific macro variables. Additionally, it indicates that the stock market return adjusts from the

previous year's imbalance at a rate of about 86.37 % annually.

8. Discussion of Findings

The findings suggest that there's strong long run relationship between exchange rates, inflation, GDP, oil prices, unemployment rates and the BSE-100 stock index. The analysis indicates that GDP, exchange rates, and unemployment rates have a positive impact on stock prices in the long term. Among these, GDP and exchange rates have a significant effect at a 5% level, while unemployment rates not statistically significant. On the other hand, inflation and oil prices have a negative impact on stock prices in the long term. However, their effects are not statistically significant.

In the short term, unemployment rates negatively affect stock prices at a 5% level of significance. The error correction coefficient of the analysis suggests that about 86.37% of the deviation from the long-term equilibrium of the BSE-100 index gets corrected annually in the short run.

9. Conclusion and Policy Recommendations

In this study, we examined that how stock market returns in India relate to factors like exchange rates, GDP, inflation, oil prices, and unemployment.

We employed the ARDL method to examine both the long-term and short-term connections between these variables and we found that there's a strong connection between these variables both in the long term and the short term.

According to the findings, we suggest some actions to improve India's financial sector.

➤ From above study as we find exchange rate positively affects the stock price, policymakers may consider measures to maintain a favorable exchange rate environment. This could involve policies aimed at promoting currency stability, such as managing inflation, implementing appropriate monetary policies, and fostering a competitive export environment. Additionally, policies that encourage foreign investment and trade can contribute to a positive impact on stock prices by bolstering economic activity and investor confidence.

➤ The Central Bank of India should use a deflationary fiscal policy to control inflation. This can help prevent high inflation rates, which could otherwise cause differences between actual and expected stock returns in the Indian Stock Market.

➤ Similarly, GDP growth positively affects stock prices, policymakers may need to focus on measures that support economic expansion and stability. This could include fiscal policies aimed at stimulating growth, such as infrastructure investment or tax incentives for businesses. Additionally, policies that promote financial market transparency and regulatory certainty can help sustain investor confidence, further supporting stock prices.

➤ Oil prices and unemployment rates negatively affect stock prices, policymakers may need to implement strategies to mitigate these impacts. For oil prices, diversifying energy sources, promoting energy efficiency, and investing in renewable energy technologies can help reduce vulnerability to oil price fluctuations. To address unemployment, policies focused on job creation, such as infrastructure projects, workforce development initiatives, and incentives for businesses to hire, can help lower unemployment rates. Additionally, social safety nets and support programs can assist those who are unemployed, reducing the overall economic strain and potential negative impact on stock prices.

➤ India being an emerging economy, should pay more attention to the stock market when making decisions about monetary policy. It's an important way to influence the economy making decisions about monetary policy. It's an important way to influence the economy.

➤ Financial authorities need to make the link between the money and stock markets stronger to provide better funding options. Policies that change interest rates should consider how they affect the stock market's access to funds.

Understanding and implementing policies based on macroeconomic factors are important for proper planning and economic development. These policies help in using resources efficiently, creating a stable business environment, establishing global relationship, improving industrial production, attracting foreign investors, boosting stock market performance, and promoting economic growth.

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