

# Impact of Macroeconomic Variables on Indian Stock Market

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## Abstract

*The present study investigated the impact of macroeconomic variables on Indian Stock Market to test that whether or not a growth in macroeconomic variables lead to growth in stock market with respect to India. For the purpose of the study, five macroeconomic variables are chosen namely GDP, Inflation, Exports, Imports and Investment and market indices of CNX Nifty 50 is taken as a measure for stock market performance. The study uses the data foreleven years starting from 2004 to 2015. TheData is analyzed using Augmented Dicky Fuller Test for testing the Unit Root of the data then further Correlation and Granger Causality Test are applied with the help of Eviews7 in order to find the relationship between the variables. And the empirical results of the study shows that all of the variables are having a unit root,i.e. there is no cause and effect relationship between Indian stock market and the five variables studied, and lastly, it is found that there exists a positive correlation between Indian stock market and the five variables studied.*

**Keywords:**Macroeconomic variables; Augmented Dicky Fuller Test, Correlation, Granger-causality test; unit-root test; EViews7; CNX Nifty 50.

## I. INTRODUCTION

The macroeconomic variables might have some considerable effect on the functioning of the stock markets. Or we can say that the stock market of any country is being affected by three factors namely firm related factors, industry related factors and the economy. Firm related factors are those which are going to affect the related firm only like labor skills, extent of finance available to the firm, etc. Industry related factors are those who are going to affect all the firms in any particular industry like introduction of new machinery which is used to manufacture a particular type of cloth will be going to affect only textile industry. Third and the last is the economic factors- the factors which are going to affect all the firms working in under any industry, also known as the macroeconomic factors or variables like appreciation in

the value of the Indian currency will benefit every firm operating in any industry, other macroeconomic variables are GDP (gross domestic product), Investment, Employment, Exports, Imports, etc. For the purpose of our study, only five variables are taken vizGDP, Inflation, Exports, Imports and Investment.The main objective of the present study is to know that whether it is the stock market that is uplifting the Indian economy or the growing economy is developing our stock market. This paper consists of four parts. First part deals with the introduction. Second part lays emphasis on various literatures that has already taken place in this or related area. Third part deals with the research methodology and data analysis and interpretation part. And lastly, fourth part lists down the major findings of the study.

## II. LITERATURE REVIEW

Darrat (1990) anatomize and tested the stock market of Canada, through his study, it was tried to find out that whether the returns are stationary over time or not. The study was conducted using the multivariate Granger-causality methodology. The results of the study found that the Canadian stock prices fully reflects all information available on monetary policy movement.Maghayereh (2003)explored the long run relationship between the Jordanian stock prices and selected macroeconomic variables from the period ranging from January 1987 to December 2000 using co-integration analysis on monthly time series data. The study boasts that macroeconomic variables like foreign reserves, exports, inflation, industrial production and interest rates are playing significant role in prognosticating future changes in stock prices with respect to Jordanian capital market. Erdogan and Ozlale (2005) anatomized the authority of various macroeconomic variables on stock returns in Turkey and opinioned that rates of exchange and industrial production were found to be favorably related to the stock return. While on the other hand, they further commented that Circulation in Money (M1) had no relevant influence on stock returns. Gan, Lee, Yong and Zhang (2006) delve the association between stock

prices and macroeconomic variables in New Zealand. Few of the variables chosen for the purpose of the study are long-run as well as short-run interest rate, exchange rate, GDP, inflation rate, domestic retail oil price and money supply and they determined that there is a long term association between stock prices and selected variables wrt New Zealand. But at the same time, the Granger causality test asserts that stock exchange is not a reasonable index for macroeconomic variables in New Zealand. Shanken and Weinstein (2006) ascertained that only Industrial Production Index is a significant factor in the development of stock markets. Agrawalla and Tuteja (2007) furnished confirmation of a sound long run equilibrium relationship that exists between stock market developments and economic growth with respect to India. Agrawalla and Tuteja (2008) concluded that cause and effect relationship is running between proxies of economic growth due to industrial production and share price index. Bansal and Pasricha (2009) investigates that fluctuations in the equity sector has meaningfully reduced after the of foreign investment in the equity sector. Aydemir and Demirhan (2009) wrap up that there is a bidirectional causal association between exchange rate and the stock market indices. Srivastava (2010) wrap up by concluding the positive relationship between the stock market and various domestic macroeconomic variables like industrial production, wholesale price index and rate of interest rather than global factors. Odhiambo, Nicholas M. (2010) in his research tested the bank-based financial development's bearing on the stock market development in South Africa using ARDL-bounds testing technique. The study attempts to find that whether the services rendered by existing banks in South Africa has a significant bearing on its stock markets or not. The experimental results of the research discloses that there is a complimentary linkage between bank's development and development in the stock market in South Africa. Regardless of fact that the stock market development model estimated is for short run or long run. Ghosh et al. (2010) explored that the dollar price, oil price, gold price and CRR has an expressive impact on stock market returns. However, two variables i.e. food price inflation and call money rate do not significantly affect stock market return. Ali et al. (2010) explored that co-integration is present between industrial production index and stock prices. However, no causal relationship exists between other macro-economic indicators and stock prices in Pakistan. Cagli et al. (2010) explored that the stock market is well co-integrated with gross domestic product, U.S. crude oil price, and industrial production. Tripathy, (2011) demonstrates the connection between stock market of India and various macroeconomic variables from the period ranging from the month of

January 2005 to February 2011 pertaining several tests such as Ljung-Box Q test, Breusch-Godfrey LM test, Unit root test and Granger causality test which depicts bidirectional linkages between interest rate, rate of exchange, international market and Indian stock market. The study focuses on significant impact of international market on Indian stock market. The study centers on relevant influence of international market on Indian Stock Market. This study also judges the influence of exchange rate movement and rate of interest on stock price. Hosseini and Ahmad (2011) explored that both long and short run connection is there between stock market indices and various macroeconomic variables in India and China. Goudarzi and Ramanarayanan (2011) examined that BSE500 stock index and series of FIIs are bilaterally to each other. Gupta (2011) summarizes that foreign institutional investment meaningfully affects the stock prices. Agrawal and Srivastava (2011) investigated that two sided causality exists between exchange rate and stock market; and there exists a positive significant relationship between volatility in stock returns and exchange rates tested through GARCH model. Naik and Padhi (2012) studies the association among the Indian stock market index i.e., BSE Sensex with various macroeconomic variables such as wholesale price index, money supply, industrial production index, treasury bills rates and exchange rates for the time period 1994 to 2011. The analysis discloses that macroeconomic variables and the stock market index are co-integrated and, hence, a relationship of long-run equilibrium exists between them. Patel (2012) studies the effect of macroeconomic variables on account of the Indian Stock Market from the period ranging from January 1991 to December 2011 using monthly data of eight macroeconomic variables, namely, Interest Rate, Inflation, Exchange Rate, Index of Industrial Production (IIP), Money Supply, Gold Price, Silver Price & Oil Price and two market indices are taken namely Sensex and S&P CNX Nifty and the results of his study reveals that there is a long run relationship between Stock Market indices and all the macroeconomic variables taken here. The study also shows the causality running from exchange rate to stock market indices to IIP and oil price. Ray (2013) analyzed the relationship between stock prices and macroeconomic variables via studying the casual association between industrial production and stock price wrt India which is studied for a period ranging from 1990-91 to 2010-11 and the findings specifies that there is no significant relationship existing among share price and industrial production in India. Although, the results of the regression suggests that there might have been a direct linkage between real industrial production and the stock prices. Sireesha (2013) studied the affect of several macroeconomic factors on the movements of the Indian stock market index Nifty, gold and silver

prices with the help of linear regression methodology. Returns of Gold, Silver, and Stock are selected for the purpose of analysis. And the results depicts that Stock returns are significantly influenced by GDP and inflation whereas return on gold are significantly influenced by money supply. Singh, (2014) studied the relationship that exists between macroeconomic variables and Indian stock market. The variables chosen for the study are average monthly closing price of BSE 100 and CNX 100 while the explanatory variables are Index of Industrial Production (IIP), Wholesale Price Index (WPI), Money Supply (M3), Interest Rates (IR), Trade Deficit (TD), Foreign Institutional Investment (FII), Exchange rate (ER), Crude Oil Price (CP) and Gold Price (GP) from the period ranging from January 2011 to December 2012, and the results of the study depicts a meaningful outgrowth of macroeconomic variables on Indian Stock Market. Singh, (2014) studies the association among macroeconomic variables and Indian stock market. In order to ascertain the relation between the two, Pearson's correlation and multivariate stepwise regression is been applied in order to deduce the impact of macroeconomic indicators on the performance of stock market. Further, with the help of Granger causality test, relationship amongst the two variables is tested. The empirical results of the study depicts that there is a meaningful impact of macroeconomic variables on Indian stock market. Luthra and Mahajan (2014) scrutinized the influence of macroeconomic factors on BSE Bankex. The index for the purpose of study includes major public and private sector banks which are listed on BSE. Macroeconomic variables taken in the study are rate of GDP growth, inflation rate, prices of gold and rate of exchange and the results shows that inflation, exchange rate and GDP growth rate affect the Bankex positively. Whereas, Gold Prices affect BSE Bankex negatively but none of these variables have a significant impact on the stock prices of banks. Mishra and Gupta (2014) summed up the major factors which are accountable for up-down movement in Indian stock market and proves that very high and positive correlation is present between Sensex and various macroeconomic variables studied here.

### III. OBJECTIVES OF THE STUDY

The present study aims to:

- To check that whether the developments in the stock market is a result of growth in various macroeconomic variables.
- To check the stationarity of the data.
- To find the cause and effect relationship between the stock indices and the macroeconomic variables taken in the study i.e., CNX Nifty50 and GDP, Inflation, Export, Import & Investment.

- To check whether there exists a correlation among the variables or not.

#### **Hypotheses:**

On the basis of objectives it is hypothesized:

- $H_{01}$  : That variable CNX Nifty 50 has a unit root.
- $H_{02}$  : That variables GDP, Inflation, Export, Import and Investment has a unit root.
- $H_{03}$ : That there is no cause and effect relationship between CNX Nifty50 and GDP, Inflation, Export, Import & Investment.
- $H_{04}$  : That there is no Correlation among the variables studied.

### IV. DATA AND METHODOLOGY

#### **A. Data**

For the purpose of the study, the daily stock index returns of Nifty are chosen. The daily stock index returns of Nifty are obtained from the official website of National Stock Exchange (NSE). CNX Nifty 50 is taken as a measure of stock market performance and GDP, Inflation, Export, Import and Investment are taken as the performance indicator of Indian economy. The analysis and the interpretation performed in this study are for a period ranging from January 2004 to December 2015.

#### **B. Methodology**

Unit root test is applied to test the stationarity of the data. A unit root test tests whether a time series variable is non-stationary using an autoregressive model. A well-known test that is valid in large samples is the augmented Dickey–Fuller test. The optimal finite sample tests for a unit root in autoregressive models were developed by Denis Sargan and Alok Bhargava. Another test is the Phillips–Perron test. This test is used to test the stationarity of the data i.e. the given data is stationary over the time period taken or not. Stationary data means that it is constant throughout the study and if the data is found to be non-stationary that means, the given data set is not constant over the time period studies or there are very much fluctuations in the data. The non-stationary data is also known as the unit root data or the data has a unit root. For the purpose of analysis, normally researchers transform the non-stationary data into stationary one but in the process of transformation, there are chances that the data may lose some of its properties. Therefore if the data is non-stationary and we need to test the relationship between the variables. Granger Causality test is applied in order to study the cause and effect relationship between the two i.e. which one is the cause and which one is the effect out of the two variables. And lastly, Co-relation is tested between the two variables.

## V. ANALYSIS AND INTERPRETATION

Testing the unit root or non-stationarity of data:

Testing the unit root for CNX Nifty 50

As mentioned above, unit root test is applied to check the stationarity of the data, that whether or not the given data moves in a constant way or not. For the purpose of

testing the stationarity of the data, unit root test is applied through Augmented Dickey-Fuller test with the help of E-Views. Null Hypotheses is taken as CNX Nifty 50 has a unit root that means, it has non-stationary data for the time period studied and the results are as follows:

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.249606	0.6548
Test critical values: 1% level	-3.432431	
5% level	-2.862345	
10% level	-2.567243	

From the above analysis, as we can see that p value is coming out to be greater than 0.05. Therefore, we will be accepting the null hypotheses and rejecting the alternative hypothesis. Hence, we can say that the data set has a unit root or the data set is said to be nonstationary which means in the duration of study, CNX Nifty 50 does not move in a constant manner.

Similarly, we tested the stationarity of the other macroeconomic variables as well and found that GDP,

Inflation, Export, Import and Investment has a unit root i.e., the does not move in a constant manner.

### Pairwise Granger Causality Tests

Granger Causality Test is applied to test that out of the two variables taken, which one is the cause and which one is the effect. In the present study, Granger Causality Test is applied with the help of E-Views .

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause EXPORT	10	14.6156	0.0082
EXPORT does not Granger Cause GDP		0.35379	0.7183
IMPORT does not Granger Cause EXPORT	10	0.92171	0.4563
EXPORT does not Granger Cause IMPORT		0.09242	0.9132
INFLATION does not Granger Cause EXPORT	10	0.61580	0.5767
EXPORT does not Granger Cause INFLATION		1.18669	0.3787
INVESTMENT does not Granger Cause EXPORT	10	3.55499	0.1095
EXPORT does not Granger Cause INVESTMENT		0.35272	0.7190
NIFTY50 does not Granger Cause EXPORT	10	0.03971	0.9614
EXPORT does not Granger Cause NIFTY50		0.39997	0.6900
IMPORT does not Granger Cause GDP	10	1.26975	0.3582
GDP does not Granger Cause IMPORT		1.10040	0.4018
INFLATION does not Granger Cause GDP	10	9.07601	0.0217
GDP does not Granger Cause INFLATION		1.20055	0.3751
INVESTMENT does not Granger Cause GDP	10	0.03429	0.9665
GDP does not Granger Cause INVESTMENT		0.59799	0.5850
NIFTY50 does not Granger Cause GDP	10	0.19057	0.8322
GDP does not Granger Cause NIFTY50		0.18677	0.8352



INFLATION does not Granger Cause IMPORT	10	1.26450	0.3594
IMPORT does not Granger Cause INFLATION		2.31065	0.1947
INVESTMENT does not Granger Cause IMPORT	10	0.40439	0.6874
IMPORT does not Granger Cause INVESTMENT		0.68179	0.5472
NIFTY50 does not Granger Cause IMPORT	10	0.16601	0.8515
IMPORT does not Granger Cause NIFTY50		0.39242	0.6945
INVESTMENT does not Granger Cause INFLATION	10	2.81108	0.1520
INFLATION does not Granger Cause INVESTMENT		2.62344	0.1663
NIFTY50 does not Granger Cause INFLATION	10	3.24931	0.1247
INFLATION does not Granger Cause NIFTY50		0.30159	0.7522
NIFTY50 does not Granger Cause INVESTMENT	10	0.16966	0.8486
INVESTMENT does not Granger Cause NIFTY50		1.48657	0.3114

From the above analysis, we can see that there is no cause and effect relationship between stock exchange indices and any of the macroeconomic variables taken for this study, although it is found that GDP is the cause for exports and inflation is the cause for GDP for the period studied.

#### Test for Correlation

	GDP	INFLATION	INVESTMENT	EXPORT	IMPORT	NIFTY50
GDP	1.000000	-0.422720	0.642757	0.653913	0.547337	0.303545
INFLATION	-0.422720	1.000000	0.093072	-0.681456	-0.780310	0.231131
INVESTMENT	0.642757	0.093072	1.000000	0.218868	0.194263	0.642011
EXPORT	0.653913	-0.681456	0.218868	1.000000	0.806245	0.087128
IMPORT	0.547337	-0.780310	0.194263	0.806245	1.000000	0.156668
NIFTY50	0.303545	0.231131	0.642011	0.087128	0.156668	1.000000

It is found that inflation is negatively correlated with GDP, Exports and Imports. Else all other variables are positively correlated to each other. Also, positive relationship is found between CNX Nifty 50 and other macroeconomic variables studied viz. GDP, Export, Import, Inflation and Investment. Or we can conclude that Indian stock market is positively affected by these five macroeconomic variables or vice-versa.

#### VI. FINDINGS

We test the unit root, causality and correlation among the Nifty 50 and five macroeconomic variables taken. And the results of the analysis show that all of the variables are having non-stationary data. We also analyzed the degree of relationship between the variables by using granger causality test and found that there is no cause and effect relationship between stock exchange indices and any of the macroeconomic variables taken for this study, although it is found that GDP is the cause for exports and inflation is the cause for GDP for the period studied. Lastly, correlation is

computed to test the degree of relationship between the variables and found that inflation is negatively correlated with GDP, Exports and Imports. Else all other variables are positively correlated to each other. Also, positive relationship is found between CNX Nifty 50 and other macroeconomic variables studied viz. GDP, Export, Import, Inflation and Investment.

#### VII. CONCLUSION

This paper investigated the impact of macroeconomic variables on Indian Stock Market by using data from NSE and economy watch from the period 2004 to 2015. First of all, stationarity of the data has been tested using unit root test, and found that all of the variables have a unit root or having a non-stationary data, then cause and effect relationship is also studied with the help of Granger Causality Test, and found that there exists no cause and effect relationship between Indian stock market indices and the variables studied. Although, although it is found that GDP is the cause for exports and inflation is the cause for GDP for the period

studied. And lastly, Correlation is tested between CNX Nifty 50 and different macroeconomic variables and found that Indian stock market is positively correlated with these five macroeconomic variables and vice-versa. This study analyzed that there is no dependency of Indian equity market on any of the five variables studied and vice versa.

## REFERENCES

- [1] Agrawal & Srivastava (2011) Stock Market Returns and Exchange Rates Volatility: A GARCH Application, *Research Journal of International Studies*, 20, 12 – 23.
- [2] Agrawalla, R. K. & Tuteja, S. K. (2007) Causality between Stock Market Development and Economic Growth: A Case Study of India, *Journal of Management Research*, 7(3), 158-168.
- [3] Agrawalla R. K. & Tuteja S. K. (2008) Share Prices and Macroeconomic Variables in India - An Approach to Investigate the Relationship Between Stock Markets and Economic Growth, *Journal of Management Research*, 8(3), 136 – 146.
- [4] Ali, I., Rehman, K. U. et al. (2010). Causal relationship between macro-economic indicators and stock exchange prices in Pakistan, *African Journal of Business Management*, 4(3), 312-319.
- [5] Aydemir, O. & Demirhan, E. (2009). The Relationship between Stock Prices and Exchange Rates Evidence from Turkey, *International Research Journal of Finance and Economics*, 23.
- [6] Bansal, A. & Pasricha, J.S. (2009) Foreign Institutional Investor's Impact on Stock Prices in India, *Journal of Academic Research in Economics*, 1(2), 174-182.
- [7] Cagli, U., Caglar, E., et al. (2010). Testing Long-Run Relationship between Stock Market and Macroeconomic Variables in the Presence of Structural Breaks: The Turkish Case, *International Research Journal of Finance and Economics*, 48.
- [8] Ghosh et al. (2010) Share Market Analysis Using Various Economical Determinants to Predict Decision of Investors. *International Conference on Modeling, Optimization and Computing*, American Institute of Physics.
- [9] Goudarzi, H. & Ramanarayanan, C. S. (2011) Empirical Analysis of the Impact of Foreign Institutional Investment on the Indian Stock Market Volatility during World Financial Crisis 2008-09, *International Journal of Economics and Finance*, 3(3), 214 – 226.
- [10] Gupta, R. (2011) Understanding the relationship of domestic and international factors with stock prices in India: an application of ARCH, *Academy of Accounting and Financial Studies Journal*, 15(2), 87 – 104.
- [11] Hosseini, S. M., Ahmad, Z., et al. (2011). The Role of Macroeconomic Variables on Stock Market Index in China and India. *International Journal of Economics and Finance*, 3(6), 233–243.
- [12] Srivastava, A. (2010) Relevance of Macro Economic factors for the Indian Stock Market. *Decision*, 37(3), 69 – 89.
- [13] Yang, X. & Wang, Y. (2007), Bivariate Causality between RMB Exchange Rate and Stock Price in China, 784-788, Retrieved from <http://www.seiofbluemountain.com/upload/product/200910/2008glhy09a6.pdf>
- [14] Darrat, A. F. (1990), Stock Returns, Money and Fiscal Policy, *Journal of Financial and Quantitative Analysis*, 25, 387-398.
- [15] Kwon, C. S. & Shin, T. S. (1999), Cointegration and Causality between Macroeconomic Variables and Stock Market Returns, *Global Finance Journal*, 10(1), 71-81.
- [16] Ray, Sarbapriya (2013), Towards Examining the Relationship between Industrial Production and Stock Price in India, *United States of America Research Journal (USARJ)*, 1 (03), 36-45 Retrieved January 28, 2014 from <http://usarj.org/article/viewFile/19/32>.
- [17] Tripathy, Naliniprava (2011), Causal Relationship between Macro-Economic Indicators and Stock Market in India, *Asian Journal of Finance & Accounting*, 3(1), 208-226.
- [18] Sireesha, Bhanu, P. (2013), Effect of Select Macroeconomic Variables on Stock Returns in India, *International Journal of Marketing, Financial Services & Management Research*, 2 (6), 197 -209, Retrieved April 19, 2014 from <http://indianresearchjournals.com/pdf/IJMFSMR>.
- [19] Singh, Pooja (2014), An Empirical Relationship Between Selected Indian Stock Market Indices and Macroeconomic Indicators, *International Journal of Research in Business Management (IMPACT: IJRBM)*, ISSN(E): 2321-886X; ISSN(P): 2347-4572, 2(9), 81-92.
- [20] Patel, Samveg (2012), The effect of macroeconomic determinants on the performance of the Indian stock market, *NMIMS management review*, issn: 0971-1023, 22.

## Websites

- [1] <http://www.economywatch.com>
- [2] <http://www.nse.com>