International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 12 | December - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

Factors Affecting NIFTY 50 and its Returns

Faculty & Mentor: Veerendra Anchan, Assistant Professor, ASMSOC, NMIMS University

Student Info: TYBBA F
1) Dhairya Ajmera, TYBBA F013, ASMSOC, NMIMS University, Mumbai
2) Harshit Jasrasaria, TYBBA F019, ASMSOC, NMIMS University, Mumbai
3) Parth Rajpal, TYBBA F034, ASMSOC, NMIMS University, Mumbai
4) Shivansh Arora, TYBBA F047, ASMSOC, NMIMS University, Mumbai
5) Uday Ahuja, TYBBA F054, ASMSOC, NMIMS University, Mumbai

Abstract

The key objective of the present study is to explore the impact of different macroeconomic variables on the stock prices in India using annual data from 2014-15 to 2022-23.
A multiple regression model is designed to test the effects of macroeconomic variables on the stock prices and granger causality test is conducted to examine whether there exists any causal linkage between stock prices and macro-economic variables.
The project will use a variety of methods to analyze the impact of these factors on Nifty returns. These methods may include regression analysis, seasonality regression, Johnasens Cointegration, Unit Root Tetsts and ANNOVA. This study provides evidence of a variation between Nifty stock returns and the values of various global indices. This finding has implications for investors and policymakers. Investors should be aware of the relationship between Nifty stock returns and global indices when making investment decisions.

The Johansen test determines if two or more non-stationary time series are cointegrated. Augmented Dickey-Fuller test was also conducted to test whether the data was non stationery or not. Cointegration is a time series quality that indicates that they have a long-run equilibrium relationship even if they are not stationary in the short run.

Through regression we try to understand if macro economic factors like currency conversion rate and the returns of indices of foreign countries have an impact on the NIFTY 50, whereas through seasonality regression we try to determine if NIFTY gets affected due to seasonal trends in different quarter or months.

Introduction

The Nifty 50 is a benchmark index representing the performance of the 50 largest and most liquid companies listed on the National Stock Exchange of India. Global indices, such as the S&P 500 and Nasdaq Composite, significantly influence the Nifty 50 due to factors like interconnected global markets, foreign institutional investments, and sectoral correlations. Examples of global indices' impact on Nifty 50 include US Federal Reserve policy changes, global economic growth trends, and major geopolitical events. In a well-functioning capital market, the stock prices move quickly in response to new information. Therefore, the stock prices reflect all the information about the stock. The stock prices reflect expectations about the future performance of the corporate houses. Therefore, if the stock prices reflect those expectations in real terms, then it would be a major indicator for the economic activity. Therefore, the dynamic relationship between the stock prices and the macroeconomic variables could be used to determine the macroeconomic policies of the nation. The objective of the study is to investigate the effect of macroeconomic variables on stock prices as well as causal relationship between macro-economic variables and stock prices in Indian context.

The findings of this study bear significant implications for investors and policymakers alike. For investors, understanding the intricate interplay between Nifty stock returns and global indices is imperative when making informed investment decisions. Policymakers, on the other hand, must consider the relationship between Nifty stock returns and global indices in the formulation of economic and financial policies, as these dynamics can significantly influence the overall health of the financial markets and the economy.

Due to gold's traditional function as a safe haven asset, the examination of the cointegration relationship between NIFTY and gold rates is critical. Gold prices frequently move in the opposite direction of stock market performance, providing investors with a safe haven during times of economic instability. Examining this link can aid in determining how effective gold is as a hedge against stock market volatility.

Forex rates also have a considerable impact on stock market performance, particularly in export-oriented economies. Currency fluctuations can have an impact on export competitiveness and overall profitability, altering investor sentiment and stock prices. Understanding the cointegration link between the NIFTY and forex rates might help you understand how currency swings affect the Indian stock market.

The CPI measures the average change in prices paid by urban consumers for a basket of consumer goods and services. CPI movements, as a key indicator of inflation, can have an impact on investment decisions and stock market performance. Examining the cointegration relationship between the NIFTY and the CPI can reveal how much inflation affects the Indian stock market.

This research paper aims to make a valuable contribution to the understanding of the intricate connections between the Nifty 50 index and global indices by scrutinizing whether there exists a variation in Nifty stock returns concerning the values of a diverse set of global indices. In statistical terms, the null hypothesis (H0) posits that there is no variation between Nifty stock returns and the values of various global indices, while the alternative hypothesis (H1) suggests that there is, indeed, a variation between Nifty stock returns and the values of different global indices.

Finally, the S&P 500 index, which measures the performance of the US stock market, serves as a global barometer of investor sentiment. The S&P 500's movements, as a leading indicator of global economic

trends, can influence investor confidence and the performance of stock markets worldwide. Examining the cointegration relationship between the NIFTY and the S&P 500 can provide insights into global stock market interconnectedness and the impact of global economic conditions on the Indian stock market.

Research objective

The Nifty 50, a benchmark index of Indian equities, is influenced by a range of factors, including economic growth, global indices, currency conversion rate, CPI, GLD, BoT, M3, oil prices etc. These factors have a cumulative impact on the nifty returns. Through our research we try to find if there is an impact on nifty due to these factors or not. We try to study the impact of some macroeconomic factors on the nifty returns

Sub-objectives

1) The key objective of the present study is to identify whether there exists a long term relationship between various economic variables and the stock prices in India using annual data from 2013 to 2023.

2) Through regression we try to understand if macro-economic factors like currency conversion rate and the returns of indices of foreign countries have an impact on the NIFTY 50, whereas through seasonality regression we try to determine if NIFTY gets affected due to seasonal trends in different quarter or months.

3) The objective of this study is to find out if the values of different worldwide indices and Nifty stock returns vary from one another.

4) The key objective of the present study is to explore the impact of different macroeconomic variables on the stock prices in India using annual data from 2014-15 to 2022-23.
A multiple regression model is designed to test the effects of macroeconomic variables on the stock prices and granger causality test is conducted to examine whether there exists any causal linkage between stock prices and macro-economic variables.

Data Collection Procedure

The data was collected through various sources comprising of the official website of nse, Investopedia, yahoo finance.

Descriptive Statistics

CPI		Gold Rate		S&P 500		NIFTY
Mean	117.04	Mean	1488.007339	Mean	3009.794404	Mean
Standard Error	1.52	Standard Error	28.14929703	Standard Error	82.11687181	Standard Error
Median	115.10	Median	1325.3	Median	2816.29	Median
Standard Deviation	15.89	Standard Deviation	293.887289	Standard Deviation	857.3253112	Standard Deviation
Sample Variance	252.50	Sample Variance	86369.73865	Sample Variance	735006.6893	Sample Variance
Kurtosis	-1.15	Kurtosis	-1.407829771	Kurtosis	-1.110850473	Kurtosis
Skewness	0.29	Skewness	0.40144208	Skewness	0.482472919	Skewness
Range	54.91	Range	957.5	Range	2846.15	Range
Minimum	91.40	Minimum	1060.8	Minimum	1920.03	Minimum
Maximum	146.31	Maximum	2018.3	Maximum	4766.18	Maximum
Sum	12757.28	Sum	162192.8	Sum	328067.59	Sum
Count	109.00	Count	109	Count	109	Count

USD to INR		CRUDE OIL		Money Supply (M3)		BoT	
Mean	70.51353853	Mean	60.81752294	Mean	1.55178E+14	Mean	-96647.42202
Standard Error	0.573951964	Standard Error	1.769471026	Standard Error	3.72328E+12	Standard Error	4203.641088
Median	69.7731	Median	57.4	Median	1.47588E+14	Median	-88977
Standard Deviation	5.992234428	Standard Deviation	18.47381987	Standard Deviation	3.88721E+13	Standard Deviation	43887.30142
Sample Variance	35.90687345	Sample Variance	341.2820207	Sample Variance	1.51104E+27	Sample Variance	1926095226
Kurtosis	-0.679211229	Kurtosis	0.257097069	Kurtosis	-1.074515634	Kurtosis	0.497096354
Skewness	0.400727247	Skewness	0.617552998	Skewness	0.367871293	Skewness	-0.746422209
Range	22.5499	Range	95.83	Range	1.35852E+14	Range	229873
Minimum	60.0586	Minimum	18.84	Minimum	9.84324E+13	Minimum	-224499
Maximum	82.6085	Maximum	114.67	Maximum	2.34284E+14	Maximum	5374
Sum	7685.9757	Sum	6629.11	Sum	1.69144E+16	Sum	-10534569
Count	109	Count	109	Count	109	Count	109

1)

Initially, we conducted Descriptive statistics and then Johansen's cointegration test has been conducted.

For conducting the Johansen's cointegration test, we have to check the stationarity of the data by using the Augmented Dickey-Fuller test (Parametric) and Philips Perron test (Non parametric).

After confirming the non-stationarity of the data, Johansen's cointegration test has been used to identify the long-term connection between the variables. This test checks whether the different variables are cointegrated or have a long run relationship or not.

The data was collected from Investing.com, Reserve Bank of India, Yahoo Finance.

For conducting this study on the variables, we have taken reference from a study conducted by Pooja Misra, IBS in which they conducted the cointegration test strength of the link between the independent parameters and the dependent parameter i.e. BSE Sensex in the long run.(Misra, 2018)

Data Analysis

Descriptive statistics

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Box-Cox(CPI)	112	0	112	4.508	4.986	4.747	0.139
Box-Cox(Gold)	112	0	112	10.119	10.955	10.464	0.257
Box-Cox(S&P500)	112	0	112	7.486	8.469	7.921	0.284
Box-Cox(USD)	112	0	112	4.083	4.414	4.235	0.083

Augmented Dickey-Fuller Test

On conducting the Augmented Dickey-Fuller test on the level data of CPI, Gold rates, S&P500 and Forex was conducted and it was observed that all the data types are non-stationery.

Variable	Dickey-Fuller	Phillips-Perron	KPSS
CPI	0.804	1.000	**<0.0001**
Gold	0.539	0.987	**<0.0001**
S&P500	0.459	0.965	**<0.0001**
Nifty	0.517	0.983	**<0.0001**
USD	0.214	0.988	**<0.0001**

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series. The series is stationary.

The p-value calculated by the Dickey-Fuller test of all the variables is greater than significance level alpha =0.05. Hence, we cannot reject the null hypothesis H0.

Now that the data has been proven to be non-stationery, we will go ahead with the Johansen's cointegration test.

Johansen's cointegration test

To check the long term relationship between Nifty and the other variables, we will run multiple individual tests with Nifty and other factors.

1. NIFTY and CPI

Lambda max test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.172	20.767	15.892	0.008
At most 1	0.047	5.324	9.164	0.250

Lambda max test indicates 1 cointegrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.172	26.091	20.262	0.007
At most 1	0.047	5.324	9.164	0.250

Trace test indicates 1 cointegrating relation(s) at the 0.05 level.

Both the Lambda max test and the Trace test indicate that CPI and Nifty are cointegrated at 5% level. Hence, they have a long run relationship.

2. NIFTY AND GOLD

Lambda max test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.109	12.643	15.892	0.152
At most 1	0.039	4.366	9.164	0.360

Lambda max test indicates 0 cointegrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.109	17.008	20.262	0.132
At most 1	0.039	4.366	9.164	0.360

Trace test indicates 0 cointegrating relation(s) at the 0.05 level.

Both the Lambda max test and the Trace test indicate that Gold and Nifty are not cointegrated at 5% level. Hence, they don't have a long run relationship.

3. NIFTY and S&P500

Lambda max test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value

None	0.085	9.760	15.892	0.357
At most 1	0.019	2.125	9.164	0.753

Lambda max test indicates 0 cointegrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.085	11.884	20.262	0.459
At most 1	0.019	2.125	9.164	0.753

Trace test indicates 0 cointegrating relation(s) at the 0.05 level.

Both the Lambda max test and the Trace test indicate that S&P500 and Nifty are not cointegrated at 5% level. Hence, they don't have a long run relationship.

4. NIFTY and Forex

Lambda max test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.164	19.745	15.892	0.012
At most 1	0.046	5.134	9.164	0.269

Lambda max test indicates 1 cointegrating relation(s) at the 0.05 level.

Trace test:

H0 (Nbr. of cointegrating equations)	Eigenvalue	Statistic	Critical value	p-value
None	0.164	24.879	20.262	0.011
At most 1	0.046	5.134	9.164	0.269

Trace test indicates 1 cointegrating relation(s) at the 0.05 level.

Both the Lambda max test and the Trace test indicate that Forex and Nifty are cointegrated at 5% level. Hence, they have a long run relationship.

Conclusion

From this study we can conclude that -

The cointegration relationship between the NIFTY and the CPI implies that changes in inflation are accompanied by corresponding changes in the value of the NIFTY over time. This implies that investors should consider inflation when making stock market investments in India.

The cointegration relationship between the NIFTY and forex rates emphasizes the significance of currency movements in the Indian stock market. Currency fluctuations can have an impact on export competitiveness and overall profitability, affecting investor sentiment and stock prices. Forex rates should be closely monitored by investors in order to assess their potential impact on the NIFTY's performance.

The absence of a cointegration relationship between the NIFTY and gold rates, on the other hand, suggests that gold does not serve as a reliable hedge against stock market volatility in the long run. While gold prices may move inversely to stock prices in the short term, this relationship does not hold over long periods of time. Investors should not rely solely on gold as a risk hedge in the stock market.

Similarly, the lack of a cointegration relationship between the NIFTY and the S&P 500 suggests that the Indian stock market is not fully integrated with the global stock market. While global economic trends can have an impact on NIFTY's performance, the Indian stock market is relatively immune to global market movements.

Overall, the study's findings offer useful insights into the long-run dynamics of the NIFTY and its relationship with key economic factors. These insights can help investors and policymakers make informed decisions about investment strategies and economic policies. Further research can be conducted to investigate the specific mechanisms by which CPI and forex rates influence NIFTY performance, providing a more nuanced understanding of the factors influencing the Indian stock market.

2)

Regression analysis is a statistical technique that is used to model the relationship between a dependent variable (also known as the outcome or response variable) and one or more independent variables (also known as predictor, explanatory, or feature variables). The goal of regression analysis is to estimate the coefficients of the regression equation, which can then be used to make predictions about the dependent variable.
The simplest form of regression analysis is linear regression, which involves a single independent variable. The equation for simple linear regression is:

y = mx + b
where:

y is the dependent variable
x is the independent variable
m is the slope of the regression line
b is the y-intercept of the regression line
The slope of the regression line represents the change in the dependent variable for a one-unit change in the independent variable. The y-intercept of the regression line represents the value of the dependent variable when the independent variable is equal to zero. Below is the result of linear regression

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.9792388
R Square	0.9589085
Adjusted R S	0.9586701
Standard Err	694.04954
Observations	521

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*	**Model is Significant**
Regression	3	5811617644	1937205881	4021.5627	0	**Since F value<0.05**
Residual	517	249041360.7	481704.7597			
Total	520	6060659005				

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1303.9075	325.1113299	-4.01064913	6.948E-05	-1942.609192	-665.20575	-1942.6092	-665.20575
EUROSTOX	0.4434836	0.151134347	2.93436687	0.0034908	0.14657066	0.7403966	0.1465707	0.7403966
S&P 500	3.3456006	0.106182693	31.50796548	2.12E-122	3.136998017	3.5542032	3.136998	3.5542032
Nikkei 250	0.0553638	0.021847018	2.534156842	0.0115659	0.012443925	0.0982836	0.0124439	0.0982836

Analysis: As we can see from the adjusted R squared, our model is significant, and the prices of Nifty can be predicted using the values of various global stock indices. This is due to various reasons, including the fact that in the incresingly gloabalised world, we are becoming more and more interconnected, and hence businesses are interconnected too. Many Geo-political and economic factors affects the daily changes in the stock prices, and US, Europe, and Japan being the top economies of the world, with significant correlation with indian market, we can see that even individually, Indian stock is significantly dependant on them.

Seasonality regression is a type of regression analysis that is used to model time series data that exhibits seasonal patterns. Seasonal patterns are repetitive fluctuations in the data that occur on a regular basis, such as monthly, quarterly, or yearly. Seasonality regression models can be used to account for these seasonal patterns and make more accurate predictions about future values of the dependent variable.
Seasonality regression works by adding dummy variables to the regression equation. Dummy variables are categorical variables that are used to represent different categories of data. For example, you could create a dummy variable for each month of the year to represent the seasonal pattern in retail sales data.The coefficients of the dummy variables in the regression equation represent the effect of each season on the dependent variable. For example, the coefficient of the dummy variable for December might be positive, indicating that retail sales are typically higher in December than in other months of the year.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.092396
R Square	0.008537
Adjusted R S	-0.092445
Standard Err	3613.7
Observation:	120

H0: Nifty 50 is not affected by seasonal variation, H1: Nifty is affected by seasonal, since p value is more than 0.05, accept null.

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	11	12143963	1103997	0.08454	0.999958
Residual	108	1.41E+09	13058826		
Total	119	1.42E+09			

	Coefficients	*tandard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	10016.96	1142.752	8.765645	2.94E-14	7751.827	12282.09	7751.827	12282.09
Jan	197.575	1616.096	0.122255	0.902925	-3005.807	3400.957	-3005.807	3400.957
Feb	226.76	1616.096	0.140313	0.888674	-2976.622	3430.142	-2976.622	3430.142
Mar	159.835	1616.096	0.098902	0.921399	-3043.547	3363.217	-3043.547	3363.217
Apr	137.525	1616.096	0.085097	0.932342	-3065.857	3340.907	-3065.857	3340.907
May	68.11	1616.096	0.042145	0.966461	-3135.272	3271.492	-3135.272	3271.492
Jun	372.835	1616.096	0.230701	0.817983	-2830.547	3576.217	-2830.547	3576.217
Jul	465.215	1616.096	0.287864	0.774003	-2738.167	3668.597	-2738.167	3668.597
Aug	760.17	1616.096	0.470374	0.639036	-2443.212	3963.552	-2443.212	3963.552
Sept	940.945	1616.096	0.582233	0.561623	-2262.437	4144.327	-2262.437	4144.327
Oct	-199.03	1616.096	-0.123155	0.902213	-3402.412	3004.352	-3402.412	3004.352
Nov	-57.36	1616.096	-0.035493	0.971752	-3260.742	3146.022	-3260.742	3146.022

Data is not seasonal, since adjusted r square is extremely low(negative, we can conclude that Nifty is not affected by seasonal trends, and is not subject to variation in months.

Analysis: The adjusted R square is negative due to which we conclude that data is not seasonal
The data is not seasonal due to a cumulative effect of various reasons, for eg festivals being spread out throughout the year and NIFTY 50 comprises of large cap stocks which preplan their production and services whereas in case of tangible products companies have a dealership selling approach and their revenues get evenly spread because dealers have to stock before festivals.

Conclusion

The key objective of the present study is to explore the impact of different macroeconomic variables on the stock prices in India using monthly, weekly whereas quarterly data from 2014-15 to 2022-23. The various factors that we took into consideration are global indices like Nikkie, S&P, currency coversion rate etc. To check the impact of these independent variables we performed regression.

After performing regression we obtain that global indices like S&P 500, NIKKEI 250, EUROSTOX have an affect on the NIFTY 50. Thus Nifty can be predicted using the values of various global stock indices.

This is due to various reasons, including the fact that in the incresingly gloabalised world, we are becoming more and more interconnected, and hence businesses are interconnected too. Many Geo-political and economic factors affects the daily changes in the stock prices, and US, Europe, and Japan being the top economies of the world, with significant correlation with indian market, we can see that even individually, Indian stock is significantly dependant on them. Whereas we also see that NIFTY is not affected significantly due to seasonal variations because of reasons like festivals being spread out throughout the year and NIFTY 50 comprises of large cap stocks which preplan their production and services whereas in case of tangible products companies have a dealership selling approach and their revenues get evenly spread because dealers have to stock before festivals.

3)

Research Objective:

The objective of this study is to find out if the values of different worldwide indices and Nifty stock returns vary from one another. Testing the alternative hypothesis (H1), which holds that there is variation between Nifty stock returns and the values of various worldwide indices, and the null hypothesis (H0), which states that there is no variation between Nifty stock returns and the values of various global indices, is the goal of the research. We have employed the ANOVA test together with descriptive statistics like correlation and histograms to accomplish this goal.

Research Methodology

This research paper uses an ANOVA test and descriptive statistics, including histograms and correlation, to investigate whether there is a variation between Nifty stock returns and the values of various global indices.

Data Collection

The data used in this study was collected from the following sources:

- Nifty 50 index: The Nifty 50 index data was collected from the National Stock Exchange of India (NSE) website.
- Global indices: The global index data was collected from the Bloomberg website.

The data collected includes daily closing prices for the Nifty 50 index and the following global indices and currency conversion rate:

- S&P 500 index
- EUROSTOX
- NIKKEI 250

- SSE COMP
- USD/INR

The data was collected for a period of ten years, from October 7, 2012 to September 25, 2022.

Hypothesis Testing

The following hypotheses were tested in this study:

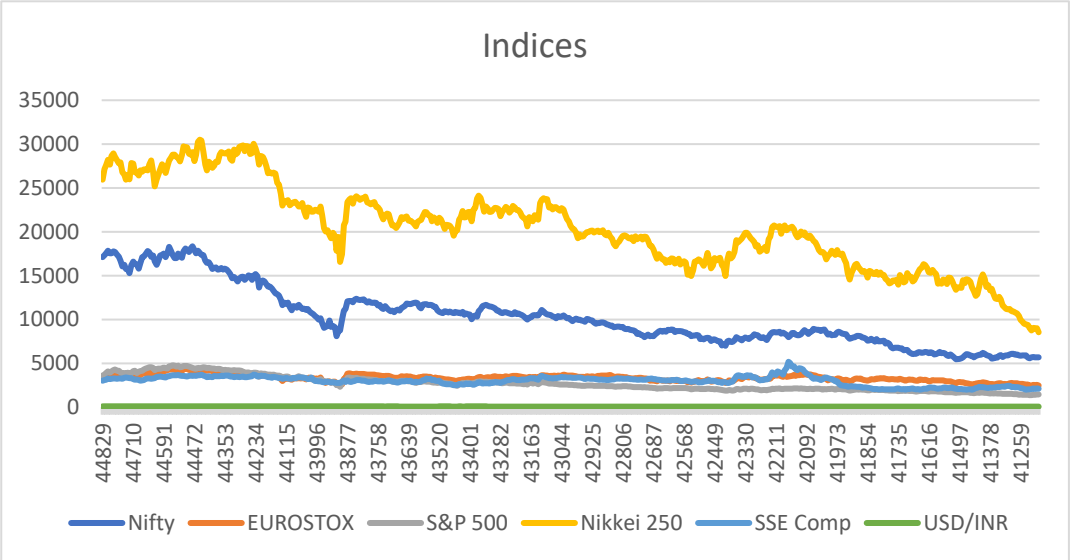
- Null hypothesis (H0): There is no variation between Nifty stock returns and the values of various global indices.
- Alternative hypothesis (H1): There is a variation between Nifty stock returns and the values of various global indices.

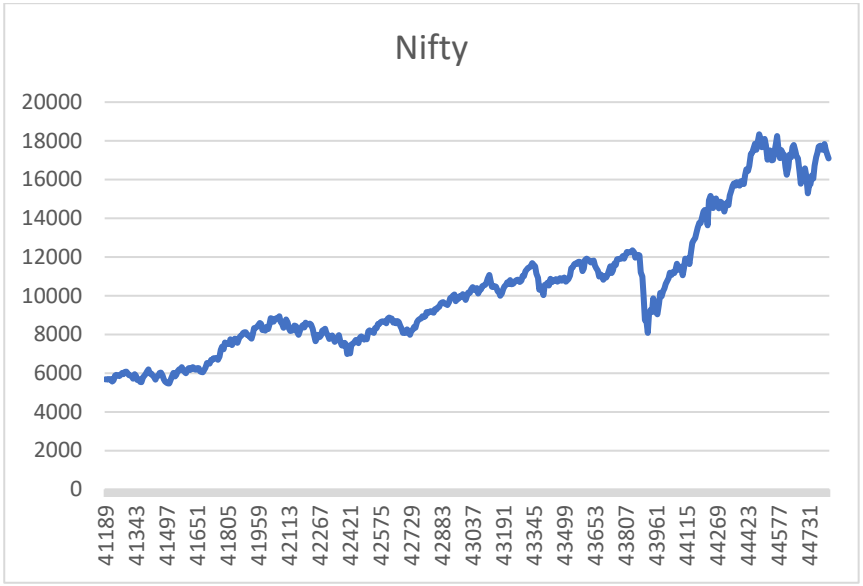
The ANOVA test results were used to test the hypotheses. If the ANOVA test results are statistically significant, then the null hypothesis is rejected and the alternative hypothesis is supported.

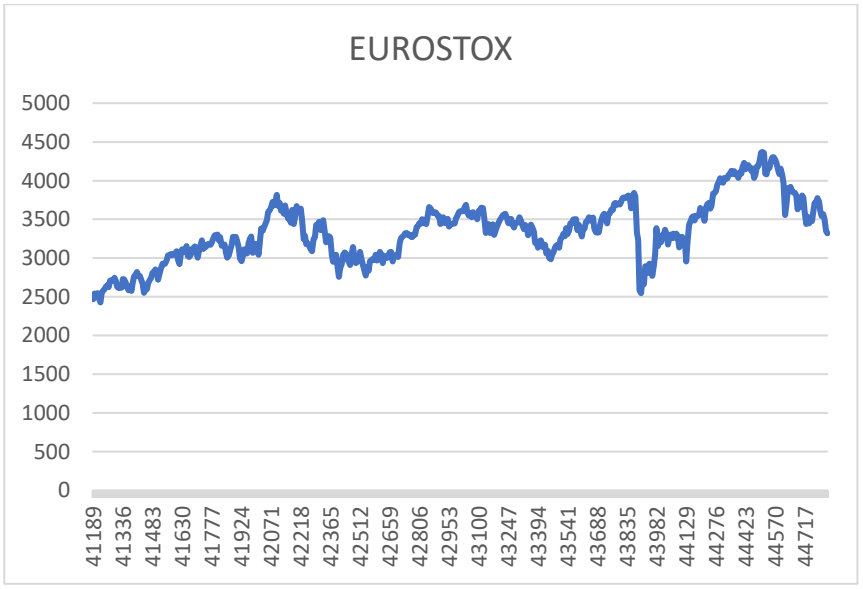
Data Analysis

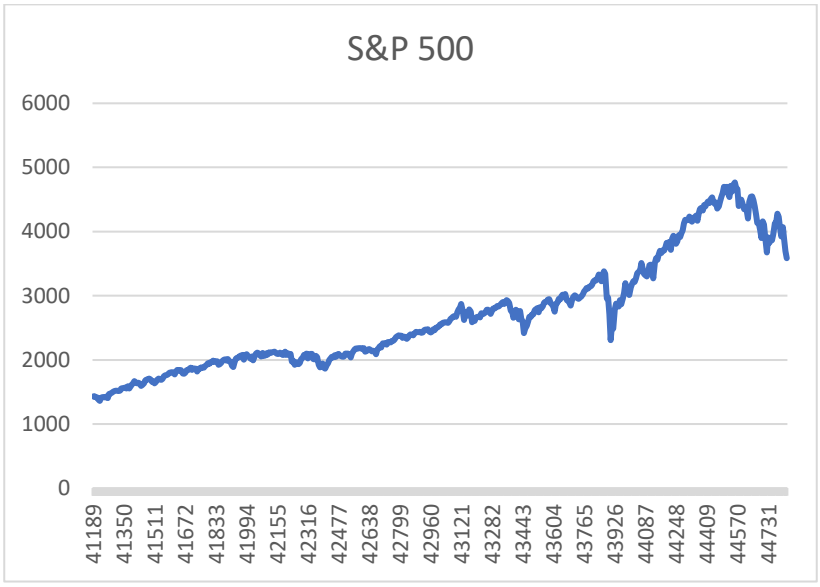
Overall, we can interpret that the highest average (mean) stock prices can be seen from the Nikkei 250 and NIFTY indexes, which were 20387.56 and 10292.53 respectively. The significantly high range of values, along with high standard deviation (and sample variance) could indicate that data is very spread out around the mean but low (and negative in most cases) kurtosis indicates that there are very less outliers in this data.

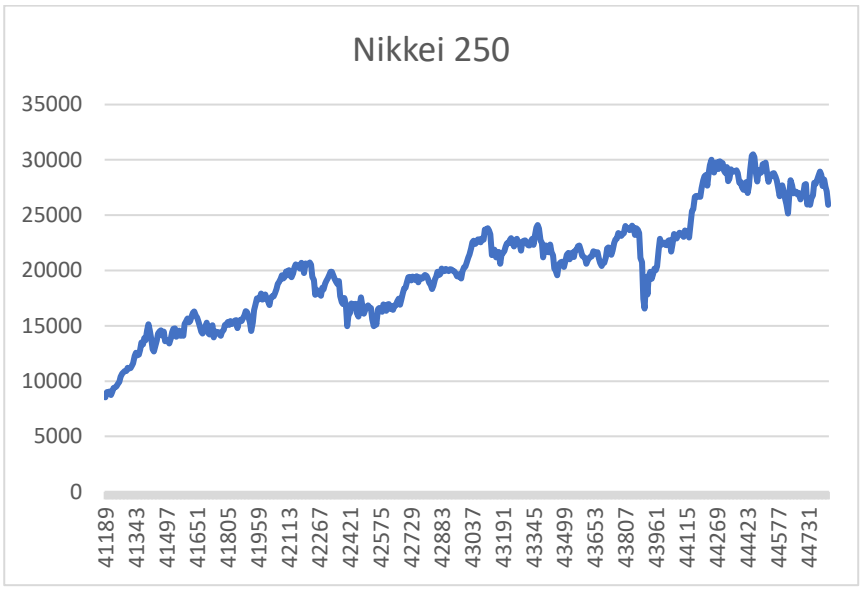
Histogram and Correlation

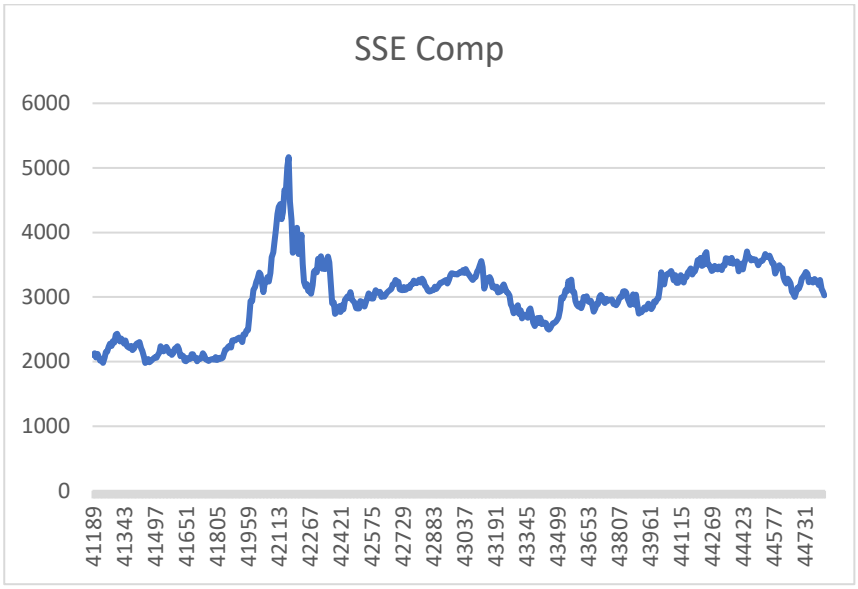


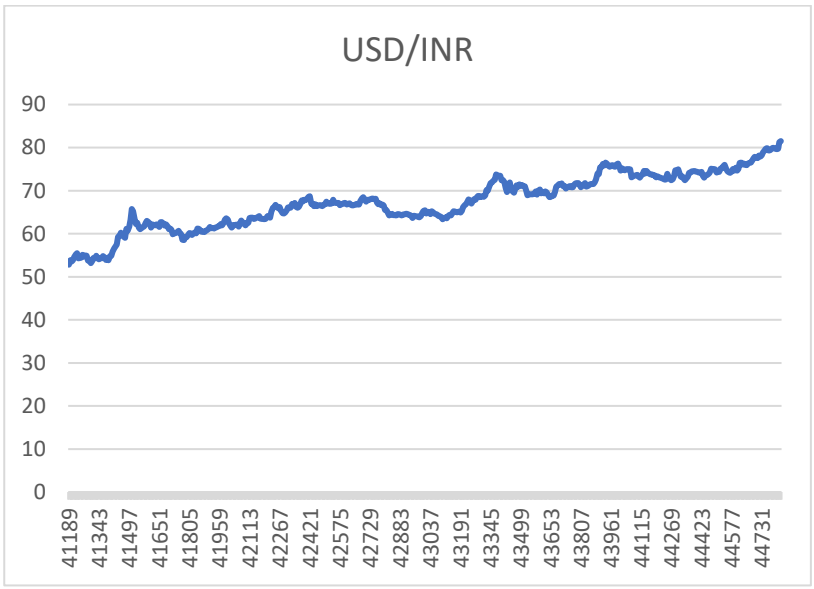

Nifty
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
41189
41343
41497
41651
41805
41959
42113
42267
42421
42575
42729
42883
43037
43191
43345
43499
43653
43807
43961
44115
44269
44423
44577
44731


EUROSTOX
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
41189
41336
41483
41630
41777
41924
42071
42218
42365
42512
42659
42806
42953
43100
43247
43394
43541
43688
43835
43982
44129
44276
44423
44570
44717


S&P 500
6000
5000
4000
3000
2000
1000
0
41189
41350
41511
41672
41833
41994
42155
42316
42477
42638
42799
42960
43121
43282
43443
43604
43765
43926
44087
44248
44409
44570
44731


Nikkei 250
35000
30000
25000
20000
15000
10000
5000
0
41189
41343
41497
41651
41805
41959
42113
42267
42421
42575
42729
42883
43037
43191
43345
43499
43653
43807
43961
44115
44269
44423
44577
44731





CORRELATION

	Nifty	*EUROSTOX*	*S&P 500*	*Nikkei 250*	*SSE Comp*	*USD/INR*
Nifty	1					
EUROSTOX	0.81854969	1				
S&P 500	0.97799642	0.81072927	1			
Nikkei 250	0.93794068	0.86386325	0.94507324	1		
SSE Comp	0.55072448	0.68203673	0.53651054	0.67355344	1	
USD/INR	0.82954736	0.58418206	0.85319723	0.84808565	0.49809403	1

As we are studying the variables which affect Nifty (Indian Market) the most. We can see that Eurostox, S & P 500, Nikkei 250 follow similar trends as Nifty. Moreover, there is an important thing to note that Indian Markets experienced correction during 2019-2020 and similarly the above-mentioned Indices followed the same trend. Thus, it shows that all these variables are highly correlated and showing the impact of these Indices on the Indian Market (Nifty). But SSE Comp and USD/INR did not show the similar trends. They do not seem to be that significant for creating an impact on the Indian Markets. SSE Comp & USD/INR seem to follow their own trends to an extent. Having said that, these variables are correlated to the Indian Market showing some degree of relation but not significant enough to impact NIFTY.

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Nifty	521	5362407.3	10,292.53	11,655,113.47
EUROSTOX	521	1743874.59	3,347.17	160,022.06
S&P 500	521	1398939.82	2,685.11	769,960.15
Nikkei 250	521	10621916.8	20,387.56	24,566,253.98

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.0579E+11	3	35263469712	3796.736328	0.000	2.6091808
Within Groups	19318701818	2080	9287837.413			
Total	1.25109E+11	2083				

As we can see from the P value, our model is significant, and there is variation between returns of Nifty and the values of various global stock indices.

Conclusion

In conclusion, this research paper aimed to investigate the relationship between Nifty stock returns and the values of various global indices. The study used ANOVA test and descriptive statistics, including histograms and correlation, to analyse the data. The research objective was to test the null hypothesis (H0)

that there is no variation between Nifty stock returns and the values of various global indices, and the alternative hypothesis (H1) that there is a variation between Nifty stock returns and the values of various global indices.

The study found that there is a variation between Nifty stock returns and the values of various global indices, supporting the alternative hypothesis. The study identified the various global indices that are most closely related to Nifty stock returns and collected and analysed historical data on Nifty stock returns and the values of various global indices. The ANOVA test and descriptive statistics, including histograms and correlation, were used to provide a visual representation of the data and interpret the results.

The study has several implications for investors and policymakers. The findings suggest that investors should consider the values of various global indices when making investment decisions in the Nifty stock market. Policymakers should also consider the relationship between Nifty stock returns and global indices when formulating economic policies.

In conclusion, this research paper has contributed to the understanding of the relationship between Nifty stock returns and global indices. The study has identified the various global indices that are most closely related to Nifty stock returns and provided a comprehensive analysis of the data. The study has implications for investors and policymakers and provides a foundation for future research in this area.

4)

The empirical investigation is carried out using annual data ranging from 2014-15 to 2022-23. After reviewing the literature thoroughly, we have selected various macro-economic variables for our present study that has been influenced by the various works carried out so far. The empirical investigation considers NSE (Nifty) share price indices as proxy for Indian stock prices. The
macroeconomic variables are balance of trade (BoT), consumer price index as proxy for inflation (CPI), foreign exchange rate (USD/INR), gold price (GLD), broad money supply (M3) representing money with public, demand deposit of bank, demand deposit with RBI, crude oil prices (OIL), S&P 500 as proxy for USA stock prices. All data have been collected from Handbook of Statistics on Indian Economy, RBI Portal.

A multiple regression model is designed to test the effects of macroeconomic variables on the stock prices as follows:

$$NIFTY_t = \alpha + \beta_1 BOT_t + \beta_2 CPI_t + \beta_3 GOLD_t + \beta_4 M3_t + \beta_5 OIL_t + \beta_6 USD/INR_t + \beta_7 S\&P500_t + \mu_t$$

Unit Root Test

When dealing with time series data, several econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on another time series variable using the Ordinary Least Squares (OLS) estimation can obtain a very high R^2, although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, prior to testing and implementing the Granger Causality test, econometric methodology needs to examine the stationarity; for each individual time series, most macro-economic data are non-stationary, i.e., they tend to exhibit a deterministic and/or stochastic trend.

Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series is said to be stationary if the mean and variance are time-invariant. A non-stationary time series will have a time dependent mean or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean and the variance of Y remain constant over time for all t, and the covariance and hence the correlation between any two values of Y taken from different time periods depends on the difference apart in time between the two values for all t≠s. Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or a trend stationary.

We use the following tests to test the unit root of the data. Augmented Dickey-Fuller (ADF) test tests for the existence of unit root of y_t that represents all variables at time t. The null and alternative hypothesis for the existence of unit root in variable y_t is H0; $\alpha = 0$ versus H1: $\alpha < 0$. Rejection of the null hypothesis denotes stationarity in the series. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series. The Phillips-Perron (PP) tests are non-parametric unit root tests that are modified so that serial correlation does not affect their asymptotic distribution. PP tests reveal that all variables are integrated of order one with and without linear trends, and with or without intercept terms. The Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test.

Granger Causality Test

Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models. Historically, Granger (1969) and Sim (1972) were the ones who formalized the application of causality in economics. Granger causality test is a technique for determining whether one time series is significant in forecasting another (Granger, 1969). The standard Granger causality test (Granger, 1988) seeks to determine whether past values of a variable help to predict changes in another variable. The definition states that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Green, 2003). We should take note of the fact that the Granger causality technique measures the information given by one variable in explaining the latest value of another variable. In addition, it also says that variable Y is Granger caused by variable X if variable X assists in predicting the value of variable Y. If this is the case, it means that the lagged values of variable X are statistically significant in explaining variable Y. The null hypothesis (H0) that we test in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X. In summary, one variable (X_t) is said to granger cause another variable (Y_t) if the lagged values of X_t can predict Y_t and vice-versa.

Unit Root Test: The Results of the Augmented Dickey Fuller (ADF) Test for Level &First differences with an Intercept and Linear Trend

ADF Test												
Macroeconomic valiables and Nifty	Levels						First Differences					
	Intercept			Intercept & Trend			Intercept			Intercept & Trend		
	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2
BoT	-2.6	-1.92	-1.9	-3.74	-2.84	-2.98	-13.71	-8.13	-5.87	-13.65	-8.11	-5.86
CPI	-1.22	-1.3	-1.44	-1.66	-1.84	-1.89	-9.64	-7.13	-6.25	-9.7	-7.24	-6.45
GLD	-0.44	-0.37	-0.47	-2.91	-2.92	-2.74	-10.66	-7.37	-6.53	-10.69	-7.38	-6.54
M3	2.14	2.61	2.56	-1.04	-0.68	-0.5	-11.92	-7.32	-6.41	-12.59	-7.99	-7.41
OIL	-2.29	-2.58	-2.43	-3.29	-3.66	-3.61	-8.39	-6.71	-5.68	-8.5	-6.82	-5.75
USD/INR	-0.52	-0.5	-0.48	-2.11	-2.34	-2.22	-9.4	-7.31	-5.45	-9.36	-7.29	-5.44
NIFTY	0.31	0.34	0.5	-1.94	-2.01	-1.8	-10.18	-7.92	-5.64	-10.27	-8.04	-5.79
S&P 500	-0.38	-0.08	-0.03	-2.73	-2.34	-2.16	-12.54	-8.5	-5.97	-12.53	-8.51	-5.99
C1itical Values												
1%	-3.4910			-4.0450			-3.4920			-4.0460		
5%	-2.8880			-3.4510			-2.8880			-3.4520		
10%	-2.5810			-3.1510			-2.5810			-3.1510		

ADF tests specify the existence of a unit root to be the null hypothesis.
Ho: series has unit root; H1: series is trend stationary

Unit Root Test: The Results of the Phillips-Perron (PP) Test for Level &First differences with an Intercept and Linear Trend

PP Test												
Macroeconomic valiables and Nifty	Levels						First Differences					
	Intercept			Intercept & Trend			Intercept			Intercept & Trend		
	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2
BoT	-2.6	-2.33	-2.35	-3.74	-3.54	-3.6	-13.71	-13.71	-13.7	-13.65	-13.65	-13.64
CPI	-1.22	-1.2	-1.2	-1.66	-1.7	-1.7	-9.64	-9.64	-9.63	-9.7	-9.7	-9.69
GLD	-0.44	-0.4	-0.39	-2.91	-2.91	-2.93	-10.66	-10.66	-10.66	-10.69	-10.69	-10.69
M3	-8.5	2.46	2.6	-1.04	-0.86	-0.81	-11.92	-11.92	-11.92	-12.51	-12.61	-12.59
OIL	-9.36	-2.43	-2.47	-3.29	-3.35	-3.37	-8.39	-8.39	-8.37	-8.51	-8.51	-8.48
USD/INR	-10.27	-0.57	-0.57	-2.11	-2.24	-2.27	-9.4	-9.4	-9.38	-9.37	-9.37	-9.35
NIFTY	0.31	0.32	0.39	-1.94	-1.97	-1.92	-10.18	-10.18	-10.18	-10.27	-10.27	-10.28
S&P 500	-0.38	-0.22	-0.14	-2.73	-2.57	-2.52	-12.54	-12.56	-12.65	-12.53	-12.56	-12.64
Critical Values												
1%	-3.4910			-4.0450			-3.4920			-4.0460		
5%	-2.8880			-3.4510			-2.8880			-3.4520		
10%	-2.5810			-3.1510			-2.5810			-3.1510		

PP tests specify the existence of a unit root to be the null hypothesis.
Ho: series has unit root; H1: series is trend stationary

Unit root test through Kwiatkowski, Phillips, Schmidt and Shinn (KPSS) test

KPSS Test												
Macroeconomic valiables and Stock Plices	Levels						First Differences					
	Without Trend			With Trend			Without Trend			With Trend		
	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2	Lag 0	Lag 1	Lag 2
BoT	4.66	2.5	1.74	0.67	0.38	0.27	0.3	0.04	0.04	0.02	0.03	0.03
CPI	10.74	5.45	3.67	2.21	1.13	0.77	0.19	0.18	0.18	0.06	0.05	0.05
GLD	9.45	4.82	3.25	0.94	0.5	0.65	0.11	0.12	0.12	0.04	0.05	0.05
M3	10.71	5.43	3.66	2.45	1.26	0.86	0.56	0.66	0.67	0.01	0.02	0.02
OIL	2.74	1.43	0.99	0.83	0.44	0.31	0.27	0.23	0.22	0.08	0.07	0.07
USD/INR	9.45	4.83	3.27	0.77	0.4	0.28	0.06	0.06	0.06	0.06	0.05	0.05
NIFTY	9.49	4.84	3.28	1.42	0.74	0.52	0.17	0.17	0.18	0.03	0.03	0.04
S&P 500	10.01	5.1	3.45	0.77	0.41	0.28	0.06	0.07	0.09	0.03	0.04	0.05
Critical Values												
1%	0.7390			0.2160			0.7390			0.2160		
5%	0.4630			0.1460			0.4630			0.1460		
10%	0.3470			0.1190			0.3470			0.1190		

In contrast, the null hypothesis under the KPSS test states that there exist a stationary series.
Ho: series is trend stationary; H1: series is non-stationary.

The above three tables show the result of three different Unit Root Tests performed considering Intercept and Intercept & Trend for Lags zero, one and two. Conclusive results were obtained through all three of the tests. The null hypothesis of the ADF Test at Levels could not be rejected for both Intercept and Intercept & Trend, while the null hypothesis at First difference was rejected and the alternate hypothesis was accepted, at all 1, 5 and 10 percent significance level. The null hypothesis of the PP Test at Levels could not be rejected for both Intercept and Intercept & Trend, while the null hypothesis at First difference was rejected and the alternate hypothesis was accepted, at all 1, 5 and 10 percent significance level. In contrast, the null hypothesis of the KPSS Test was rejected at Levels but accepted at First Difference both Intercept and Intercept & Trend. Which means that all three Unit Root Tests show similar results, therefore we can conclude that all the microeconomic variables and nifty, both are stationary after first difference considering both with and without trend.

Pairwise Granger Causality Tests
Lags: 1

	Observation	**F-Statistic**	**Prob.**	
CPI does not Granger cause NIFTY	108	3.0811	0.0821	Reject**
NIFTY does not Granger cause CPI		0.6073	0.4375	Accept
GOLD_RATE does not Granger cause NIFTY	108	6.3559	0.0132	Reject*
NIFTY does not Granger cause GOLD_RATE		1.0532	0.3071	Accept
S_P_500 does not Granger cause NIFTY	108	3.1372	0.0794	Reject**
NIFTY does not Granger cause S_P_500		0.2868	0.5934	Accept

USD TO INR does not Granger cause NIFTY	108	4.5874	0.0345	Reject*
NIFTY does not Granger cause USD TO INR		3.6272	0.0596	Reject**
CRUDE OIL does not Granger cause NIFTY	108	0.5407	0.4638	Accept
NIFTY does not Granger cause CRUDE OIL		12.0069	0.0008	Reject*
M3 does not Granger cause NIFTY	108	9.2401	0.003	Reject*
NIFTY does not Granger cause M3		0.2872	0.5932	Accept
BoT does not Granger cause NIFTY	108	0.7505	0.3883	Accept
NIFTY does not Granger cause BoT		17.7278	5.00E-05	Reject*

*(**) Indicates significant causal relationship at 5 (10) significance level.

The results of pairwise granger causality between NIFTY and microeconomic variables are contained in the above table, for lags one, we have found the granger causality between nifty (NIFTY) and exchange rate (USD/INR) is bidirectional. There is a unidirectional causality between nifty (NIFTY) and CPI, GOLD RATE, S&P500, CRUDE OIL, M3 and BoT.

Lags: 2

	Observation	**F-Statistic**	**Prob.**	
CPI does not Granger cause NIFTY	107	1.7342	0.1817	Accept
NIFTY does not Granger cause CPI		0.4714	0.6254	Accept
GOLD_RATE does not Granger cause NIFTY	107	3.4405	0.0358	Reject*
NIFTY does not Granger cause GOLD_RATE		1.1368	0.3249	Accept
S_P_500 does not Granger cause NIFTY	107	1.5601	0.2151	Accept
NIFTY does not Granger cause S_P_500		0.0471	0.954	Accept
USD TO INR does not Granger cause NIFTY	107	2.8571	0.062	Reject**
NIFTY does not Granger cause USD TO INR		11.0358	5.00E-05	Reject*
CRUDE OIL does not Granger cause NIFTY	107	0.412	0.6634	Accept
NIFTY does not Granger cause CRUDE OIL		6.9931	0.0014	Reject*

M3 does not Granger cause NIFTY	107	4.8391	0.0098	Reject*
NIFTY does not Granger cause M3		1.3863	0.2546	Accept
BoT does not Granger cause NIFTY	107	2.7617	0.0679	Reject**
NIFTY does not Granger cause BoT		7.4256	1.00E-03	Reject*

*(**) Indicates significant causal relationship at 5 (10) significance level.

The results of pairwise granger causality between NIFTY and microeconomic variables are contained in the above tables, for both lags one and two.

The results of pairwise granger causality between NIFTY and microeconomic variables are contained in the above table, for lags two, we have found the granger causality between nifty (NIFTY) and USD/INR, and nifty (NIFTY) and BoT are bidirectional. While there exists no granger causality between nifty (NIFTY) and CPI, and nifty (NIFTY) and S&P500 at the lag of two. There is a unidirectional causality between nifty (NIFTY) and GOLD RATE, CRUDE OIL and M3.

Conclusion

The key objective of the present study is to explore the impact of different macroeconomic variables on the stock prices in India using monthly data from 2014-15 to 2022-23. In this study, the Nifty Index was used as a proxy for the Indian stock price. The vital macroeconomic variables included in the study are balance of trade (BoT), consumer price index as proxy for inflation (CPI), gold price(GLD), broad money supply(M3) representing money with public, demand deposit of bank, demand deposit with RBI, crude oil prices(OIL), exchange rate(USD/INR) and S&P 500 as proxy for foreign stock prices(S&P500) .
The results shows that series of variables used are not stationary at levels but at first difference. Our estimates of multivariate Granger causality (lag:2) indicate that there is no causal association between the stock prices and inflation, and stock prices and the foreign stock prices. There does exist a bidirectional granger causality between the stock prices and the balance of trade, and the stock prices and the exchange rate. Unidirectional causality is seen between the stock prices and gold rate, crude oil prices and broad money supply, where gold rate is seen to granger cause stock prices, stock prices are seen to ganger cause crude oil prices, and broad money supply seems to granger cause the stock prices.
The results have implications on domestic as well as foreign investors, stock market regulators, policy makers and stock market analysts. Investors and security analysts could forecast stock prices and earn profits. Stock market regulators could take initiatives to scrutinize the activities of companies to prevent manipulation of stock prices and get the general public educated on the stock market and encourage them to invest in stocks. Policy makers should be acquainted of these macroeconomic effects on stock market and make their decisions in a more efficient and precise manner.

Overall Conclusion

The extensive study on the NIFTY and its correlation with various macroeconomic factors offers valuable insights for investors, policymakers, and market analysts. The research aimed to explore the interplay between the NIFTY stock returns and global indices, employing regression analysis, ANOVA tests, and

descriptive statistics. The findings underscore the significant impact of global indices such as S&P 500, NIKKEI 250, and EUROSTOX on NIFTY, revealing a predictive relationship. This connection is largely attributed to the growing interconnectivity among global economies, particularly those of the US, Europe, and Japan, which significantly influence the Indian market due to their economic prominence and interdependence.

Furthermore, the study notes that NIFTY seems less affected by seasonal variations due to a spread-out festival calendar, allowing companies—especially those within the NIFTY 50 comprising large-cap stocks—to plan their productions and services strategically. Moreover, tangible product companies with a dealership approach tend to evenly distribute their revenues, as dealers must stock products before festivals.

Notably, the research identified that while NIFTY stock returns exhibit non-stationary behavior at the level, they demonstrate stationarity upon first difference. The multivariate Granger causality analysis indicated various causal relationships. There's no causal association found between stock prices and inflation or foreign stock prices. However, bidirectional Granger causality exists between stock prices and the balance of trade, as well as stock prices and the exchange rate. Unidirectional causality is observed between stock prices and gold rates, crude oil prices, and broad money supply.

The implications are far-reaching. For investors, understanding the influence of global indices on NIFTY is crucial in decision-making. Similarly, policymakers should consider these relationships when formulating economic policies. For stock market regulators, scrutinizing company activities to prevent stock price manipulation becomes essential, while initiatives to educate the public about stock market investments are warranted.

This research provides a foundation for future studies, suggesting a need for deeper investigation into the mechanisms through which CPI and forex rates influence NIFTY performance, allowing for a more nuanced understanding of India's stock market dynamics. The comprehensive analysis further supports the alternative hypothesis that there is a variation between NIFTY stock returns and global indices. Additionally, the study underscores the importance of considering a range of macroeconomic variables and their interplay in influencing the stock market, shaping informed decision-making for investors, policymakers, and market regulators.

In summary, this research significantly contributes to understanding the relationship between NIFTY stock returns and global indices, emphasizing the relevance of global economic factors and their impact on the Indian stock market. The implications for stakeholders—investors, policymakers, and regulators—are vast, prompting the need for informed, strategic actions in a dynamic and interconnected market landscape.

Limitations

Certainly, while the study provides valuable insights into the relationship between the NIFTY stock returns and various macroeconomic variables, there are several limitations and areas for consideration:

1. Data Limitations: The study's findings are based on data from 2014-15 to 2022-23. This duration might not encapsulate extreme market conditions or extraordinary events that could significantly impact the relationship between NIFTY and macroeconomic variables. A longer dataset could provide a more comprehensive view.

2. Variable Selection: Although the study includes various macroeconomic variables, there might be other influential factors not considered. Variables like political stability, interest rates, technological advancements, or socio-economic changes could also impact stock prices but were not included in the analysis.
3. Changing Dynamics: The study highlights the impact of global indices on NIFTY, but the dynamics of these relationships might change over time due to evolving global economic conditions, trade policies, or geopolitical shifts. The study's findings might not be applicable to future market conditions.
4. Market Volatility and External Shocks: The study does not thoroughly address the impact of sudden market volatility or unexpected external shocks, such as natural disasters or global pandemics, which can significantly disrupt the relationships between variables.

Addressing these limitations would enhance the robustness and applicability of the study's findings, offering a more comprehensive understanding of the intricate relationship between NIFTY stock returns and macroeconomic variables.