

IMPACT OF INFLATION AND GDP ON CNX NIFTY

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Abstract :

Inflation and GDP are the two main important macro-economic variables. GDP is an economic indicator of the market value of all finished goods and services produced over a period (Quarterly or yearly) of time. There has been a decline in the GDP growth rate in the year 2017 compared to previous year. Several factors including global situation are responsible for the decline in GDP growth rate. Inflation is a continual growth in the universal worth of goods and services in an economy over a period of time. When the price level increases, each component of currency buys fewer goods and services. This paper mainly deals with the impact of Inflation and GDP on Indian market that is National stock exchange (NSE). For this we have collected 10 years quarterly data and also applied E-views statistical package. Unit root test for stationary, co-integration test, vector error correction model, and granger causality test, were conducted.

Keywords: Inflation, Gross domestic product, National stock exchange, E-views.

Introduction

The National stock exchange (NSE) was established in 1992 as a tax-paying company and was recognized as a stock exchange in 1993 under the Securities Contracts (Regulation) Act, 1956. NSE commenced operations in the Wholesale Debt Market (WDM) segment in June 1994. NSE is world's 10th largest stock exchange as of march 2017. But only 4% of Indian economy is actually imitative from the stock exchanges in India. As of 2016, there are more than 7,000 companies listed in stock market in which about 4,500 companies are traded in both the exchanges that is BSE and NSE. Both Equity and derivatives are traded in the NSE.

Gross domestic product (GDP) is an Economic indicator of the market value of all finished goods and services produced over a period (Quarterly or yearly) of time. Gross domestic product includes all private and public consumption, government outlays, and investments. There has been a decline in the GDP growth rate in the year 2017 compared to previous year. Several factors including global situation are responsible for the decline in GDP growth rate. Demonetization, introduction of goods and service tax at the same time are one of the main reasons for the decline in our economic growth rate. To increase the GDP growth rate, there should be an increase in consumer spending, investment levels, government spending, imports and exports. By



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improving in these areas, we can see better number in economic growth. Generally, there should be high GDP. If GDP numbers are rising year by year, it means Indian economy has good control and our nation is moving forward. If GDP numbers are falling, it means our economy is in trouble and the nation is losing. Therefore, the growth rate should be higher.

Inflation is when the price level increases, each component of currency buys fewer goods and services; therefore, inflation reflects a decrease in price. A chief measure of price inflation is the inflation rate, the annualized proportion change in an overall cost, usually the CPI, over time. The opposite of inflation is deflation. Continuously, inflation moves either in positive or negative way.

Nowadays, most economists favor a low and steady rate of inflation. Low (as similar to zero or negative) inflation moderates the severity of economic recessions qualifying the labor market to regulate more rapidly in a decline, and reduces the risk. The task of keeping the rate of inflation low and stable is usually given to the monetary authorities. Normally, these monetary authorities are the World Bank that controls monetary policy through the setting of interest rates. From the data we can say that CNX nifty contributes 38% for macro-economic variables.

Literature Review

- 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.

- Sharma (2007) has examined the relationship between the Nifty (NSE) and macroeconomic variables using quarterly data for the period of 1975 to 1999. Employing Johansen's co-integration technique and vector error correction model (VECM) he found that the stock prices positively relates to industrial production, inflation, money supply, short term interest rate and also with the exchange rate, but, negatively related to long term interest rate. Their causality analysis revealed that every macro-economic variable considered caused the Nifty (NSE) in the long run.
- 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.
- Sharma & Mahendru (2010) analyse long term relationship between BSE and macroeconomic variables, vis-à-vis, change in exchange rate, foreign exchange reserve, inflation rate and gold price. The study period ranges between January 2008 and January 2009. The multiple regression model was applied and the results reveal that exchange rate and gold prices highly effect the stock prices, while FOREX and inflation have limited influence on stock prices.
- Ghosh et al. (2010) found that dollar price, oil price, gold price and CRR have a

significant impact on stock market returns. However, food price inflation and call money rate do not affect stock market return. Srivastava (2010) concluded that in the long term, stock market was more affected by domestic macroeconomic factors like industrial production, wholesale price index and interest rate than global factors.

- Naresh Chandra Sahu and Deepinder H. Dhiman (2011) felt there is no causal relationship between the stock market indicator (BSE) and Real GDP. These two are co-related to each other highly. The boom of the stock market is not helping the real economy growth. The method used is correlation and Ganger Causality Regression Technique. Augmented Dickey Fuller unit Root test is used to verify the stationary of the series and data from 1981 to 2006 annual data.
- Karam Pal and Ruhee Mittal (2011) has studied 56 quarterly data from 1995 to 2008 of BSE sensex and inflation, Treasury bill rate, Exchange rate and S&P CNX Nifty data. By using Root Test, Cointegration Test and Error Correction Mechanism (ECM), they said that the Skewness and Kurtosis shows that there is a lack of symmetry in the distribution. Inflation is affecting the stocks of the both. GDS will not have considerable effect on the stock markets.
- Shrinivasm p (2011) studied the long-run relationships between NSE-Nifty share price index and other crucial macroeconomic variables and also examined the short-run causal nexus between NSE Nifty price index and the selected macro-economic variables in India. The macro economic variables such as index of industrial production, money

supply, exchange rate, interest rate, consumer price index and the US stock price index were used. The study found that the NSE-Nifty price index has a long-run positive relationship with money supply, index of industrial production, interest rate, and the US stock market index and negative relationship with exchange rate and the NSE-Nifty price index in long run.

- 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 and the analysis revealed that there was a long-run relationship exists between the stock market index and set of macroeconomic variables.
- Kiran Kumar Kotha (2016) 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.

Objectives:

The main objective of this study is to explore the causal link between Indian Nifty (NSE) and macro-economic variables.

- To assess the dynamics of short-term linkages between CNX Nifty (NSE) and macro-economic variables.
- To explore the presence of long-term equilibrium relationship between Indian Nifty (NSE) and Inflation rate and GDP.

- To capture the linear inter-dependence among the variables under study.

Methodology

Nifty returns (NSE), Gross domestic product (GDP) and Inflation are the main variables for the causality analysis. The study is based on the time series from the period of 2007 to 2017 Quarterly data has been collected. Data were processed and analyzed by applying econometric tools and techniques through EViews statistical package. The analysis comprised of:

- Testing the stationarity of data using graphical analysis combined with the popular Augmented Dickey Fuller (ADF) Unit Root Test Method
- Testing the co-integration between Nifty returns, GDP and Inflation growth rate by administering Johansen's Co-integration Test (JCiT)
- Fitting a vector error correction model (VECM) if Cointegration was established
- Proceeding towards testing the presence of causal relationship between Nifty returns, GDP and Inflation by administering the Granger Causality Test (GCT) upon confirmation of variables being co-

integrated. Data visualization by way of line graphing provided an initial clue regarding the likely nature of the series.

Hypotheses

The following hypotheses were developed to meet the objectives of the present study.

- H1: CNX Nifty, macro-economic variables has a unit root test.
- H2: There is no co-integration between CNX Nifty, and macro-economic variables.
- H3: CNX Nifty does not Granger-cause Inflation.
- H4: Inflation does not Granger-cause Nifty returns.
- H5: GDP does not Granger-cause Nifty returns.
- H6: Nifty returns does not Granger-cause GDP.
- H7: GDP does not Granger-cause Inflation.
- H8: Inflation does not Granger-cause GDP.

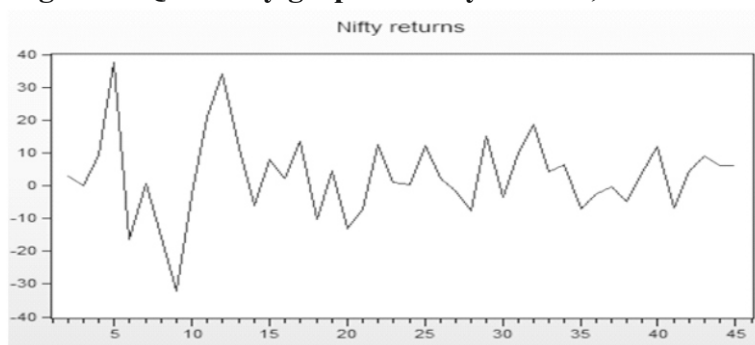
Results and discussion

Following graphs represents the changes in CNX nifty and macro-economic variable.

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Figure 1: Quarterly graph of Nifty returns, 2007 – 2017



Source: EViews graph analysis (2018)

Figure 2: Quarterly graph of Inflation, 2007 – 2017

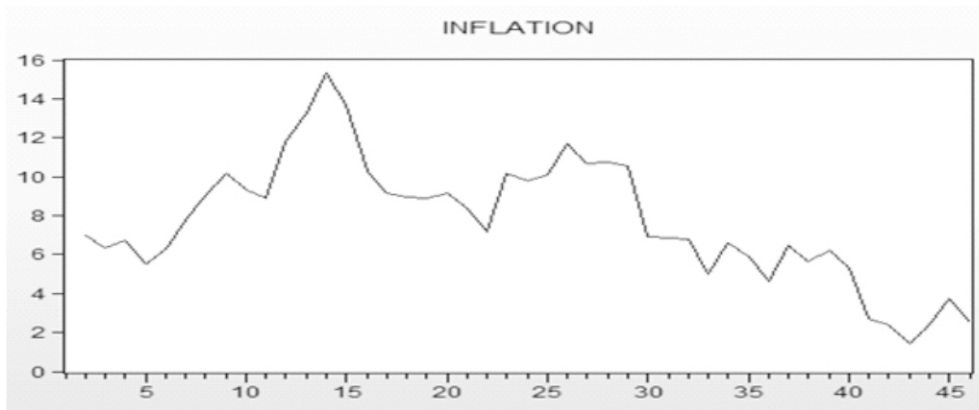
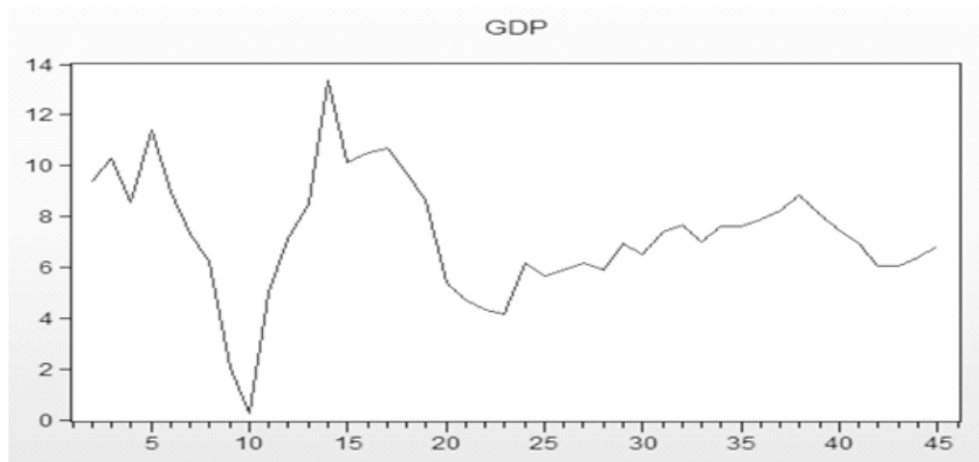


Figure 3: Quarterly graph of Inflation, 2007 – 2017



Source: EViews graph analysis (2018)

Graphical Analysis: The first impression obtained from Figures 1, 2, and 3 was that the GDP Inflation appear to be trending upwards until more recently when it seem to have stabilized. During 2007 to 2017, the GDP growth rate averaged 7.2755 percent, and inflation 7.855 percent in the subsequent years between 2007 and 2017. And Nifty returns seem to be slow and steady during recession period, it has picked up the trend in the year 2010 and resulted in an incredible amount of growth rate in the Nifty. Similarly, during 2007 to 2017, the Nifty returns averaged 2.98 percent, which raises doubts about stationarity or non-stationarity of both series, hence further tests had to be conducted.

Table 1: ADF Unit Root Test for Nifty returns, Inflation, GDP, 2007 – 2017

Particulars	T-statistic	Probability
At level	-1.6326	0.0513
1 st difference	-2.2375	0.0126

Source: EViews software analysis results (2018)

Unit Root Test : Table 1 shows the results of the ADF Unit Root Test. The results show that the null hypotheses H1 is that Nifty returns (NSE), GDP and Inflation have unit roots can be rejected since the probability is less than 0.05 respectively at first difference. Therefore it was concluded that Nifty returns, GDP and Inflation time series do not have unit root problem and the data is good enough to proceed for co-integration test.

Table 2: Johansen’s co-integration test from 2007- 2017

Cointegration Test	Level	Max.Eigen Value	Tstatistic	C.V. at 5%	Probability
Trace Test	H ₀ : r=0 (none)*	0.5431	51.9179	29.7970	0.0000
	H ₁ : r≤ 1 (at most 1)	0.3386	19.7966	15.4947	0.0105
Max.Eigen	H ₀ : r=0 (none)*	0.5431	32.1213	21.1316	0.0010
	H ₁ : r≤ 1 (at most 1)	0.3386	16.9514	14.2614	0.0184

Source: EViews software analysis results (2018)

Also, the results of Johansen co-integration test as presented in Table-2 exhibit that the trace statistic for the calculated Max-Eigen value (51.9179) is more than its critical value (29.7970) indicating the absence of co-integration between variables in confirmation of the null hypothesis (H3). Similarly, the Max-Eigen test confirms the absence of long-run co-integration between the two time series, since Max-Eigen t-statistic value (32.1213) is greater than its critical value (21.1316) at 5% level of significance.

Nonetheless, further results of Johansen co-integration test denote that the null hypothesis H3: there is no co-integration between the Nifty returns, Inflation and GDP is rejected at 5 percent level of significance, since trace test and Maximum Eigen test indicate at most 1 Co-integration equation at the 0.05 level. This, in turn, leads to the acceptance of alternative

hypothesis that there is co-integration between Nifty returns, inflation and GDP growth rate.

Vector Error Correction Model (VECM): Since some co-integration between Nifty returns, GDP and inflation in India was empirically established, the next level of analysis involved fitting the series into a VECM and the results, as shown in Table 3 based on the first normalized eigenvector, indicates the presence of long-run relationship between Nifty returns, GDP and inflation. The estimated co-integrating coefficient for the GDP growth is as follows

The t-statistic of the co-integrating coefficient of inflation and GDP are given in the bracket. And the coefficient for Inflation is negative and GDP is in positive, which means that increase in inflation can be associated with negative growth or decline in the Nifty returns as observed by Reinhart.

Table 3: Co-integrating Vector of GDP Growth and FDI in India, 1992 – 2016

CointegratingEq:			
NIFTY_RETURNS(-1)	INFLATION(-1)	GDP(-1)	Constant
1	-0.187804 -0.31114 [-0.60361]	2.226538 -0.52281 [4.25876]	-17.16306

Source: EViews software analysis results (2018)

Since some co-integration between Nifty returns, inflation and GDP growth was empirically established, the next level of analysis involved fitting the series into a VECM and the results, as shown in Table 3 indicates the presence of long-run relationship between Nifty returns, Inflation and GDP.

Table 4: Vector error correction model

Error Correction:	D(NIFTY_RETURNS)	D(INFLATION)	D(GDP)
CointEq1	-1.684651 -0.37199 [-4.52870]	0.020774 -0.04591 [0.45250]	0.021259 -0.05402 [0.39352]
D(NIFTY_RETURNS(-1))	0.512761 -0.2637 [1.94445]	-0.015958 -0.03254 [-0.49035]	0.022122 -0.0383 [0.57766]
D(NIFTY_RETURNS(-2))	0.217032 -0.16613 [1.30640]	0.014624 -0.0205 [0.71328]	0.027124 -0.02413 [1.12428]
D(INFLATION(-1))	-1.523846 -1.40658 [-1.08337]	0.090511 -0.17359 [0.52141]	0.063649 -0.20427 [0.31160]
D(INFLATION(-2))	-2.096834 -1.40473 [-1.49270]	-0.031205 -0.17336 [-0.18000]	0.079132 -0.204 [0.38791]
D(GDP(-1))	2.706044 -1.44757 [1.86937]	0.110945 -0.17865 [0.62102]	-0.132637 -0.21022 [-0.63095]
D(GDP(-2))	2.357223 -1.47551 [1.59757]	-0.130246 -0.1821 [-0.71526]	0.022951 -0.21428 [0.10711]
C	-0.160366 -1.97588 [-0.08116]	-0.067844 -0.24385 [-0.27822]	-0.043965 -0.28694 [-0.15322]

() error term, [] t-value

Source: EViews software analysis results (2018)

As shown in the above table lower t-statistic values of -4.5287, 0.4525 are 0.39352 respectively are both less than the critical value (1.96) at 5 percent significance level, thus evidencing the absence of long-run equilibrium relation between Nifty returns, inflation and GDP. Thus, it could be inferred that the value of next year's Nifty returns is not necessarily influenced by the current year's Inflation and GDP at 95 percent confidence level. From the VECM result, it is evident that Inflation and GDP has no significant long-run negative impact on nifty returns.

Dependent variable: Nifty returns

Independent variable: Inflation, GDP.

System Equation

The following is the system equation which is generated from the dependent variable to know the long run causality.

$$D(\text{NIFTY_RETURNS}) = C(1) * (\text{NIFTY_RETURNS}(-1) + 0.120640420641 * \text{INFLATION}(-1) - 0.102706806382 * \text{GDP}(-1) - 3.20919676041) + C(2) * D(\text{NIFTY_RETURNS}(-1)) + C(3) * D(\text{NIFTY_RETURNS}(-2)) + C(4) * D(\text{INFLATION}(-1)) + C(5) * D(\text{INFLATION}(-2)) + C(6) * D(\text{GDP}(-1)) + C(7) * D(\text{GDP}(-2)) + C(8)$$

Long run causality

$$D(\text{NIFTY_RETURNS}) = C(1) * (\text{NIFTY_RETURNS}(-1) + 0.120640420641 * \text{INFLATION}(-1) - 0.102706806382 * \text{GDP}(-1) - 3.20919676041) + C(2) * D(\text{NIFTY_RETURNS}(-1)) + C(3) * D(\text{NIFTY_RETURNS}(-2)) + C(4) * D(\text{INFLATION}(-1)) + C(5) * D(\text{INFLATION}(-2)) + C(6) * D(\text{GDP}(-1)) + C(7) * D(\text{GDP}(-2)) + C(8)$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.684651	0.371994	-4.528698	0.0001
C(2)	0.512761	0.263704	1.944455	0.0604
C(3)	0.217032	0.16613	1.3064	0.2004
C(4)	-1.523846	1.406576	-1.083373	0.2865
C(5)	-2.096834	1.404726	-1.4927	0.145
C(6)	2.706044	1.447573	1.869366	0.0705
C(7)	2.357223	1.475506	1.597569	0.1197
C(8)	-0.160366	1.975876	-0.081162	0.9358

C (1) is significant because it is less than 5% and co-efficient is negative. There is long run causality running from Nifty returns to GDP. C (1) = speed not adjustment towards long run equilibrium but it must be significant (significant is negative) and then there is no long run causality.

Short run causality

$C(5) = C(6) = C(7) = 0$

Wald Test

Test Statistic	Value	df	Probability
F-statistic	1.936925	(3, 33)	0.1428
Chi-square	5.810775	3	0.1212

Null Hypothesis: $C(5) = C(6) = C(7) = 0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	-2.096834	1.404726
C(6)	2.706044	1.447573
C(7)	2.357223	1.475506

Wald statistics to check Nifty returns, Inflation, GDP $C(5) = C(6) = C(7) = 0$ hence there is a short run causality running from Inflation, GDP to Nifty returns, and the probability is greater than 5%.

- There is long run causality running from Nifty returns to Inflation and GDP.
- There is shot run causality running from Nifty returns to Inflation and GDP.

Table 5: Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.	Result
INFLATION does not Granger Cause NIFTY_RETURNS	42	0.5531	0.5798	Accepted
NIFTY_RETURNS does not Granger Cause INFLATION		1.06761	0.3542	Accepted
GDP does not Granger Cause NIFTY_RETURNS	42	1.52295	0.2314	Accepted
NIFTY_RETURNS does not Granger Cause GDP		3.70566	0.3341	Accepted
GDP does not Granger Cause INFLATION	42	2.45332	0.0999	Accepted
INFLATION does not Granger Cause GDP		0.31809	0.7295	Accepted

Source: EViews Software Analysis Result (2018)

From the above table it is clear that there is no cause-effect relationship in the variables. So, the hypothesis which are p value < 0.05 is rejected. And the other hypothesis which the p-value is higher than 0.05 at 5% level of significance.

Null hypothesis Inflation does not granger cause Nifty returns (0.5798), Nifty returns does not

granger cause Inflation (0.3542), GDP does not granger cause Nifty returns (0.2314), growth does not Granger-cause DGR is accepted as the probability value (0.1666), GDP does not granger cause inflation (0.0999) and inflation does not granger cause GDP (0.7255), Nifty returns does not granger cause GDP (0.3341) All these hypothesis were accepted because the probability value is greater than .05 required significance level. So by this we can say that the dependent variable cannot be used to predict the future level of all independent variables. And Independent variables also does not necessarily have to attract or lead to increasing levels of dependent variable. Similarly,

Summary and Findings

The paper was designed to examine the empirical relationship between Nifty returns (NSE), GDP and inflation using Quarterly time series from 2007 to 2017. After assessing stationarity of the Nifty returns, GDP and Inflation and conducting series of econometric tests to determine co-integration and causality, the following major findings emerge from the study:

- All variables like Nifty returns (NSE), GDP and Inflation are stationary based on Augmented Dickey Fuller (ADF) test. The trace test under Johansen co-integration method indicates one co-integrating equation at 5 percent level of significance.
- From the VECM result, it is evident that Nifty returns has no significant long-run negative impact on GDP and inflation.
- The Granger causality test results showed statistically significant absence of causality between GDP and inflation. This means that inflation and GDP growth are not mutually correlated.

Conclusion

This paper mainly explains about the cause and effect relationship of the variables like National stock exchange (NSE), Inflation and GDP. In India only 4% of people will trade. Whereas in UK and US 70 % of the GDP is derived From the Big companies and the corporate sector. As of October 2016 corporate sector in India holds only 12 to 14% of the national GDP in India. The study we have considered 10 year quarterly data of all the 3 variables. As a result we can say that National stock exchange will contribute more than 30% for the Inflation and more than 40% for the Indian GDP. As result in vector error correction we found that T-static for inflation was in negative which results that increase in inflation can be associated with negative growth or decline in the Nifty returns. But whereas in GDP it gave positive result.

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