

A Study On Causal Relationship Between Macro Economic Variables And Indian Stock Market

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ABSTRACT

This study explores into the intricate relationship between macroeconomic variables and the Nifty indices in India from 2018 to 2022. The study aims to determine how variables like interest rate, consumer price index, exchange rate, cash reserve ratio, and Treasury bill affect Nifty indices by using analytical research methods like correlation analysis, linear regression, augmented Dickey Fuller test, lag determination, and Granger causality test. Through a comprehensive review of literature, the research establishes a foundation for understanding the dynamics between macroeconomic indicators and stock market performance. The consumer price index has the largest impact on the Nifty indexes, which show strong relationships with important macroeconomic indicators. Furthermore, linear correlations between the Nifty indexes and the consumer price index and the interest rate are found via Granger causality tests. These findings have significance for investors and policymakers alike, emphasizing how crucial it is to take macroeconomic factors into account when making investments and formulating policies. As a result, this study helps stakeholders to navigate the complexities of the Indian stock market by providing insightful information about the relationship between macroeconomic conditions and stock market performance.

Keywords: Macroeconomic variables, Stock market performance, Investment decisions, Economic indicators.

INTRODUCTION

The stock market, also known as the equity market, involves the purchase and sale of securities through exchanges or over-the-counter. It is divided into primary market, where companies raise capital through initial public offerings, and secondary market, where investors sell securities for cash. The goal is to maximize returns by buying and selling stocks before prices rise or decrease, with companies not declaring dividends unless they have made profits.

Stock Exchange

Stock Exchanges in India, including Bombay and National, allow brokers and traders to buy and sell securities, issue and redeem instruments, and facilitate capital events like income and dividend payments.

National Stock Exchange

The National Stock Exchange of India (NSE), established in 1992, is India's largest financial market. It ranks fourth globally in equity trading volume. Trading began in 1994, covering 12 sectors and 50 stocks across 50 stocks.

Macroeconomics

Macroeconomics is a comprehensive study of the economy, examining national and international levels, including Gross Domestic Product, resource allocation, international trade, fiscal and monetary policies,

inflation, interest rates, and unemployment. It is rooted in microeconomics and is used by governments and agencies to construct economic and fiscal policies.

Industry Profile

The securities market is a crucial global financial system, enabling companies and governments to raise capital through issuing securities. Regulated by agencies, it's interconnected and can impact financial stability. Technological advancements have created new trading platforms and financial products, creating both opportunities and challenges.

Statement of the problem

This study examines the impact of macroeconomic variables on Nifty indices from 2018-2022, focusing on interest rate, consumer price index, exchange rate, cash reserve ratio, and Treasury bill. The findings could be crucial for investors and policymakers.

Scope of the study

The study aims to analyze the impact of macroeconomic variables on the Nifty indices from 2018-2022, identifying key drivers and analyzing data using econometric techniques like multiple regression and time series analysis. The project aims to provide insights into the Nifty indices' drivers and offer recommendations for investors and policymakers.

Objectives of the study

- To analyze the relationship among Interest rate, Consumer price index, Exchange rate, Cash reserve ratio, Treasury bill and Nifty Indices.
- To study the impact of Interest rate, Consumer price index, Exchange rate, Cash reserve ratio and Treasury bill on Nifty Indices.
- To study the pair wise causality between Nifty indices and Consumer price index, Exchange rate, Cash reserve ratio and Treasury bill.

Limitations of the study

- The study was limited to Nifty during the study period January 2018 – December 2022.
- The analysis is purely based on Secondary data available.
- The Macroeconomic variables which we have selected are limited to 5.

II. REVIEW OF LITERATURE

Ali (2023) study explores the long-run equilibrium, short-run dynamics adjustment, and causal relationship between DSE share price index and macroeconomic variables using co integration test, VECM, and Granger causality test, highlighting implications for investors, policymakers, and academicians.

Jasvinderkaur et al (2022) study examines the relationship between sustainable stock market index and macroeconomic variables in India, using data from 2013-2020. Findings suggest a long-run equilibrium linkage between macroeconomic variables and sustainable stock prices, suggesting investors can diversify portfolios accordingly.

Dube (2021) study on Zimbabwe's stock market development found no regression violations and co-integration between macroeconomic variables. The study found a bidirectional relationship between stock market capitalization and exchange rate, no causality between real GDP and stock market development, and no causality between inflation and stock market capitalization. The study recommends government policies to stabilize Zimbabwe's macroeconomic environment and promote transparency and accountability.

Chang (2020) investigates the impact of macroeconomic variables on stock prices and indices under different market conditions. Industrial production index, trade balance, and foreign direct investment significantly influence stock prices. However, exchange rate, interest rate, consumer price index, and foreign direct investment vary across different market states.

John (2019) study explores the impact of macroeconomic variables on Nigeria's stock market performance. Four variables were studied: money supply, interest rate, exchange rate, and inflation rate. Results showed that money supply had a significant positive effect, while interest rate had a negative effect. The study also found a long-run relationship between macroeconomic indicators and stock market performance.

RESEARCH METHODOLOGY

Analytical research design is utilized to quantify the relationship between variables and analyze their cause and effect. This research utilizes secondary data from sources like Yahoo Finance and RBI database, which are easily accessible and shared publicly, making it a comprehensive analysis. The research was conducted over five years from 2018 to 2022, utilizing data collected and utilized. Collected data can be analysed with the help of statistical tools like Correlation, Regression, Granger Causality

DATA ANALYSIS AND INTERPRETATION

Correlation Analysis

Hypothesis

H₀: There is no significant relationship among the and Nifty Indices.

H₁: There is significant relationship among the and Nifty Indices.

		NIFTY	INT RATE	CPI	FOREX	CRR	T BILL
NIFTY	Pearson Correlation	1	-.431**	.889**	.682**	.448**	-.360**
	Sig. (2-tailed)		.001	.000	.000	.000	.005
	N	60	60	60	60	60	60
INT_RATE	Pearson Correlation	-.431**	1	-.577**	-.364**	.481**	.984**
	Sig. (2-tailed)	.001		.000	.004	.000	.000
	N	60	60	60	60	60	60
CPI	Pearson Correlation	.889**	-.577**	1	.889**	.204	-.513**
	Sig. (2-tailed)	.000	.000		.000	.119	.000
	N	60	60	60	60	60	60
FOREX	Pearson Correlation	.682**	-.364**	.889**	1	.140	-.322*
	Sig. (2-tailed)	.000	.004	.000		.288	.012
	N	60	60	60	60	60	60
CRR	Pearson Correlation	.448**	.481**	.204	.140	1	.565**
	Sig. (2-tailed)	.000	.000	.119	.288		.000
	N	60	60	60	60	60	60
T_BILL	Pearson Correlation	-.360**	.984**	-.513**	-.322*	.565**	1
	Sig. (2-tailed)	.005	.000	.000	.012	.000	
	N	60	60	60	60	60	60

The study reveals a significant relationship between the Nifty indices, interest rate, and Treasury bill, with p values below 0.05. The relationship between the indices and the exchange rate and cash reserve ratio is positive, while the consumer price index has the highest correlation with the indices at 0.889.

Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.959 ^a	.919	.911	867.85763

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	459928931.289	5	91985786.258	122.130	.000 ^b
	Residual	40671550.522	54	753176.862		
	Total	500600481.811	59			

Coefficients

Model	Beta	t	Sig. Value
Interest Rate	0.550	2.026	.048
Consumer price index	1.216	7.080	.000
Exchange Rate	-0.447	-3.700	.001
Cash Reserve ratio	0.348	4.062	.000
Treasury bill	-0.619	-2.246	.029

*Dependent variable -Nifty indices

The study finds that the Consumer Price Index, Foreign Exchange Rate, and Cash Reserve Ratio have a significant impact on the Nifty Indices. The p-values for Interest rate and Treasury Bill are less than critical P-value 0.05, indicating no impact. The positive beta values indicate that when these variables rise, so will the Nifty indices, while negative beta values indicate that as these variables rise, the indices will fall.

AUGMENTED DICKEY FULLER TEST

The Augmented Dickey Fuller Test (ADF) is a statistical method used to check the stationarity of data series by comparing absolute test values and critical values at a 95% confidence interval. If the criteria are met, the test is repeated at level I.

VARIABLES	ADF at I(0)			ADF at I(1)		
	Calculated Values	Significant Values at 5%	P-value	Calculated Values	Significant Values at 5%	P-value
NIFTY	-0.3296	-2.8910	0.9136	-7.6729	-2.8910	0.0000
INTEREST RATE	-1.4187	-2.8910	0.5668	-5.2598	-2.8910	0.0000
CONSUMER PRICE INDEX	-0.0171	-2.8910	0.9528	-5.3056	-2.8910	0.0000
EXCHANGE RATE	-1.0987	-2.8910	0.7105	-8.2435	-2.8910	0.0000
CASH RESERVE RATIO	-1.0836	-2.8910	0.7167	-7.5874	-2.8910	0.0000
TREASURY BILL	-1.3016	-2.8910	0.6230	-5.0150	-2.8910	0.0001

Interpretation of ADF results:

The study found non-stationarity in all variables at ADF I (0), with calculated values of nifty, interest rate, consumer price index, exchange rate, cash reserve ratio, and Treasury Bill all lower than the critical values. The null hypothesis was accepted, indicating that the absolute values of all variables were higher than test critical values. The p-values of all variables were all smaller than 0.05, rejecting the null hypothesis and proving stationarity. This implies that co integration tests can be performed in selected data series after first differencing, confirming the stationarity of variables at I (1).

LAG DETERMINATION

The Lag model is a time series data model that uses a regression equation to predict the current values of a dependent variable using the vector auto regression (VAR) lag order selection method.

- Sequential Modified Likelihood Ratio (LR) Test Statistic
- Final Prediction Error (FPE)
- Akaike Information Criterion (AIC)
- Schwarz Information Criterion (SIC)
- Hannan-Quinn Information Criterion (HQ)

The optimum lag order, determined using Schwarz information criteria and Hannan-Quinn Information Criterion, is 1, the minimum value among other criteria, allowing for further Granger causality test calculation.

GRANGER CAUSALITY

The study investigates the cause-effect relationship between interest rate, consumer price index, exchange rate, cash reserve ratio, Treasury bill, and Nifty Indices using granger causality test to determine stationary and appropriate lag length.

Hypothesis

H₀ - Returns of Nifty Indices is not caused by interest rate, Consumer price index, Exchange rate, Cash reserve ratio, and Treasury bill or vice versa.

H₁ -Returns of Nifty Indices is caused by Interest rate, Consumer price index, Exchange rate, Cash reserve ratio, and Treasury bill or vice versa.

Null Hypothesis	Obs	Lag	F Statistic	P value	Inference
D(Int Rate) does not Granger Cause D(NIFTY)	58	1	0.02335	0.8791	Accept
D(NIFTY) does not Granger Cause D(IR)	58	1	15.8120	0.0002	Reject
D(CPI) does not Granger Cause D(NIFTY)	58	1	1.17550	0.2830	Accept
D(NIFTY) does not Granger Cause D(CPI)	58	1	9.20189	0.0037	Reject
D(Forex Rate) does not Granger Cause D(NIFTY)	58	1	0.20684	0.6510	Accept
D(NIFTY) does not Granger Cause D(Forex Rate)	58	1	0.08173	0.7760	Accept

D(CRR) does not Granger Cause D(NIFTY)	58	1	3.92522	0.0526	Accept
D(NIFTY) does not Granger Cause D(CRR)	58	1	1.27646	0.2635	Accept
D(TB) does not Granger Cause D(NIFTY)	58	1	2.69587	0.1063	Accept
D(NIFTY) does not Granger Cause D(TB)	58	1	1.56848	0.2157	Accept

The F statistics table shows that for every insignificant p-value greater than 0.05, the null hypothesis is accepted, indicating that the corresponding variable does not granger cause other corresponding variables. Only two instances out of eight of Nifty causing interest rate and consumer price index have p-values smaller than 0.05, indicating unidirectional causality. Therefore, future interest rate and consumer price index values can be estimated using past Nifty figures, but vice versa is not true.

FINDINGS AND CONCLUSION

- The analysis reveals a strong correlation between interest rate, consumer price index, exchange rate, cash reserve ratio, Treasury bill, and Nifty Indices, with some variables being positively and negatively correlated. The analysis examines the impact of interest rate, consumer price index, exchange rate, cash reserve ratio, and Treasury bill on Nifty Indices using linear regression, finding that consumer price index has the highest impact. The analysis reveals a unidirectional granger causality between Nifty indices to interest rate and Nifty indices to consumer price index, despite other variables not granger causing nifty indices, fulfilling the Granger Causality test.

Conclusion

The research reveals that macroeconomic variables significantly influence the Nifty indices price, with Consumer Price Index being the most important factor for investors to consider. Other variables like interest rate, exchange rate, cash reserve ratio, and Treasury bill developments may also impact the price. The study suggests that investors and securities companies should consider macroeconomic variables like interest rate, consumer price index, exchange rate, cash reserve ratio, and Treasury bill before investing in the Indian stock market.

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