

Relationship Between Macroeconomic Variables and Stock Market Index: A Comparative Study Between India and United Kingdom

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ABSTRACT

The stock market plays a crucial role in the context of economic development of any country. To examine the impact of various independent factors such as currency fluctuation (in context with USD), Interest rate and Inflation on the Stock Indices of India and UK. The study has been conducted for a period of 9 years i.e., April 2014 to March 2023. Techniques like Unit Root test, VAR, Cointegration test, Granger Causality test, Correlation and Regression are used to study the causality relationship and impact of macroeconomic variables between two nations. The results show that there is a unidirectional relationship between Nifty 50 and exchange rate, interest rates of India; FTSE 100 and interest rates of UK. And also, it is concluded that there is an impact of inflation rate and exchange rate of India on FTSE 100. On other hand, it is concluded that there is an impact of inflation rate and interest rate of UK on Nifty 50. Hence, investors are suggested to consider inflation rate, exchange rate and interest rate before investing in stock market.

Keywords: Inflation rate, Exchange rate, Interest rate, Nifty 50, FTSE 100.

1. Introduction

Stock market is being affected by many external factors like inflation rate, currency exchange rate, money supply, GDP, interest rate, exports etc. This study mainly focuses on three macroeconomic variables that affect stock market namely...

- Inflation rate
- Exchange rate
- Interest rate

People who live in countries with low interest rates borrow more money from banks and save less. Both the supply and demand of money in the economy rise. The rising commodity prices leads to inflation. Higher inflation generally has a depressing effect on a nation's currency's value. This is so because rising inflation devalues a currency's purchasing power, which makes it less valuable in relation to other currencies. Increased inflation typically has a negative effect on currency conversion rates.

Stock market return is also influenced by inflation. Many emerging economies are struggling to control inflation because it tends to have a negative impact on stock market performance. Economic stability is measured in terms of price stability of a country. High inflation creates uncertainty in an economy and it will make domestic and foreign investors not to invest in stock market.

1.1 Inflation:

Inflation refers to increase in the overall average price level of the products or services. The most widely reported measure of inflation in India after 2014 is the consumer price index (CPI) which measures the changes in the average prices of consumer goods and services. The increase in price of products and services cause market uncertainty. Corporation's profit and growth margins may be affected by rising inflation, which could have an impact on investor decision.

1.2 Exchange Rate:

Exchange rate is the rate at which one nation's currency will be exchanged for another nation currency and affects the trade movement between the countries. The movements in stock market influence exchange rate to appreciate or depreciate against foreign currencies. This study is to observe the impact of Indian and UK currency fluctuation in context with Dollar on stock market.

1.3 Interest Rate:

One of the factors that affect stock prices is expected earnings which in turn, is affected by interest rates. If the repo rate continues to go up, banks will raise loan rates. This will lead to higher loan repayment costs for corporates. Rising costs reduce the net profit, which reflects in stock prices.

Interest rate are a reflection of economic conditions. Central banks raise and lower interest rates to encourage economic growth and manage inflation. If inflation is high, they raise interest rates to control it. If inflation is low, they lower interest rates to encourage consumers to spend and borrow money.

1.4 Indian Stock Exchange:

Indian stock exchange refers to 7 official operating stock and commodity exchanges by SEBI. The two principal large stock exchange sin India are Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). This study is mainly concentrated on impact of Interest rate, Exchange rate and Inflation rate on NSE Index.

National Stock Exchange (NSE) is one of the leading stock exchanges of India, based in Mumbai. NSE is under the ownership of various financial institutions such as banks and insurance companies. It is the world's largest derivatives exchange by number of contracts traded and the third largest in cash equities by number of trades. It is one of the largest stock exchanges in the world by market capitalization.

NSE's flagship index is NIFTY 50, a 50 stock index is used extensively by investors in India and around the world as a barometer of the Indian capital market. The NIFTY 50 is a benchmark of Indian stock market index that represents the weighted average of 50 of the largest Indian companies listed on the National Stock Exchange. The NIFTY 50 index was launched in 1996 by NSE.

1.5 London Stock Exchange:

London Stock Exchange (LSE) is a stock exchange in the City of London, England, United Kingdom. As of 2021, the total market value of all companies trading on LSE was £3.9 trillion. The LSE was the most-valued stock exchange in Europe from 2003. According to the report, approximately 12% of UK-resident individuals reported having investments in stocks and shares. LSE is one of the world's oldest stock exchanges. LSE's flagship index is The Financial Times Stock Exchange 100 Index also called the FTSE 100 Index or informally, the "Footsie" , is a share index of the 100 companies listed on the London Stock

Exchange with the highest market capitalisation. The index is maintained by the FTSE Group, a subsidiary of the London Stock Exchange Group.

2. Literature Review

1. **Basabi Bhattacharya, Jaydeep Mukherjee (2008)** in their article “Causal Relationship Between Stock Market and Exchange rate, Foreign exchange Reserves and Value of Trade balance: A Case Study for India” published in “Journal of Business Finance & Accounting” investigates the causal relationship between stock market and exchange rate, foreign exchange reserves in India. It applied techniques of unit root test, Cointegration test and long run Granger non-causality test to analyze the causal relationship between the BSE Sensitivity Index and three macroeconomic variables. This article concludes that there is no causal relationship between exchange rate, foreign exchange reserves, value of trade balance and stock prices.
2. **Anokye M. Adam, George Twenwoah (2008)** in their article “Macroeconomic Factors and Stock Market Movement: Evidence from Ghana” published in “Journal of Macroeconomics” examines the effect of macroeconomic variables on stock price movement in Ghana. It analyzed both short-run and long-run relationship between stock market and macroeconomic variables like Treasury bill rates, Foreign direct investments, exchange rates and consumer price index from 1991 to 2006. It applied Johansen’s multivariate cointegration test and found that there is a positive relationship between inflation and stock price movement and the impact of interest rates on stock price movement is very low. The study also recommended that investors should concentrate more on inflation and exchange rates instead of interest rates.
3. **D.V. Lokeswar Reddy (2012)** in his article “Impact of Inflation and GDP on Stock Market Returns in India” published in “International Journal of Advanced Research in Management and Social Sciences” studied the Impact of inflation and GDP on stock market returns in India. It used regression analysis to show the impact of macroeconomic variables on Indian stock market returns. It found that 95.6% explanatory variables influencing the stock market returns. It also found that GDP is the most important variable that influences the stock market returns. It suggested that investors those who invest in stock market has to concentrate on GDP and inflation before taking any investment decisions.
4. **Saurabh Singh, L.K. Tripathi, Kirti Lalwani (2012)** in their article “An Empirical Study of Impact of Exchange Rate & Inflation Rate on Performance of BSE Sensex published in “A Journal of Multidisciplinary Research” examines the primary factors that are affecting Bombay Stock Exchange (BSE) in India. It used Regression analysis to know the impact of inflation and exchange rate on BSE Sensex. The research identifies the level of influence of exchange rates and inflation on BSE Sensex. It found that inflation and exchange rates significantly affect the performance of BSE Sensex. It also suggested to consider the influence of Interest rate, money supply, government policies on exchange rate.
5. **Dr. Chandra Mohan, Mrs. N. Chitradevi (2014)** in their article “Impact of Inflation and Exchange Rate on Stock Market Performance in India” published in “Indian Journal of Applied Research” aims to analyze the impact of inflation and exchange rate on stock market return in India. It applied Multiple

correlation and linear multiple regression tools to find the relationship between inflation, exchange rate and their impact on stock market returns in India. This article concludes that there is a significant relationship between the macroeconomic variables namely inflation and exchange rate on Indian stock market. It also suggested that managing macroeconomic factors effectively will help to improve the index value of banks.

6. **Evans O. Amata, Willy Muturi, Martin Mbewa (2016)** in their article “The Causal Relationship Between Inflation, Interest Rate and Stock Market Volatility in Kenya” published in “European Journal of Business, Economics and Accountancy” examined the relationship between interest rate, inflation and stock market volatility in Kenya. The main aim of this study is to examine the long run and short run causal relationship between inflation, interest rates and stock market volatility in Kenya. The study used both primary and secondary data over a period of 14 years from January 2001 to December 2014. It employed Multicollinearity test, Auto correlation test, Normality test and Unit root test to examine the causal relationship between inflation, interest rate and stock market volatility. The study also analyzed the investor’s perception on the relationship between interest rates, inflation and stock market volatility. It found that there is a positive relationship between inflation and stock market volatility both in short run and long run. It also found that there is a negative relationship between interest rates and stock market volatility both in short run and long run. Through primary data from investor’s, it is analyzed that 69% respondents agreed that a change in inflation will cause a change in stock market. And 75% respondents agreed that a change in interest rates will affect the stock market.
7. **Santoshi Gande (2016)** in her article “Impact of Select Macro Economic Variables on BSE Sensex Returns” published in “Indian Streams Research Journal” studied the impact of selected Macroeconomic variables on BSE Sensex returns. It used correlation to analyze the relationship between 5 macroeconomic variables and BSE Sensex returns. It is concluded that there is a positive relation between variables like Reverse repo rate, Bank rate, inflation, Industrial growth rate, Gross domestic product, Exchange rates on BSE Sensex returns. The study revealed that repo rate is not influencing the BSE Sensex returns. It also revealed that when compared to other macroeconomic variables inflation and exchange rates are more influencing the BSE Sensex returns. It suggested that effect of Dow Jones industrial average on Indian stock market can also be analyzed.
8. **Manpreet Kaur (2017)** in her article “An Impact of Inflation and Exchange Rate on Stock Returns: Evidence from India” publishes in “Scholarly Research Journal for Interdisciplinary Studies” investigates the relationship between Indian stock market and macroeconomic variables i.e., inflation and exchange rates. Multivariate Regression model is used to find the relationship between Indian stock market and macroeconomic variables. The results shows that there is a significant relationship between inflation and stock returns and insignificant relationship between exchange rates and stock returns.
9. **Khaled Lafi AL-Naif (2017)** in his article “The Relationship Between Interest Rate and Stock Market Index: Empirical from Arabian Countries” published in “Research Journal of Finance and Accounting”

examines long-run and short-run relationship between interest rates and Arab Monetary Fund indices for five Arabian stock market indices namely Jordan, Egypt, Oman, Qatar and Kuwait.

It employed Augmented Dickey Fuller test, Vector Auto Regression test, Johansen test of cointegration and Granger causality test to analyze the relationship between interest rates and Arabian stock market index. This study concludes that there is a significant negative relationship between interest rate and stock market index in Egypt and insignificant relationship in Qatar and Kuwait. A significant positive relationship was found between interest rate and stock market index in Oman and Jordan.

10. **Izunobi Anthony Okechukwu, Nzotta Samuel Mbadike (2019)** in their article “Effects of Exchange Rate, Interest Rate and Inflation on Stock Market Returns Volatility in Nigeria” published in “International Journal of Management Science and Business Administration” studied the effect of exchange rate, interest rate and inflation on stock market returns volatility in Nigeria. It employed GARCH technique to find the volatility in stock market returns. It found that there is a negative relationship between interest rates and stock market returns and positive relationship between inflation, exchange rates and stock market returns. It also concluded that there is a high volatility in the Nigerian stock market returns.
11. **Mahima Jejani, Tushar Jejani (2019)** in their article “Impact of Exchange Rate, Interest Rate and Inflation on Indian Stock Market” published in “International Journal of Policy Sciences and Law” analyzed the Impact of Exchange rate, Interest rate and Inflation on Indian Stock Market. In this study exchange rates are considered in respect to Dollar, Euro and Pound and also considered both Sensex and Nifty 50 Indices.
The study is performed for a period of 29 years from 1991-2019. It employed correlation and regression to find the relationship and impact of macroeconomic variables on Indian stock market. It found that there is a strong and positive correlation between exchange rates and Indian stock market, weak and negative correlation between interest rates, inflation and Indian stock market.
12. **Sreenu, N., Rao, K.S.S., & Naik, S. (2022)** in their article “Impact of Exchange Rate and Inflation Rate on Stock Market Return Volatility in India” published in “Academy of Marketing Studies Journal” inspects the impact of inflation and exchange rate on Indian stock market. This research used Co-integration technique and autoregressive distributed lag (ARDL) model to study the impact of Exchange rate and inflation on Indian Stock Market. GARCH is also used to study the long-run and short-run relationship between the exchange rate and inflation on Indian Stock Market. The study revealed that there is only long-term relationship between NSE returns and variables.

3. Research Methodology

3.1 Statement of the Problem

Inflation rates are closely related to interest rates, which can influence exchange rates. During high inflation foreign goods and services become more attractive as they are cheaper. This means imports will increase and cause an increase in currency supply in forex markets which results in depreciated currency. The higher inflation results in higher interest rates in order to control the cash flow in the society. And higher interest rates attract more foreign investment which leads to increase in exchange rates.

- How higher inflation will affect the interest rates and exchange rates?
- How does inflation devalue a currency?

The problem of this study is how inflation rate, exchange rate and interest rate will affect the stock market.

3.2 Need of the study

The stock prices of securities are affected by the sectoral Indices of National Stock Exchange (NSE) & London Stock exchange (LSE). The volatility in the sectoral indices is due to various micro and macroeconomic variables. An investor has to concentrate on these micro and macroeconomic variables before taking any investment decisions. This study focuses on the impact of selected macroeconomic variables namely interest rates, inflation and exchange rates on stock market index of India and UK.

3.3 Objectives of the Study

- To identify whether there is a causal relationship between macroeconomic variables and SMI of India and UK.
- To see the interrelationship and impact of selected macroeconomic variables between the two nations.

3.4 Scope of the Study

The study focuses on the relationship and impact of three macroeconomic variables namely interest rates, exchange rates and inflation on stock market index of India and UK over a period of 9 years i.e., April 2014 to March 2023.

3.5 Data Collection

This study is fully based on secondary data. Monthly data of Stock market indices are collected from yahoo.finance website for a period of 9 years from April 2014 to March 2023. Inflation rate, exchange rate and interest rate data are collected from Handbook of statistics on Indian economy from RBI portal and Trading Economics.

3.6 Limitations of the Study

- This study considers only three macroeconomic variables that affect Indian stock market and UK stock market.
- CPI measure is considered while collecting the data of inflation rates.
- The study is performed only for 9 years period.

3.7 Statistical tools

3.7.1 Unit Root Test

Unit root test is used to test whether the time series data of a variable is non-stationary and possesses a unit root. The first step, the study employed Augmented Dickey Fuller (ADF) test to check the stationarity of the time series data of selected variables, because mostly the time series data of macroeconomic variables are often assumed to be non-stationary.

3.7.2 Vector Auto Regression (VAR)

Vector autoregression (VAR) is a statistical model used to capture the relationship between multiple quantities as they change over time and also to determine the optimum lag length.

3.7.3 Johansen Test of Cointegration

After ensuring that the data series is stationary at 1st difference, we test the possibility of a long run equilibrium relationship between variables using Johansen test of cointegration. Johansen's test comes in two main forms i.e., Trace tests and Maximum Eigenvalue test. Johansen test suggests the trace and the maximum eigenvalue tests in testing the statistical significance.

3.7.4 Granger Causality Test

Granger causality is an econometric test used to verify the usefulness of one variable to forecast another variable. A variable is said to Granger-cause another variable if it is helpful for forecasting the other variable. Fail to Granger-cause if it is not helpful for forecasting the other variable.

According to Granger's definition of causal relationships:

H₀: Macroeconomic variables does not Granger cause SMI.

H₀₁: SMI does not Granger cause Macroeconomic variables.

3.7.5 Correlation

Correlation is a statistical technique that expresses how two variables are linearly related. It's a common tool used for describing the relationship between two variables.

3.7.6 Regression

A regression is a statistical technique that relates a dependent variable to one or more independent variables. A regression model is able to show whether changes observed in the dependent variable are associated with changes in explanatory variables. Simply, it shows the impact of one or more independent variables on dependent variable.

4. Data Analysis & Interpretation

4.1 Unit root test:

The results of unit root test for the variables (inflation rate, exchange rate, interest rate, stock market indices) of India and UK are shown in below table 4.1

Null Hypothesis H₀: Variables have a unit root.

Table 4.1 Results of ADF Test

Country	Variables	Level & Intercept		1 st Difference & Intercept		2 nd Difference & Intercept		Decision
		t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	
India	Inflation rate	-1.509	0.525	-4.828	0.000	-	-	I ~ (1)
	Exchange rate	-0.193	0.935	-9.806	0.000	-	-	I ~ (1)
	Interest rate	-1.909	0.327	-3.247	0.020	-	-	I ~ (1)
	Nifty 50	-0.539	0.878	-10.86	0.000	-	-	I ~ (1)
UK	Inflation rate	1.639	0.999	-8.764	0.000	-	-	I ~ (1)

	Exchange rate	-2.303	0.173	-8.393	0.000	-	-	I ~ (1)
	Interest rate	-1.094	0.716	-1.401	0.579	-19.231	0.000	I ~ (2)
	FTSE 100	-2.237	0.194	-10.606	0.000	-	-	I ~ (1)
C.V		-2.88		-2.88		-2.88		

C.V: Critical values at 5% level

Interpretation:

At Level & Intercept, the t-Statistic values of all macroeconomic variables (inflation rate, exchange rate & interest rate) and stock market index of both India and UK are greater than the critical value (-2.88) at 5% level and the p-values of all variables are greater than the level of significance (0.05). So, the null hypothesis H_0 cannot be rejected at 5% significance level. Hence all variables have a unit root.

We concluded that, all series of variables are non-stationary at level. In order to make the series stationary we take first difference.

At 1st Difference & Intercept, except for the interest rates of UK the t-Statistic value of all variables of India and UK are less than the critical value (-2.88) at 5% level and p-values of all variables are less than the level of significance (0.05). So, the null hypothesis is rejected at 5% significance level. Hence, all series of variables except interest rates of UK are stationary at first difference and variables are integrated of order I ~ (1).

We concluded that, all series of variables are stationary at first difference except interest rates of UK. In order to make the interest rates data series stationary we take second difference.

At 2nd Difference & Intercept, the t-Statistic value of UK interest rates is less than the critical value (-2.88) at 5% level and p-value of UK interest rates are less than the level of significance (0.05). So, the null hypothesis is rejected at 5% significance level. Hence, the interest rate data series of UK is stationary at second difference and the variable is integrated of order I ~ (2).

4.2 VAR Lag Order Selection Criteria

We found that all the variables and SMI of India and UK are non-stationary at level but stationary at first difference, whereas UK interest rate data series is stationary at second difference.

The next step is selecting the optimum lags used in the Johansen Test of Cointegration.

Table 4.2: VAR Lag Order selection Criteria

Country	Lag	LR	FPE	AIC	SC	HQ
India	0	NA	1.35e+08	30.07162	30.18199	30.11615
	1	952.6740	2964.899	19.34566	19.89750*	19.56830*
	2	36.40532	2709.260*	19.25334*	20.24665	19.65408
	3	26.38874*	2760.144	19.26668	20.70145	19.84552
	4	9.522542	3483.844	19.48964	21.36589	20.24659
UK	0	NA	1076.941	18.33339	18.43759	18.37556
	1	1032.773	0.028182	7.782088	8.303122*	7.992960*
	2	33.72953	0.026833	7.731434	8.669296	8.111004
	3	23.07375	0.028457	7.786219	9.140907	8.334486
	4	36.46515*	0.025443*	7.666880*	9.438395	8.383844

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Interpretation:

The results show the t-Statistics values, for selecting the optimum lags by using VAR model, the lag selection criteria consisting of sequential modified LR test, Akaike information criteria (AIC), Final prediction error (FPE), Hannan-Quinn information criteria (HQ) and Schwarz information criteria (SC). The lower value of each criteria, the better will be the model.

India:

The results indicate that the optimum lags for LR criteria is 3, FPF & AIC is 2, SC & HQ is 1. Among all the models the best model is Akaike information criteria (AIC). Hence, we consider the optimum lags as 2.

UK:

The results indicate that the optimum lags for LR, FPF & AIC is 4, SC & HQ is 1. Among all the models the best model is Akaike information criteria (AIC). Hence, we consider the optimum lags as 4.

4.3 Johansen Test of Cointegration Results

The next step is to determine the long-term relationship between macroeconomic variables and stock market index. We consider all the variables and SMI that are stationary at first difference. The results of the Johansen Cointegration test for the variables and stock market index of India and UK are shown in below table 4.3

H₀: There is no cointegration between inflation, exchange rates, interest rates and Nifty 50.

H₀₁: There is no cointegration between inflation, exchange rates and FTSE 100.

Table 4.3: Cointegration test results

Country	Hypothesized No. of CE(s)	Eigenvalue	Trace Test		Maximum Eigenvalue test	
			Trace St.	Prob.**	Max E. St.	Prob.**
INDIA	None	0.142686	35.52177	0.4208	15.54910	0.7037
	At most 1	0.093784	19.97267	0.4247	9.946262	0.7497
	At most 2	0.076020	10.02641	0.2787	7.985517	0.3802
	At most 3	0.020004	2.040891	0.1531	2.040891	0.1531
UK	None	0.088843	17.43881	0.6076	9.583135	0.7828
	At most 1	0.060812	7.855671	0.4810	6.462207	0.5546
	At most 2	0.013438	1.393464	0.2378	1.393464	0.2378
0.05 Critical Value for H ₀ : None			47.85613		27.58434	
0.05 Critical Value for H ₀ : At most 1			29.79707		21.13162	

0.05 Critical Value for H ₀ : At most 2	15.49471		14.26460	
0.05 Critical Value for H ₀ : At most 3	3.841466		3.381466	

* denotes rejection of the hypothesis at the level

**MacKinnon-Haug-Michelis (1999) p-values

Note: UK interest rates are excluded from Johansen Test of Cointegration as the data series is stationary at second difference.

Interpretation:

India:

The results shows that the Trace Statistic (35.52177) and Max-Eigen Statistic (15.54910) are less than 0.05 critical value of Trace (47.85613) and Max-Eigen (27.58434) tests. Also, the P-value of Trace (0.4208) and Max-Eigen (0.7037) tests are greater than the level of significance (0.05). So, the null hypothesis H₀ of cointegration relation (None) cannot be rejected at 5% significance level. Hence, there is no long-term relationship between macroeconomic variables and stock market index.

UK:

The results shows that the Trace Statistic (17.43881) and Max-Eigen Statistic (9.583135) are less than 0.05 critical value of Trace (29.79707) and Max-Eigen (21.13162) tests. Also, the P-value of Trace (0.6076) and Max-Eigen (0.7828) tests are greater than the level of significance (0.05). So, the null hypothesis H₀₁ of cointegration relation (None) cannot be rejected at 5% significance level. Hence, there is no long-term relationship between macroeconomic variables and stock market index.

4.4 Granger Causality Results

The Granger Causality test is used to determine whether one time series data is useful for forecasting another time series data. The results of Granger causality test between macroeconomic variables and SMI are shown in below table 4.4

Table 4.4: Pairwise Granger Causality Tests

Country	Null Hypothesis	F Statistic	Prob.	Decision
India	H ₀ : Inflation Rate does not Granger Cause NIFTY50	0.153	0.85	Accept H ₀
	H ₀₁ : NIFTY50 does not Granger Cause Inflation Rate	2.377	0.09	Accept H ₀₁
	H ₀₂ : Exchange Rate does not Granger Cause NIFTY50	1.271	0.28	Accept H ₀₂
	H ₀₃ : NIFTY50 does not Granger Cause Exchange Rate	10.024	0.00	Reject H ₀₃
	H ₀₄ : Interest Rate does not Granger Cause NIFTY50	1.228	0.29	Accept H ₀₄
	H ₀₅ : NIFTY50 does not Granger Cause Interest Rate	6.103	0.00	Reject H ₀₅
UK	H ₀ : Inflation Rate does not Granger Cause FTSE100	1.053	0.38	Accept H ₀
	H ₀₁ : FTSE100 does not Granger Cause Inflation Rate	1.453	0.23	Accept H ₀₁
	H ₀₂ : Exchange Rate does not Granger Cause FTSE100	1.564	0.19	Accept H ₀₂
	H ₀₃ : FTSE100 does not Granger Cause Exchange Rate	1.003	0.41	Accept H ₀₃
	H ₀₄ : Interest Rate does not Granger Cause FTSE100	0.921	0.45	Accept H ₀₄
	H ₀₅ : FTSE100 does not Granger Cause Interest Rate	3.957	0.01	Reject H ₀₅

Interpretation:

- The Granger Causality between inflation and Nifty 50 has a probability value 0.85 for H_0 and 0.09 for H_{01} are greater than the level of significance (0.05). So, the null hypotheses H_0 and H_{01} cannot be rejected at 5% significance level. Hence, inflation data cannot be used to forecast the Nifty 50 and vice-versa.
- The Granger Causality between exchange rate and Nifty 50 has a probability value 0.28 for H_{02} is greater than the level of significance (0.05) and probability value 0.000 for H_{03} is less than the level of significance (0.05). So, the null hypotheses H_{02} cannot be rejected and H_{03} is rejected at 5% significance level. Hence, exchange rate data cannot be used to forecast the Nifty 50 but we can use Nifty 50 data to forecast exchange rate.
- The Granger Causality between interest rate and Nifty 50 has a probability value 0.29 for H_{04} is greater than the level of significance (0.05) and probability value 0.00 for H_{05} is less than the level of significance (0.05). So, the null hypotheses H_{04} cannot be rejected and H_{05} is rejected at 5% significance level. Hence, interest rate data cannot be used to forecast the Nifty 50 but we can use Nifty 50 data to forecast interest rate.
- The Granger Causality between inflation and FTSE 100 has a probability value 0.38 for H_0 and 0.23 for H_{01} are greater than the level of significance (0.05). So, the null hypotheses H_0 and H_{01} cannot be rejected at 5% significance level. Hence, inflation data cannot be used to forecast the FTSE 100 and vice-versa.
- The Granger Causality between exchange rate and FTSE 100 has a probability value 0.19 for H_{02} and 0.41 for H_{03} are greater than the level of significance (0.05). So, the null hypotheses H_{02} and H_{03} cannot be rejected at 5% significance level. Hence, exchange rate data cannot be used to forecast the FTSE 100 and vice-versa.
- The Granger Causality between interest rate and FTSE 100 has a probability value 0.45 for H_{04} is greater than the level of significance (0.05) and probability value 0.01 for H_{05} is less than the level of significance (0.05). So, the null hypotheses H_{04} cannot be rejected and H_{05} is rejected at 5% significance level. Hence, interest rate data cannot be used to forecast the FTSE 100 but we can use FTSE 100 data to forecast interest rate.

4.5 Correlation Between Variables

Correlation is used to find the relationship between variables and it also shows how much of one variable is explained by the other variable, its value lies between -1 to +1. The results show the relationship between macroeconomic variables of India and FTSE 100 and also show the relationship between macroeconomic variables of UK and Nifty 50 in table 4.5

Table 4.5: Correlation matrix

Country	Variables		St. (Prob.)
India	FTSE 100	Inflation Rate	-0.237
		Exchange Rate	0.144
		Interest Rate	0.013
UK	Nifty 50	Inflation Rate	0.778
		Exchange Rate	0.509
		Interest Rate	0.461

Interpretation:

The probability value of interest rate (0.013) and exchange rate (0.144) shows a significant positive relationship between variables of India and FTSE 100. While probability value of inflation (-0.237) shows a negative significant relationship between Indian inflation and FTSE 100.

The probability value of inflation (0.778), exchange rate (0.509) and interest rate (0.461) shows a positive significant relationship between macroeconomic variables of UK and Nifty 50.

4.6 Regression Analysis

Regression is used to find the impact of independent variable on dependent variable. It also indicates how much of independent variable explains the dependent variable. The results show the impact of macroeconomic variables on SMI of India and UK in table 4.6

H₀: There is no significant impact of inflation on SMI.

H₀₁: There is no significant impact of exchange rate on SMI.

H₀₂: There is no significant impact of Interest rate on SMI.

Table 4.6: Regression Results

Country	Dependent Variable	Independent Variables	Inflation rate	Exchange rate	Interest rate
India	FTSE 100	Prob.	0.002	0.005	0.112
		R-squared	0.128		
UK	Nifty 50	Prob.	0.000	0.117	0.003
		R-squared	0.646		

Interpretation:

- The probability values of inflation rate and exchange rate (0.002 & 0.005 respectively) are less than the level of significance (0.05). So, the null hypotheses H₀ & H₀₁ are rejected at 5% significance level. Hence, there is a significant impact of Indian inflation rate and exchange rate on FTSE 100.
- The probability value of interest rate (0.112) is greater than the level of significance (0.05). So, the null hypothesis H₀₂ cannot be rejected at 5% significance level. Hence, there is no significant impact of Indian interest rate on FTSE 100.
- The R-Square value is 0.128 that indicates 12% of independent variables (inflation rate, exchange rate & interest rate) explains FTSE 100.
- The probability value of inflation rate and interest rate (0.000 & 0.003 respectively) are less than the level of significance (0.05). So, the null hypothesis H₀ & H₀₂ is rejected at 5% significance level. Hence, there is a significant impact of UK inflation rate and exchange rate on Nifty 50.
- The probability value of exchange rate (0.117) is greater than the level of significance (0.05). So, the null hypothesis H₀₁ cannot be rejected at 5% significance level. Hence, there is no significant impact of UK exchange rate on Nifty 50.
- The R-Square value is 0.646 that indicates 64% of independent variables (inflation rate, exchange rate & interest rate) explains Nifty 50.

5. Findings

All macroeconomic variables and SMI of India and UK are stationary at first difference and the variables are integrated of order $I \sim (1)$ except interest rates of UK. UK interest rate series are stationary at second difference and the variable is integrated of order $I \sim (2)$.

The results indicates that for Indian variables the selected optimum lag length is 2 and for variables of UK the selected optimum lag length is 4.

From cointegration test, it is concluded that there is no long-term relationship between macroeconomic variables and SMI of India and UK.

By employing Granger causality test, we found that there is no causality relationship between inflation rate and SMI of India. On other hand, we can conclude that there is a unidirectional causality relationship between macroeconomic variables (exchange rate, interest rate) and SMI of India. And also, there is no causality relationship between inflation rate, exchange rate and SMI of UK. But there is a unidirectional causality relationship between interest rate and SMI of UK.

From correlation test, we found that there is a significant positive correlation between macroeconomic variables and SMI between the two nations except for inflation rates of India. It is found that there is a significant negative correlation between inflation rate of India and FTSE 100.

By using Regression, we found that there is a significant impact of inflation rate, exchange rate of India on FTSE 100 but there is no significant impact of interest rates of India on FTSE 100. And also, there is a significant impact of inflation rate, interest rate of UK on Nifty 50. On other hand, we conclude that there is no significant impact of exchange rates of UK on Nifty 50.

6. Suggestions

Before investing in stock market, investors have to consider macroeconomic variables like inflation rate, exchange rate and interest rate.

Due to increasing inflation rate of UK, investors have to consider inflation rate before investing in stock market. Currently, the inflation rate of India is under control which benefits fixed rate, low interest mortgages and stock market investors.

The interest rates of India and UK are increasing to control inflation, which results in decreasing the stock prices of Nifty 50 and FTSE 100. So, investors have to consider interest rates before investing in stock market.

7. Conclusion

The main purpose of this research is to know the causality relationship between macroeconomic variables and stock market index as well as to know the interrelationship and impact of macroeconomic variables on SMI between the two nations. From the results we conclude that Nifty 50 data series is used in forecasting exchange rate and interest rates of India. On other hand, it is concluded that FTSE 100 data series is used to forecast interest rates of UK.

By performing Correlation analysis, we can conclude that there is a significant positive interrelationship between two nations but Indian inflation rate has a significant negative relationship with FTSE 100. In India, if exchange rate and interest rate increase then there will be an increase in the stock prices of FTSE 100 index. On other hand, if inflation rate of India increases then there will be a decrease in the stock prices of FTSE 100 index. In UK, if there is an increase in selected macroeconomic variables then the stock prices of Nifty 50 index will increase. It is also concluded that there is an impact of inflation rate,

exchange rate of India on FTSE 100 i.e., UK stock market index. And there is an impact of UK interest rates on Nifty 50 i.e., Indian stock market.

The results conclude that 12% of macroeconomic variables of India explains FTSE 100 and 64% of macroeconomic variable of UK explains Nifty 50.

8. References

1. Mgammal, M. H. (2018). The effect of inflation, interest rates and exchange rates on stock prices comparative study among two GCC countries. SSRN.
2. Jefry, J., & Djazuli, A. (2020). The Effect of Inflation, Interest Rates and Exchange Rates on Stock Prices of Manufacturing Companies in Basic and Chemical Industrial Sectors on the Indonesia Stock Exchange (IDX). *International Journal of Business, Management and Economics*, 1(1), 34-49.
3. Semuel, H., & Nurina, S. (2014). Analysis of the effect of inflation, interest rates, and exchange rates on Gross Domestic Product (GDP) in Indonesia (Doctoral dissertation, Petra Christian University).
4. 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, 1-8.
5. Amanda, S. T., Akhyar, C., & Ilham, R. N. (2023). THE EFFECT OF INFLATION, EXCHANGE EXCHANGE, INTEREST RATE ON STOCK PRICE IN THE TRANSPORTATION SUB-SECTOR, 2018-2020. *Journal of Accounting Research, Utility Finance and Digital Assets*, 1(4), 342-352.
6. Nurmasari, I., & Nur'aidawati, S. (2021). The Effects of Inflation, Interest Rates and Exchange Rates on Composite Stock Price Index During the Covid-19 Pandemic. *Jurnal Mandiri: Ilmu Pengetahuan, Seni, Dan Teknologi*, 5(2), 77-85.
7. Al-Abdallah, S. Y., & Aljarayesh, N. I. (2017). Influence of Interest Rate, Exchange rate and Inflation on Common Stock Returns of Amman Stock Exchange, Jordan. *International Journal of Economics, Commerce and Management*, 5(10), 589-601.
8. Fahlevi, M. (2019, August). The influence of exchange rate, interest rate and inflation on stock price of LQ45 index in Indonesia. In *First International Conference on Administration Science (ICAS 2019)* (pp. 157-163). Atlantis Press.