NIFTY as a true barometer of Indian Economy: a study of Interdependency of Stock market and Economy

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Abstract

The stock market has been a place of attraction for many investors with an ambition to get extraordinary return. This is hard but true that till now no successful attempt has been made to predict the return pattern of stock market. Numerous studies have been done both in the domestic and the international level to study the interrelationship between the stock market return and the various economic variables. This present study has taken the various micro and macro-economic variables such as broad money supply (M3), index of industrial production, wholesale price index, exchange rate between US dollar and Indian rupees, fiscal deficit of Indian government, bank rate of RBI, FII purchase in Indian market. These variables are compared with the return of the National stock exchange index Nifty. The various statistical tools used for the study are the Augmented ducky fuller and Philips and Peron test to test the unit root of the variables, then we used the Johansen cointegration test followed by VECM model test. We have also used Granger Causality test in this study. The result of the study revealed that there exist a long run association between the nifty and the other economic variables but the association is not so significant. There exists two way causality between exchange rate and the Nifty return. But only unidirectional causality exists from Nifty return to FII Purchase and IIP.

Keywords: Economic variables, ADF and PP test, Johansen Cointegration test, VECM, Granger causality test.

1. Introduction:

The Indian economy has opened up the doors of globalization and simultaneously liberalized the domestic economy with the mantra of privatization of Indian industry. In the meantime the governments of India as well as its central bank (RBI) have lunched various policy measures to boost up the industrial sectors. The ultimate result is reflected in the performance of the stock market. The present study is intended to study the inter-relationship between the various economic variables and the stock market return. The various micro and macro-economic variables taken are broad money supply (M3), index of industrial production, wholesale price index, exchange rate between US dollar and Indian rupees, fiscal deficit of Indian government, bank rate of RBI, FII purchase in Indian market. The data has been collected for a long period of 15 years ranging from April 2000 to March 2015 and has been put to various statistical tools to arrive at the conclusions. We have used the unit root test to verify whether the data series are stationary or not, after that Johansen co-integration test was applied to test the long run association between the variables. In the next step we have applied the VECM model to develop a regression model to establish the causality between the variables taking Nifty return as depended variable and the other economic variables as independent variable. We have also used the Granger causality test to find, which variable affect the nifty return most. The result of the study revealed that there exist a long run association between the nifty and the other economic variables but the association is not so significant.

2. Overview of Literature:

Lucas (1997) and Alexander (1999) have showed in their study that the co integration method gives better result than simple correlation study to help in deciding the portfolio diversification and asset allocation process.

Maneschiold (2006) in his co integration analysis indicated that German markets dominate the long-term relationship with Baltic stock markets. The lack of co integration represent that the diversification in the investment process will help the investor in the international market.

Kasibhatla et al (2006) studied cointegration between major West European stock markets (CAC40, DAX30, and FTSE100). Their findings supported the notion that there is cointegration between the markets, and identified the CAC40 as being weakly exogenous. There can be excess returns in the short term by diversifying internationally, however due to the long run cointegration, Kasibhatla et al claim that there is no benefit of long-term international portfolio diversification (between CAC40, DAX30, FTSE100).

The use of the co integration study has revealed that there exists significant linkage between the international financial markets. The existence of such linkages between international stock markets suggests diversification benefits are not fruitful (Kasa, 1992).

There have been a number of empirical studies describing the interrelationship between the fundamental economic activities and the stock market return in the developed economies. Such studies are Fama, 1970, arbitrage pricing theory (APT).

(Brahmasrene and Jiranyakul, 2007) has pointed out the drawback of the APT and showed that all the stocks as well as the market index are affected by the common economic factors such as

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changes in interest rate, money supply, economic growth, and inflation simultaneously.

(Geske and Roll, 1983) has studied that among all economic variables the exchanges rate fluctuations in the market has a major impact upon the stock market return. This is because as depreciation of domestic currency increases the volume of exports. Provided that the demand for export goods is elastic, this in turn causes higher cash flows for domestic companies, and thus causes stock prices to increase

Current account deficit and/or trade deficit is considered a factor affecting country risk for investors (e.g., Tourani-Rad,Choi, and Wilson, 2006; Sun and Tong, 2000).

Empirical evidence is available that the stock market return and the inflation are negatively related to each other (Fama and Schwert, 1977; Geske andRoll, 1983). On the other hand, in the case that contracts are nominal and cannot adjust accordingly, the effect will be negative. Therefore, in this context, the effect of nominal interest rates on stock prices is also expected to be negative (Chen et al., 1986).

Ajayi and Mougoue (1996) studied the long term and the short term relationship between stock price and the exchange rate by using the bivariate error correction model showed that the stock price has a negative short run effect on the domestic currency values. However, sustained increases in the domestic stock prices in the long run cause an increase in the domestic currency, due to the increased demand for the currency

Hashemzadeh and Taylor (1998) investigate the direction of causality between the money supply, stock prices, and interest rates in the US. The relationship between money supply and stock prices is reflected by a feedback system, with money supply explainingsome of the observed variation in stock price levels, and vice versa. Causality runs from interest rates to stock prices, but not the other way around. Emerging stock markets have been identified as being at least partially segmented from global capital markets. As a consequence, it has been argued that local factors rather than global ones are the primary source of equity return variation in these markets.

Bilson, Brailsford, and Hooper, pp. 401, 404) has found out that the national level economic variables are more significantly influencing the stock market return than the international level factors.

Bailey and Chung (1995) study the systematic influence of exchange rate fluctuations and political risk on stock returns in Mexico. Their major findings reflect consistency with time-varying equity market premium for exposure to the changes in free market dollar premium. Using Granger causality and monthly data, Abdalla and Murinde (1996) investigate the relationships between exchange ratesand stock prices in India, Korea, Pakistan, and thePhilippines. They find a unidirectional causality from exchange rates to stock prices in all countries except the Philippines, where stock prices Granger cause stock prices. Mookerjee and Yu (1997) report that not all macroeconomic variables are cointegrated withstock prices in Singapore.

Investigating the effects of changes in the consumerprice index on industrial production and stockmarket returns for China, Soenen and Johnson(2001) report a positive and significant associationbetween stock returns and real output. Inflation does not impact on Chinese real stock returns. Ibrahim (2003) obtained results suggesting cointegration between returns and the money supply in the Malaysian stock market. Patra andPoshakwale (2006) examined the short-run dynamic adjustments and the long-run equilibrium

relationships between selected macroeconomic variables, trading volume and stock returns in the Greek stock market during the period of 1990 to1999. They revealed that short run and long run equilibrium relationship exists between inflation, money supply and trading volume and the stock prices in the Athens stock exchange. No shortrun or long run equilibrium relationship is foundbetween the exchange rates and stock prices.

Brahmasrene and Jiranyakul (2007) examined the relationship between stock market index and selected macroeconomic variables during the post inancial liberalization (pre-financial crisis) and post-financial crisis in Thailand. In the empirical analysis, they perform unit root, cointegration and Granger Causality tests. Their results show that money supply has a positive impact on the stock market index, while the industrial production index, the exchange rate and oil prices have a negative impact in the post-financial liberalization period.

Using a multivariate approach, Muradoglu, Taskinand Bigan (2000) study the causal relationship between macroeconomic variables and stock returns in nineteen emerging markets. They use Granger causality tests for each country on a set of selected macroeconomic indicators. They conclude that two-way interactionbetween stock return and macroeconomic variables derives from the size of the stock markets, and their integration with the world markets.

2.1 About the NSE and the economic variables:

National Stock Exchange (NSE)

The National Stock Exchange of India (NSE) was incorporated in November 1992 as a tax-paying company and was recognized under the Securities Contracts (Regulation) Act, 1956 in 1993 as a stock exchange. It was set up with the objective to establish nationwide trading facility for all types of securities, for ensuring equal access to investors all over the country through an appropriate telecommunication network,providing a fair, efficient & transparent securities market using an electronic trading system,enabling shorter settlement cycles and book entry settlements and meeting international benchmarks and standards. It is India's largest and world's third largest stock exchange.

Inflation- It plays an important variable to judge an economy so far as the cost of production and living are concern. In India, inflation is being measured in Wholesale Price Index (WPI) and Consumer Price Index (CPI). WPI represents the price of goods at a wholesale stage, whereas the CPI measured inflation at consumer or end user stage. In India WPI is used as an important measure of inflation as fiscal and monetary policy changes are greatly influenced by changes in WPI. Again Indian stock market is greatly influenced by the rate of inflation as there is an inverse relation between inflow of foreign capital and inflation.

Index of Industrial Production (IIP)

One of the key factors in economic analysis and policy making of any country in general and India in particular is its industrial production. IIP is a statistical device which enables us to arrive at a single representative figure to measure the general level of industrial activity in the economy. This is an indicator of paramount importance to the Government for policy formulation and implementation. It has also got a positive impact for the capital formation of an economy.

Fiscal Deficit-

Fiscal deficit has always been the cause of concern for the Indian economy since independence. It is the outcome of huge no planned expenditure which include huge defense expenditure, subsidies and interest payments for public debt. It is increasing at an alarming rate due to huge net market borrowing of the central government. However, the government has contained the fiscal deficit at 3.99 per cent of GDP in 2014-15 to Rs 5.01 lakh crore as international oil price has touched to the record low. For this reason, the Indian stock market has shown a positive trend in the last financial year.

Exchange rate-

The exchange rate has got direct relation with the international competitiveness of the firms and also affects their input and output price. It also affects value of the firm as the future cash flows of the firm change with the fluctuations in the foreign exchange rates. Again, the depreciation of exchange rate will make adverse effects on both exporters and importers. Whereas, currency appreciation has both negative and positive effect on the domestic stock market for export-dominant and import-dominated countryrespectively.

Broad money-

The money supply-stock market nexus has been widely tested because of the belief that the growth in money supply has direct effects through portfolio changes, and indirect effects through their effects on real activity variables, which in turn postulated to be the fundamental determinants of stock prices.

Gross Domestic Product (GDP)

The performance of a stock market is being affected by the real Gross Domestic Product (RGDP) of the economy as RGDP cause prices to change in the stock market today. Changes in information about the future course of RGDP may cause prices to change in the stock market. This explanation suggests that while stock prices are used to predict future economic activity, the actual causality is from future GDP growth in current stock prices.

Foreign Institutional Investment

Indian stock market is the most volatile one in the world as the stock price is being regulated by many political, economic and global factors. However, the major factor is the huge intraday transactions by the Foreign Institutional Investors.

3. Objective and rational of the study:

The objectives of the study are:

1- To study and estimating the relationship of economic variables taken in the study and the stock market return.
2- To establish the cause and effect relationship between these variables and the stock market return.

The rational of the study lies in the fact that after establishing the Cointegrating and cause and effect relationship we can plan our investment in the portfolio by observing the economic variables in the Indian economy. The result of the study can also be used in the forecasting of the short term as well as long term futures.

4. Data and methodology:

The secondary source of data has been used to collect the monthly data of the various economic variables. We have collected monthly closing price data of NIFTY from national stock exchange for the period April 2000 to March 2015 and the data of all other variables are also collected for the same period. The data of economic variables has been collected from the official website of the Reserve Bank of India and investing.com and moneycontrol.com.

Methodology: The data so collected has been put to unit root test first to check whether data are stationary or not. In the second step we have applied the Johansen co-integration test to find out the long run association between the variables. Since all the variables are not stationary this study has used the VAR model instead of OLS to establish the relationship between the economic variables and the market return. The use of VAR model is better as it applies the appropriate lag number so as to estimate the real effect of the independent variables on the dependent variables. In the next step Granger causality has been applied to support the findings of the VAR model. The Granger causality test establishes the causality between two variables. The general model of the test is given bellow. If b_j is statistically significant then we can say that Y is the granger cause of X. and if α_i is statistically significant we can say that X is Granger cause of Y.

5. Analysis:

This study has taken the monthly data of the various variables and the application of the various tests has generated the following results and the analysis of the result has been done I the following paragraphs.

Table-1

Unit root test								
	ADF test				**P.P. test**			
	At level		**At 1st difference**		**At level**		**At 1st difference**	
Variables	Critical value	Test statistics	Critical value	Test statistics	Critical value	Test statistics	Critical value	Test statistics
Nifty	3.4351	2.5552	3.4351	13.618	3.4351	2.8344	3.4352	13.6248
BM3	3.4369	1.6027	3.4369	2.9827	3.4351	0.5641	3.4352	15.4584
EXCR	3.4351	1.2142	3.4351	12.1662	3.4351	1.3568	3.4352	12.1471
FIIPURCHASE	3.4352	4.0897	3.4352	19.046	3.4351	5.8126	3.4352	22.0681
FISD	3.4367	1.9925	3.4367	11.995	3.4351	11.4178	3.4352	33.2056
IIP	3.4371	1.3491	3.4371	3.0254	3.4351	5.2718	3.4352	43.1035
WPI	3.4351	2.1471	3.4351	13.3675	3.4351	2.1818	3.4352	13.3674

At 5% significance level

In the first step we conducted to test the stationarity of the variables taken in this study. For this purpose two unit root test Augmented Ducky fuller test and Philips Peron test has been conducted to ensure the consistency in the result. The results as shown in the table-1 all most all the variables are non-stationary series with an exception FIIPURCHASE variable. When tested for stationarity in their 1st deference series all the variable series became stationary.

Table-2

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.429252	263.8064	125.6154	0.0000
At most 1 *	0.378820	165.6651	95.75366	0.0000
At most 2 *	0.243452	82.34165	69.81889	0.0036
At most 3	0.090440	33.51855	47.85613	0.5283
At most 4	0.064470	16.92959	29.79707	0.6452
At most 5	0.026496	5.267226	15.49471	0.7798
At most 6	0.003240	0.567977	3.841466	0.4511

Trace test indicates 3 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table-3

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.429252	98.14125	46.23142	0.0000
At most 1 *	0.378820	83.32345	40.07757	0.0000
At most 2 *	0.243452	48.82311	33.87687	0.0004
At most 3	0.090440	16.58896	27.58434	0.6154
At most 4	0.064470	11.66236	21.13162	0.5812
At most 5	0.026496	4.699249	14.26460	0.7792
At most 6	0.003240	0.567977	3.841466	0.4511

Max-eigenvalue test indicates 3 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table-4

2 Cointegrating Equation(s):		Log likelihood	-7620.607			
Normalized cointegrating coefficients (standard error in parentheses)						
NIFTY	BM3	EXCR	FIIPURCHASE	FISD	IIP	WPI
1.000000	0.000000	-56.40606	-0.046051	0.028402	-34.5378	11.77882
		(11.2009)	(0.00467)	(0.00557)	(4.71327)	(1.81547)
0.000000	1.000000	-1783.01	-0.491062	-0.773311	-214.564	78.51131
		(186.272)	(0.07759)	(0.09262)	(78.3823)	(30.1915)

The results of the Johansen co- integration test have been shown in table-2, table-3 and table-4. The data reflects that all the variables taken in the study has long run integration among themselves. As all the variables are cointegrated with each other in the next step we have applied the VECM model to develop the regression equation to show the dependency of the nifty return in upon the other macroeconomic variables. The equation derived after applying the VECM model has been shown in the table-5 bellow.

Table-5

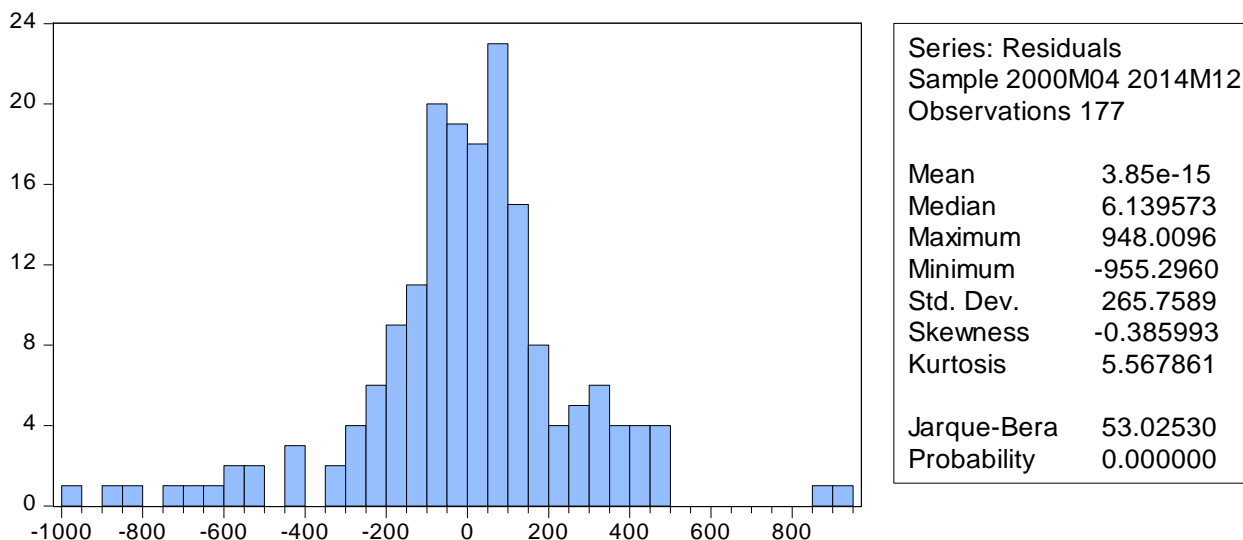| Dependent Variable: D(NIFTY) |
|---|
| Method: Least Squares |
| Sample (adjusted): 2000M04 2014M12 |

Included observations: 177 after adjustments

D(NIFTY) = C(1)*(NIFTY(-1) - 0.0567360222821*BM3(-1) + 186.440989014 *EXCR(-1) - 0.0874071540449*FIIPURCHASE(-1) - 0.0982393263153 *FISD(-1) + 99.0111860728*IIP(-1) + *D(FISD(-1)) + C(11)*D(FISD(-2)) + C(12)*D(IIP(-1)) + C(13)*D(IIP(-2)) +1.95908134445*WPI(-1) - 17215.2319116) + C(2)*D(NIFTY(-1)) + C(3)*D(NIFTY(-2)) + C(4)*D(BM3(-1)) + C(5)*D(BM3(-2)) + C(6)*D(EXCR(-1)) + C(7)*D(EXCR(-2)) + C(8)*D(FIIPURCHASE(-1)) + C(9)*D(FIIPURCHASE(-2)) + C(10) C(14)*D(WPI(-1)) + C(15)*D(WPI(-2)) + C(16)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.011359	0.012275	0.925354	0.3562
C(2)	-0.09717	0.097729	-0.994248	0.3216
C(3)	-0.02587	0.100715	-0.256885	0.7976
C(4)	-0.01131	0.050288	-0.224816	0.8224
C(5)	0.012019	0.052049	0.230909	0.8177
C(6)	-33.9677	23.37732	-1.453017	0.1482
C(7)	23.59518	23.33774	1.011031	0.3135
C(8)	0.000929	0.00207	0.448963	0.6541
C(9)	0.004961	0.001965	2.524878	0.0125
C(10)	0.001565	0.001166	1.342408	0.1814
C(11)	0.001189	0.0009	1.320772	0.1885
C(12)	-0.68472	4.023631	-0.170175	0.8651
C(13)	-0.5535	3.841621	-0.144081	0.8856
C(14)	3.035143	2.466543	1.230525	0.2203
C(15)	-2.0701	2.461241	-0.841081	0.4015
C(16)	42.42449	42.71528	0.993192	0.3221
R-squared	0.076055	Mean dependent var		39.65847
Adjusted R-squared	-0.01003	S.D. dependent var		276.4808
S.E. of regression	277.8634	Akaike info criterion		14.17818
Sum squared resid	12430496	Schwarz criterion		14.46529
Log likelihood	-1238.77	Hannan-Quinn criter.		14.29462
F-statistic	0.883526	Durbin-Watson stat		1.944462
Prob(F-statistic)	0.583608			

The above model developed as a result of the VECM model and the equation developed in the VECM model has been applied in the estimate equation in the E-views software the above equation has been developed. The analysis of the above result reveals that the dependent variable Nifty is very insignificantly related to eco-nomic variables taken in the study. To verify the consistency and dependability of the above result we have also carried on some other test as shown in the table-6, 7 and8.

In the first step we have test the normality of the residuals and result are shown in table-6. The result reveals that the residuals are normally distributed and the satisfy the test of normality.

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Table-6

Series: Residuals
Sample 2000M04 2014M12
Observations 177

Mean	3.85e-15
Median	6.139573
Maximum	948.0096
Minimum	-955.2960
Std. Dev.	265.7589
Skewness	-0.385993
Kurtosis	5.567861
Jarque-Bera	53.02530
Probability	0.000000

In the table below we show the results of the test for heteroscedasticity which reflects that the data is not heteroscedatic in nature and there is no ARCH effect.

Table-7

Heteroskedasticity Test: ARCH			
F-statistic	1.798165	Prob. F(1,174)	0.1817
Obs*R-squared	1.800229	Prob. Chi-Square(1)	0.1797

In the table-8we have presented the result of test for the serial correlation and the result reveals that there is no serial correlation between the variables taken in the study.

Table-8

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.273032	Prob. F(2,159)	0.7614
Obs*R-squared	0.605802	Prob. Chi-Square(2)	0.7387

From the above three tests we can conclude that the result derived from the VECM model are reliable and can be used for the decision making.

Table- 9

Pairwise Granger Causality Tests			
Sample: 2000M01 2014M12			
Lags: 7			
Null Hypothesis:	Obs	F-Statistic	Prob.
BM3 does not Granger Cause NIFTY	173	1.574	0.1468
NIFTY does not Granger Cause BM3		1.46213	0.1845
EXCR does not Granger Cause NIFTY	173	3.67887	0.001
NIFTY does not Granger Cause EXCR		3.60005	0.0013
FIIPURCHASE does not Granger Cause NIFTY	173	1.12445	0.3504
NIFTY does not Granger Cause FIIPURCHASE		5.59221	0.000009
FISD does not Granger Cause NIFTY	173	1.55968	0.1512
NIFTY does not Granger Cause FISD		1.50711	0.1684
IIP does not Granger Cause NIFTY	173	1.84387	0.0824
NIFTY does not Granger Cause IIP		2.29427	0.0297
WPI does not Granger Cause NIFTY	173	1.13375	0.3447
NIFTY does not Granger Cause WPI		0.96996	0.4551

The result of the granger causality test as shown in the table-9 reflects that the two way causality exist between nifty and exchange rate and there exists one way causality from nifty towards FII purchase and IIP.As in all other cases we don't find any causality between other variables.

6. Conclusions:

This study examines the relationship between the stock market return and the major macro and micro economic variables. The result of the study revealed that there exists a long run association though the causality is very mild. The major variable that affects the stock market return turn out to be the foreign exchange rate of Indian rupees with the US dollar. This finding is important for the investors for decision making that they will observe the economic variable along with other variables such as the market demand and supply situation and the profitability and efficiency of the Indian corporate world as a whole.

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