

# An Empirical Study on Impact of Macroeconomic Factors on Nifty

Cenia Cidar<sup>1</sup> & Stella Mary<sup>2</sup>

<sup>1</sup>Student, Christ University

<sup>2</sup>Assistant Professor, Department of Management Studies, Christ University Bangalore.

---

**Abstract:** *This paper aims at studying the relationships between the Indian stock market index Nifty and five macroeconomic variables, namely, interest rate, Gold Price, Forex Rate, Crude oil and inflation over the period 2001 to 2015. Johansen's co-integration test was done to analyse the long-run equilibrium relationship between the stock market index and the macroeconomic variables.*

**Keywords:** *Stock Market Index, Macroeconomic Variables, Co-integration Test,*

## Introduction

Stock markets play a vital role in growing industries and with respect to commerce of a country which eventually affects the economy. Therefore its importance has been well acknowledged in industries and investors perspectives. The stock market obtains long-term capital to the listed firms by pooling funds from different investors and thereby allows them to expand in business. The investors watch the performance of stock markets by observing the composite market index, before investing funds.

Several domestic and international factors directly or indirectly affect the performance of the stock market. The relationship between macroeconomic variables and a developed stock market has been well documented in literature. The paper extends the existing literature in the Indian context. This study takes into consideration five macroeconomic variables - interest rate, Gold Price, Forex Rate, Crude oil and inflation and CNX Nifty.

Dubravka Benaković and Petra Posedel analysed the returns on 14 stocks of the Croatian capital market. Inflation, industrial production, interest rates, market index and oil prices were the macroeconomic factors that were considered. Multiple regression was used to estimate sensitivities of these stocks to these factors which are measured by beta coefficients. Further the estimated beta coefficients were used as independent variables and stock returns as dependent variables in cross-sectional regression. This results in helping obtain the time series of risk premiums for each macroeconomic factor. The results showed that the market index had the largest statistical significance for all stocks and also had

positive relation to stock returns. Interest rates, oil prices and industrial production showed positive relation to stock returns, whereas inflation had a negative influence on a stock return.

Mahmoud Ramadan Barakat et al studied the relationship between the stock market and macroeconomic factors in two emerging economies namely Egypt and Tunisia. The variables considered were deposit rate as proxy for Interest rate, CPI as proxy for inflation, local currency per US dollar as proxy for exchange rate, M2 as proxy for money supply, and finally market index as proxy for the stock market. The tests conducted were unit root test, Augmented Dicky Fuller (ADF), Vector Auto Regression (VAR) to select the optimal lag length, co-integration test, and Granger causality test. It was exhibited that interest rate, exchange rate, CPI and money supply have a relationship with the stock market either a long run relationship or a causal relation in both Egypt and Tunisia.

Dr.Venkatraja.B in his paper observes the relationship between the Indian stock market performance (BSE Sensex) and five macroeconomic variables, namely, index of industrial production, wholesale price index, gold price, foreign institutional investment and real effective exchange rate . Multiple regression technique is used for this purpose, It is observed that any variation in the value of WPI,IIP,FII and REER has strong positive influence on the BSE stock market performance. Furthermore, the coefficients of all the variables except IIP are statistically significant. Their conclusion states that inflation, inflow of foreign institutional investment, exchange rate and gold price impact the Indian stock market performance significantly.

Chen et al. (1986) observed a few macroeconomic variables and their influence on stock market returns. They modeled equity return as a function of macro variables and non-equity assets returns. It was found that the macro-economic variables such as industrial production anticipated and unanticipated inflation, yield spread between the long and short term government bonds explained the stock returns.

Ratanapakorn and Sharma (2007) studied the short-run and long run relationship between the US stock price index and macroeconomic variables. Quarterly data for the period of 1975 to 1999 was used. Johansen's co-integration technique and vector error correction model were used to find that the stock prices are influenced positively by industrial production inflation money supply short term interest rate and also with the exchange rate and influenced negatively by long term interest rate. Causality analysis showed that every macroeconomic variable considered affected the stock prices in the long term.

Yet another paper used vector error correction model (VECM) to examine the relationship between stock market returns in Japan (Mukherjee and Naka (1995)) and a set of six macroeconomic variables such as exchange rate, inflation, money supply, industrial production index, the long-term government bond rate and call money rate. It was found that the stock market was co-integrated with these set of variables implying a long-run equilibrium relationship between the stock market return and the selected macroeconomic variables.

The paper by Mookerjee and Yu (1997) analyzed the relation between Singapore stock returns and four macroeconomic variables, namely narrow money supply, broad moneysupply, exchange rates and foreign exchange reserves from monthly data of October 1984 to April 1993. It was observed that both narrow and broadmoney supply and foreign exchange reserves showed a long run relationship with stock prices whereas exchange rates did not.

Wongbampo and Sharma (2002) investigated the relationship between stock returns in 5-Asian countries viz. Malaysia,Indonesia, Philippines, Singapore and Thailand using five macroeconomic variables GNP, inflation, money supply, interest rate, and exchange rate. The data used was monthly data for the period of 1985 to 1996. It was found that, in the long run growth in output positively influenced all the five stock price indexes whereas aggregate price level had a negative impact.

The paper by Maysami et al. (2004) explored the relationship between the macroeconomic variables and sectorwise stock indices in Singapore using monthly data from January 1989 to December 2001. Johansen co-integration and VECM were used to find a long-run equilibrium relationship between the Singapore stockmarket and the macroeconomic variable tested.

Gan et al. (2006) studied the relationships between New Zealand stock market index and a set of seven macroeconomic variables during the time period from January 1990 to January 2003. Co-integration

and Granger causality test revealed that a long term relationship between New Zealand's stock market index and the macroeconomic variables exists. Their results indicated that interest rate, money supply and real GDP consistently determined the New Zealand stock market prices.

The effect of exchange rate and oil price on stock market returns for BRIC nations was examined by Robert (2008) using monthly data from March 1999 to June 2006. It was concluded that there was no significant relationship between present and past market returns with macroeconomic variables. This implied that the markets of Brazil, Russia, India and China had poor market efficiency.

Aggarwal (1981) investigated the effect of changes in exchange rates on the stock prices of USA. The study used floating rate monthly data of 4 years from 1974 to 1978 for conducting the analysis. The results of the study found that there is a positive and significant relationship between US stock returns and the US exchange rates.

Solnik (1987) studied and investigated the influence of economic variables including interest rates, foreign exchange rates and the changes in inflation rates on stock exchange. For this analysis the study used western countries with monthly data. The results of the research study found that there is an insignificant but positive relationship between the variables studied.

Hanniger (1988) investigated the relationship of exchange rate with stock prices, for this analysis the study used 7 years data starting from 1980 to 1986. The research results found negative and significant relationship of exchange rate with stock prices.

Roll (1992) investigated the causal relationship between foreign exchange rate with stock prices. The study for the purpose of analysis used 4 years daily based data from 1988 to 1991. The results depicted that there is a positive causal linkage and association between foreign exchange rate and stock prices.

Ahmed (2008) employed the Johansen's approach of co-integration and Toda -Yamamoto Granger causality test to investigate the relationship between stock prices and the macroeconomic variables using quarterly data for the period of March, 1995 to March 2007. The results indicated that there was an existence of a long-run relationship between stock price and FDI, money supply, index of industrial production. His study also revealed that movement in stock price caused movement in industrial production. Pal and Mittal (2011) investigated the relationship between the Indian stock markets and

macroeconomic variables using quarterly data for the period January 1995 to December 2008 with the Johansen's co-integration framework. Their analysis revealed that there was a long-run relationship exists between the stock market index and set of macroeconomic variables. The results also showed that inflation and exchange rate have a significant impact on BSE Sensex but interest rate and gross domestic saving (GDS) were insignificant.

The study uses time series obtained from Bombay Stock Exchange official website and Handbook of Statistics on Indian Economy provided by the Reserve Bank of India. It uses the time series data analysis technique to study the relationship between the stock market index and the selected macroeconomic variables. In a time series analysis, the ordinary least squares regression results might provide a spurious regression if the data series are non-stationary. Thus, the data series must obey the time series properties i.e. the time series data should be stationary, meaning that, the mean and variance should be constant over time and the value of covariance between two time periods depends only on the distance between the two time period and not the actual time at which the covariance is computed. The most popular and widely used test for stationarity is the unit root test. The presence of unit root indicates that the data series is non-stationary. Three standard procedures of unit root test namely the Augmented Dickey Fuller (ADF), Phillips-Perron (PP), and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests are performed to check the stationary nature of the series.

### Research Design

The macro-economic variables included in the study are Industrial Production Index, Wholesale Price Index, Money Supply, Treasury Bill Rates and Exchange Rates. The historical data for these variables have been obtained from BSE, RBI, MOSPI and data.gov.in. Johansen's co-integration and vector error correction model have been applied to explore the long-run equilibrium relationship between stock market index and macroeconomic variables.

### Objectives of the study

The study investigates the relationship between the Indian Stock Market Index and five macro-economic variables, namely, industrial production index, wholesale price index, money supply, treasury bills rates and exchange rates during the period 2001–2015. The goal of the present study is to test whether the economic fundamentals in India explain the stock prices behavior in the market

### Methodology

To test the hypothesis, monthly average prices of nifty are taken from NSE website for the period 2001 to 2015 and their returns were calculated by using the formula

$$nret = \ln\left(\frac{nret_t}{nret_{t-1}}\right)$$

Data for all macroeconomic variables except crude oil price and gold price is collected from the database of the Indian economy maintained by Reserve Bank of India. Crude oil price and gold price data is collected from the database of International Monetary Fund.

Normality test is checked using Jarque Bera statistics and stationarity is tested using Augmented Dickey Fuller Unit root test. After confirming the stationarity of the impact of the macroeconomic variables on nifty is analysed

### Hypothesis

- H0: There is no impact of Macroeconomic Variables on Nifty
- H1: There is an impact of Macroeconomic Variables on Nifty

### Results and Discussions

First, descriptive statistics like Skewness, Kurtosis, Jarque-Bera Statistic, and Probability Value are calculated for all five macroeconomic variables and nifty. Results of the same are presented in Table 1.

	A	B	C	D	E	F
1	-0.66	0.23	-0.36	0.509	-0.62	-0.16
2	5.51	5.73	3.91	5.32	4.83	2.23
3	60.5	57.6	10.14	48.23	37	5.25
4	0	0	0.006	0	0	0.07

A-Nifty, B-Interest Rate, C- Gold rate, D-Forex rate, E-Crude oil, F-Inflation  
 1-Skewness, 2-Kurtosis, 3-Jarquebera, 4-Probability

From Table 1 we can see that all variables are negatively skewed except for Interest rate and Forex Rate. Jarque-Bera statistic tests the null hypothesis that data follow normal distribution. By observing probability values of Jarque-Bera statistics, null hypothesis is rejected for all variables even at 1% level of significance. This shows randomness and inefficiency of the market.

	A	B	C	D	E	F
A	1					
B	-0.03	1				
C	0.21	0.18	1			
D	-0.41	0.09	0.23	1		
E	0.08	0.07	0.17	-0.02	1	
F	0.01	0.59	0.08	0.012	0.018	1

A-Nifty, B-Interest Rate, C- Gold rate, D-Forex rate, E-Crude oil, F-Inflation

From Table 2 we can see that interest rate, forex rate and inflation are negatively correlated with nifty and with very low level of correlation coefficient. The other variables show positive correlation with low level of correlation coefficient.

The Unit root Test statistics are calculated using Augmented Dickey Fuller test for all assumptions ie; with intercept, without intercept but trend and with intercept and trend. The results are shown in Table 3.

	ADF Test statistics	Critical Values		
		1%	5%	10%
A	-13.93	-4.01	-3.43	-3.14
B	-11.86	-4.01	-3.43	-3.14
C	-11.32	-4.01	-3.43	-3.14
D	-10.8	-4.01	-3.43	-3.14
E	-11.79	-4.01	-3.43	-3.14
F	-11.79	-4.01	-3.43	-3.14

A-Nifty, B-Interest Rate, C- Gold rate, D-Forex rate, E-Crude oil, F-Inflation

From Table 3 we can see that all the variables have their t-statistic absolute values greater than the absolute values of significance. This means we should reject the null hypothesis “variables have unit root.” The variables being tested are thus stationary.

No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.*
None *	0.334909	185.9992	83.93712	0.0000
At most 1 *	0.211384	114.6287	60.06141	0.0000
At most 2 *	0.198410	73.07055	40.17493	0.0000

At most 3 *	0.170990	34.36797	24.27596	0.0019
At most 4	0.008823	1.551467	12.32090	0.9783
At most 5	3.21E-06	0.000562	4.129906	0.9885

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level \* denotes rejection of the hypothesis at the 0.05 level

The above tables give the clear picture of the cointegration test results using Johansen’s cointegration method. There are two statistics namely Trace statistics and Max Eigen value statistics. It can be clearly observed from the above tables, that there are at least 4 cointegrations equations in the model. So there exists a cointegration among the variables or there exists long run relation among the variables. The null hypothesis for None is that there is no cointegration equation likewise for the other conditions. So, the condition ‘At Most 4’s null hypothesis is rejected here stating that there exists long run relation among the variables. For both the statistics, are telling the same story that variables are cointegrated. So, when the variables are found cointegrated, vector error correction model can be adopted.

### Conclusion

This paper studies the effect of macroeconomic determinants on the performance of the Indian Stock Market by using monthly data for the period January 2001 to December 2015. We see that there exists a long run equilibrium relation between stock market index and all macroeconomic variables.

The present study confirms the beliefs that macroeconomic factors continue to affect the Indian stock market. However, the limitations of the study should not be over looked. The present study is limited to only five selected macroeconomic variables. Inclusion of more variables with a longer time period may improve the results. A logical extension of the study can be done by including more variables and analyzing sector wise stock index.

### References

- [1] Barakat, R., Elgazzar, S. H., & Hanafy, K. M. (2016). Impact of Macroeconomic Variables on Stock Markets: Evidence from Emerging Markets. *International Journal of Economics and Finance*, 8 (1).
- [2] Dr.Venkatraja.B. (2014). Impact Of Macroeconomic Variables On Stock Market Performance In India: An Empirical Analysis. *International Journal of Business Quantitative*

*Economics and Applied Management Research ,  
1 (6).*

- [3] GATUHI, S. K. (2015). *MACROECONOMIC FACTORS AND STOCK MARKET PERFORMANCE IN KENYA.*
- [4] Kudal, M. P. Impact of Macroeconomic Variables on Indian Stock Market and Strategies. *Tirpude's National Journal of Business Research (TNBJR) , 4 (1).*
- [5] Kumar, R. (2013). The Effect of Macroeconomic Factors on Indian Stock Market Performance: A Factor Analysis Approach. *IOSR Journal of Economics and Finance , 1 (3).*
- [6] NAIK, P. K., & PADHI, P. (2005). The Impact of Macroeconomic Fundamentals. *Eurasian Journal of Business and Economics .*
- [7] Patel, S. (2012). The effect of Macroeconomic Determinants on the Performance of the stock Market. *NMIMS Management Review .*
- [8] SINGH, P. (2014). INDIAN STOCK MARKET AND MACROECONOMIC FACTORS IN CURRENT. *International Journal of Research in*
- [9] Talla, J. T. (2013). *Impact of Macroeconomic Variables on the Stock Market Prices of the Stockholm Stock Exchange.*