IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): 2231 –5268
www.ijcsms.com

AN EMPIRICAL ANALYSIS OF CAUSAL RELATIONSHIP BETWEEN STOCK MARKET AND MACROECONOMIC VARIABLES IN INDIA

Ashish Kumar
Asst. Professor Sh. L.N. Hindu College, Rohtak
ashish_prl@yahoo.com

ABSTRACT

The present paper is aimed at studying the nature of the causal relationship between stock prices and macroeconomic variables in India, if any such relationship exists. For this purpose the techniques of unit–root tests, cointegration and the Granger causality test have been applied between the NSE Index 'Nifty' and the macroeconomic variables, viz., Real effective economic rate (REER), Foreign Exchange Reserve (FER), and Balance of Trade (BoT), Foreign Direct Investment (FDI), Index of industrial production (IIP), Wholesale price index (WPI) using monthly data for the period from 1st April 2006 to 31st March 2010 have been studied.

The major findings of the study are (i) there is no co integration between Nifty and all other variables except Wholesale price index (WPI) as per Johansen Co integration test. Therefore causal relationship between such macro economic variables having no co integration with nifty is not established. (ii) Nifty does not Granger Cause WPI and WPI also does not Granger Cause Nifty.

Keywords: *Granger Causality, Macroeconomic Variables, Co-integration, Stock Prices JEL Classification: G1, E4*

Introduction

The economic environment ant the variables constituting that environment exert a significant impact on the stock market returns in a given country. The economic environment is composed of the micro and macro level variables which may either be formed logically on economic fundamentals or by many subjective factors which are unpredictable and non quantifiable. It is generally perceived that domestic economic variables play a seminal role in the overall performance of stock market. But in the era of globalisation and integration of world economies the impact of global economic variables can not be ignored. The important external factors influencing the stock prices of an economy may include interalia stock market returns in other developed economies such as US and China, the interest rate (LIBOR), foreign investment and the exchange rate etc. It is a very well recognised fact that recent subprime crisis in U.S. had a significant impact on the movement in the capital markets across the globe as foreign hedge funds unwind their positions in various markets to meet their obligations in U.S. Another important example in this regard is the appreciation of Indian currency due to increased inflow of foreign exchange which caused a decline in the stock prices of major export oriented companies prominently in the information technology and textile sectors. The modern financial theory concentrates upon systematic factors as sources of risk and contemplates that the long run return on an individual asset must replicate the changes in such systematic factors. It leads to a conclusion that securities market has an important relationship with real and financial sectors of the economy. This relationship is generally can be understood in two ways. The first relationship states that stock market leads economic activity, whereas the second case suggests that it follows economic activity. A prior knowledge of the sensitivity of stock market to macro economic behaviour of key economic variables and vice-versa is important in many areas of investments and finance. This research may be helpful to comprehend this relationship.

The process of liberalisation and globalisation was initialised in the year 1991 in our country. For this purpose various measures have been adopted. All this has resulted in integration of our economy with rest of the economies around the globe and has also resulted in increased share in international trade and increased foreign reserve. Besides this several reforms in the capital market have also been made such as opening of the stock markets to international investors, increase in the regulatory power of SEBI, trading in derivatives etc. These measures have resulted in noteworthy improvements in the size and depth of stock markets in India and they are beginning to play their due role. An understanding of the macro dynamics of Indian stock market can be valuable for traders, investors and also for the policy makers of the country. Results of the study may help in diagnosing whether the movement of stock market is the result of some other variables or it is one of the causes of movement in other macro variable in the economy. The study also expects to explore whether the movement of stock market is associated with the economy. In this context, the objective of this paper is to investigate such causal relations between stock market and macro economic aggregates for India for the period between 2006 to 2010.

The present paper is divided in the four sections. Section I provides a review of the selected literature on the causal relationship between stock market returns and selected macro economic variables. In Section II data and the methodology for testing the stationarity, the existence of cointegration, and the direction of causality if any has been discussed. The results of techniques applied and their interpretation is given in Section III of the paper. Finally, the conclusion of the paper is represented in Section IV.

I. Review of Literature

There is no dearth of literature on study of causal relationship between stock market and macro economic variables. The review

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): 2231 –5268
www.ijcsms.com

of the literature shows that there are numerous studies which confirm a causal relationship between stock prices and economic variables. Ma and Kao [1990] in their study reported that currency appreciation has an inverse impact on the domestic stock market especially in the case of export dominant economy. This is in confirmation with goods market theory. Bahmani and Sohrabian [1992] studied the causal relationship between U.S. stock market (S&P 500 index) and effective exchange rate of dollar in the short period of time. Their theory established a bi-directional causality between the two for the studied time period. However, co-integration analysis failed to identify any long run relationship between the two variables. A similar research was conducted by Abdalla and Murinde [1996] in budding fiscal markets of India, Pakistan, Korea and Philippines which showed causality in one direction from exchange rates to stock prices for the selected countries except Philippines. Ajayi and Mougoue [1996] in their study used daily data for eight countries to find interactions between stock markets and foreign exchange rates. The study on monthly exchange rates and stock prices conducted by Abdalla and Murinde [1996] resulted that a monthly exchange rates leads the stock prices but the reverse of this is not true. Pan, et al. [1999] conducted a study on establishing cause and effect relationship between exchange rates and stock prices. To serve the purpose daily market data was used. The study showed that the exchange rates Granger cause stock prices but stock prices does not Granger cause exchange rate. They further came out with the conclusion that the causal relationship has become stronger in the aftermath of the Asian financial crisis of 1998.

Malliaris and Urrutia [1991] observed that the performance of the stock market might be used as a leading indicator for real economic activities in the United States. For the United Kingdom, Thornton [1993] also found that stock returns tend to lead real income. In related work and Chang and Pinegar [1989] also concluded that there is a close relationship between stock market and the domestic economic activity.

A large number of researches {Chen, Roll, and Ross [1986], Bodie [1976], Fama [1981], Geske and Roll [1983], Pearce and Roley [1983], Pearce [1985], James et. al. [1985], and Stulz [1986]} have been executed to establish empirical association between macroeconomic variables and stock market returns. Bodie in 1976, Fama in 1981, Geske and Roll, Pearce and Roley in 1983 and Pearce in 1985 found a negative relationship between stock market returns and inflation & money growth in their respective studies. However, many scholars [Mukherjee and Naka, 1995] negated the above mentioned view point and stated that positive effects will overshadow the negative effects eventually and with the growth of money supply stock prices will tend to rise.

Mukherjee and Naka [1995] carried out a study between the Japanese *industrial production* and stock market return and their study found a positive impact of industrial production growth on stock market return. Their findings were in consistence with the findings of Cutler, Poterba, and Summers [1989] where a significantly positive correlation was found between Industrial Production growth rate and real stock market returns over the period from 1926 to 1986, except the sub period of 1946- 85.

In context of developing countries Mustafa, K et al. [2007] have done a study to investigate the empirical relationship between the stock market and real economy in Pakistan economy by taking up various variables like per capita GDP, output growth to represent the Real economy and stock market liquidity, size of stock market representing the Stock Market. Cointegration and Error Correction Model Technique has been adopted to establish the empirical relation, if any between the two from the time period 1980- 2004. Husain, F. [2006] examined the causal relationship between stock price and real sector variables of Pakistan economy, using annual data from 1959-60 to 2004-05. It studied the causal relationship between them using various econometric techniques like ECM, Engle-Granger co integrating regressions and Augmented Dickey Fuller (ADF) Unit Root tests. The study indicates the presence of a long run relationship between the stock prices and real sector variables.

More recently, Humpe, A., et al. [2009] have tried to relate the macro economic variables with long term stock market movements in US and Japan within the framework of a standard discounted value model by using monthly data over 40 years. A cointegration analysis has been applied to model the long term relationship between the industrial production, money supply, the consumer price index, long term interest rates and stock prices in US and Japan. The authors have found a significant relation between the macro economic variables and stock market in the long run.

In Indian context, Abhay Pethe and Ajit Karnik [2000] has investigated the inter – relationships between stock prices and important macroeconomic variables, viz., exchange rate of rupee vis-à-vis the dollar, prime lending rate, narrow money supply, and index of industrial production. The analysis and discussion are situated in the context of macroeconomic changes, especially in the financial sector, that have been taking place in India since the early 1990s. Chakradhara Panda, et al. [2001] explored the causal relations and vibrant interactions among monetary policy, real activity, expected inflation and stock market returns in the post liberalization period by using a vector–autoregression (VAR) approach. The major findings of their study are (i) expected inflation and real activity do affect stock returns, (ii) monetary policy loses its explanatory power for stock returns when expected inflation and real activity are present in the system, (iii) the relationships of monetary policy, expected inflation and real activity with stock returns lack consistency, (iv) there is no causal linkage between expected inflation and real activity. The nature of causal relationship between macro economic aggregates and stock prices was examined by Bhattacharya and Mukherjee [2002] for the period of 1992-93 to 2000- 2001. In this study they concluded no causal relationship between the stock prices and various macro economic aggregates such as national income, money supply and interest rates. However, they reported a bi directional causation between the inflation rate and stock prices. Kanakaraj, A. et al. [2008] examined the trend of stock prices and various macro economic variables between the time periods 1997-2007. They tried to explore upon and answer that if the recent stock market boom can be explained in the terms of macro economic fundamentals and have concluded by recommending a strong relationship between the two.

The review of the literature made for the purpose of the present study indicates there are different results with regard to the

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): 2231 –5268
www.ijcsms.com

causal relationship between key macro economic variables and stock market returns. The relationship differs in different stock markets and time horizons. The present paper is an effort to augment the existing literature by providing robust results based on different econometric techniques, about causal relationship for a period of 4 years (1.4.2006 to 31.3.2010) by using monthly data.

II. Empirical Methodology and Data

Stationarity of a data series is a prerequisite for drawing meaningful inferences in a time series analysis. Generally a data series is called stationary series if its mean and variance are constant over a given period of time and the covariance between the two time periods does not depend on the actual time at which it is computed but it depends only on lag amid the two time periods. The correlation between a series and its lagged values are assumed to depend only on the length of the lag and not when the series started. This property is known as stationarity and any series obeying this is called a stationary time series.
To test the stationarity of a series three different unit root tests have been applied. The stationarity of the time series has been verified by applying Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests. [Dickey and Fuller (1979, 1981), Phillips and Perron (1988), Enders (1995), Gujarati (2003)]. Further KPSS test has also been for increasing the reliability of the results. [Kwiatkowski, Phillips, Schmidt. and Shin (1992)].

Augmented Dickey Fuller (ADF) Test

Our study makes use of Augmented Dickey-Fuller (ADF) test which is a modified version of Dickey Fuller (DF) test. ADF test is superior to DF test as it makes a parametric correction in the original DF test for higher-order correlation by assuming that the series follows an AR (p) process. The approach of ADF test takes care of higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression. The specification of Augmented Dickey-Fuller test used in the study is given below:

$$\Delta y_t = \alpha_0 + \lambda y_{t-1} + \Sigma \gamma_i \Delta y_{t-i}^{p} + u_t \qquad \textbf{(I)}$$

Phillips-Perron (PP) Test

For adjusting with higher- order serial correlation in a given time series Phillips and Perron (1988) adopted a nonparametric method. The test regression for the Phillips-Perron (PP) test is the AR (1) process. As mentioned above the ADF test adds lagged differenced terms of the dependent variable to the right-hand side of the regression the PP test makes a nonparametric correction to the t-statistic of the coefficient from the AR(1) regression to counter the serial correlation in u_t. Phillips-Perron test is free from parametric errors which is a major advantage of this test. This test further allows the disturbances to be weakly dependent and heterogeneously distributed. That is why PP test is applied in the study for checking the stationarity of the time series data.

KPSS Test

ADF test is often criticised for not being able to make a distinction between unit root and near unit root processes in the case of short period time series. In this regard KPSS test scores over ADF test as it has the null hypothesis of series being stationary against the null hypothesis of having a unit root in ADF and PP tests. This feature of KPSS test ensures that the alternative will be accepted guarantees that the alternative will be accepted or rejected when there is strong evidence for or against it [Kwiatkowski, Phillips, Schmidt. and Shin (1992)].

Co-integration Test

Cointegration analysis helps in examining long run equilibrium relationship by the use of non-stationary series. If two variables are found to be cointegrated, they would not drift apart over a period of time on an average. The present study makes use of Johansen's Maximum Likelihood procedure for examining cointegration.

Granger Causality Test

The dynamic linkage is examined using the concept of Granger's causality test (1969, 1988). Granger causality test is applied on a stationary series. This test analyses the fact that between two given factors which one is the causing one and which factor is getting affected by another. The test is based on following two regression equations:

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-j} + u_{1t} \qquad \text{(II)}$$

$$X_t = \sum_{i=1}^{n} \lambda_i X_{t-i} + \sum_{j=1}^{n} \delta_j Y_{t-j} + u_{2t} \qquad \text{(III)}$$

In the two equations given above it has been assumed that disturbances u_{1t} and u_{2t} are not correlated with each other. Equation (II) postulates that current Y is related to its own past values as that of X and next equation (III) postulates a similar behaviour of X. There are following four possibilities of cause and effect:

1. Unidirectional causality from X to Y is indicated if the estimated coefficients on the lagged X in equation (II) are statistically different from Zero as a group (i.e. $\Sigma\alpha_i \neq 0$) and the set of estimated coefficients on the lagged Y in equation (II) is not statistically different from zero (i.e. $\Sigma\delta_j \neq 0$).
2. Unidirectional causality from Y to X is indicated if the estimated coefficients on the lagged X in equation (III) are statistically different from Zero as a group (i.e. $\Sigma\alpha_i \neq 0$) and the set of estimated coefficients on the lagged Y in equation (III) is statistically different from zero (i.e. $\Sigma\delta_j \neq 0$).

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): **2231 –5268**
www.ijcsms.com

	BOT	FDI	FER	IIP	NIFTY_CL	REER	WPI
Mean	-33750.19	8658.104	1046881.	273.6208	4205.306	97.51708	224.6375
Median	-29714.00	7836.500	1166866.	269.2500	4305.400	97.56500	226.5500
Maximum	-15376.00	22529.00	1301645.	347.3000	6144.350	106.0900	250.5000
Minimum	-69925.00	2405.000	690730.0	225.2000	2674.600	87.48000	199.0000
Std. Dev.	14217.27	4646.714	214050.1	26.96276	872.2687	5.679449	15.35988
Skewness	-0.759591	0.869245	-0.452362	0.620278	0.098875	-0.074652	0.116621
Co-eff. of Variance	-42.125	53.66896	20.44646	9.854061	20.7421	5.824056	6.83763
Kurtosis	2.751454	3.416896	1.530345	3.330791	2.359419	1.856711	1.689008
Jarque-Bera	4.739378	6.392298	5.956823	3.296808	0.898900	2.658803	3.546204
Probability	0.093510	0.040919	0.050874	0.192357	0.637979	0.264636	0.169805
Sum	-1620009.	415589.0	50250309	13133.80	201854.7	4680.820	10782.60
Sum Sq. Dev.	9.50E+09	1.01E+09	2.15E+12	34168.56	35760076	1516.039	11088.51
Observations	48	48	48	48	48	48	48

Table 1: Descriptive Statistics

3. Feedback, or bilateral causality is suggested when the sets of X and Y coefficients are statistically significant different from zero in both the regression equations.
4. Independence is suggested when the sets of X and Y coefficients are not statistically significant in both the cases.

Lag-Length Criteria

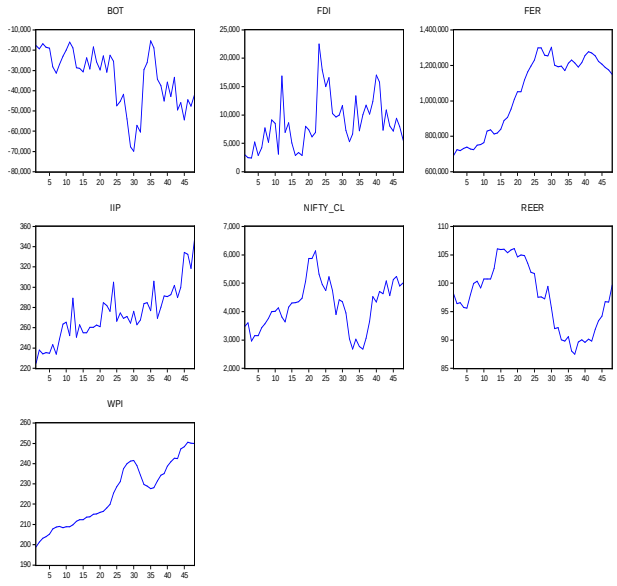
In applying econometrics techniques determination of lag length of an autoregressive process is a difficult task.
To overcome this problem various lag length selection criteria such as Akaike Information Criterion, Schwarz Information Criterion, Hannan-Quinn Criterion, Final Prediction Error, and Corrected version of AIC have been suggested in the literature.
Asghar and Irum have compared various lag determination criteria such as Akaike Information Criterion, Hannan-Quinn Criterion, Schwarz Information Criterion, Final Prediction Error and Corrected version of AIC. The selection of lag length was made for three different cases viz. under normal errors, under non-normal errors and under structural break by applying Monte Carlo simulation technique. Their study shows that the performance of all these criteria improves with an increase in the sample size. For sample size of 30, although AIC and FPE have the highest probability of correct estimation but all other criteria also perform very well. For sample size equal to 60, probability of correct estimation for HQC is highest but AIC and SIC also has probability of correct estimation close to that of HQC. For large sample size (120 or greater) performance of SIC is the best. This shows that AIC and FPE are efficient but not asymptotically consistent where as SIC, AIC and HQC are asymptotically consistent criteria. Liew and Khim [2004] have carried out this study for both normal and non-normal errors. They found that HQC is the best for large samples. In the present study lag length is determined on the basis of Hannan-Quinn Information Criteria.

III. Empirical Analysis

The descriptive statistics for all four variables are calculated and presented in table 1. These variables are Real Effective Economic Rate, Balance of Trade, Foreign Exchange Reserve and NSE Nifty. The skewness coefficient, in excess of unity is taken to be fairly extreme [Chou 1969]. High or low kurtosis value indicates extreme leptokurtic or extreme platy-kurtic [Parkinson 1987]. Generally values for zero skewness and kurtosis at 3 represents that the observed distribution is normally distributed. It is also observed that the frequency distribution of the selected macro economic variables is not normal. It is also evidenced by the Jarque-Bera statistics in the results. Further, the coefficient of variance indicates that the Foreign Direct Investment, Balance of Trade, Foreign Exchange Rate and Nifty are relatively more volatile in comparison to Index of Industrial Production, Wholesale Price Index and Real Effective Exchange Rate.

The first and simplest type of test one can apply to check for stationarity is to actually plot the time series and may look for possibility of trend in mean and variance, evidence of autocorrelation and seasonality in the data. If these patterns are found in the series then the series can be regarded as non stationary. The seven time series displayed in figure-1 exhibit different such patterns. Foreign Exchange Reserve, Index of Industrial Production and Wholesale Price Index seem to exhibit a trend in the mean since they have a clear upward slope. In fact, sustained upward or downward sloping patterns (linear or non-linear) are signs of a non-constant mean. The time series on Balance of Trade, Nifty and Real Effective Economic Rate in the figure contain an obvious trend in both mean and variance. This is a sign of non-stationarity.

Figure 1: Dataset Graph



Apart from visual inspection, formal test for stationarity is essential to opt for appropriate methodological structure. As a first step, we tested all the variables (Balance of Trade, Foreign Exchange Reserve, Foreign Direct Investment, Nifty, Real Effective Economic Rate, Index of Industrial Production and Wholesale price index) for stationarity by applying ADF, PP unit root test and KPSS stationarity test. The result of ADF, PP and

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): **2231 –5268**
www.ijcsms.com

KPSS statistics are given in table-2. On the basis of ADF statistics and PP test, all the series are found to be non-stationary at levels except Foreign Direct Investment which is significant at one percent. Further, ADF statistics and PP test rejects null hypotheses of unit root in case of first differences for all the variables. In the end, KPSS test is also applied which has a null hypothesis that series is stationarity. In this case, all variables are non stationary in levels (except nifty) and stationary in first differences. Assuming all the variables are non-stationary at levels and stationary at first differences on the basis of ADF, PP, KPSS tests and visual inspections, Johansen's approach of cointegration and Granger causality test have been applied.

Variables	Null Hypothesis: Variable is non-stationary		Null Hypothesis: Variable is non-stationary		Null Hypothesis: Variable is stationary	
	Augmented Dicky Fuller Test Statistic		Phillips-Perron Test Statistic		Kwiatkowski-Phillips-Schmidt-Shin test statistic	
	Level	First Difference	Level	First Difference	Level	First Difference
	t- statistic p-value	t- statistic p-value	t- statistic p-value	t- statistic p-value	LM-Stat.	LM-Stat.
BOT	-2.389654 0.1500	-7.779047* 0.0000*	-2.389654 0.1500	-7.724768* 0.0000*	0.515649**	0.043815
FER	-1.795759 0.3781	-5.191802* 0.0001*	-1.651677 0.4488	-5.360630* 0.0000*	0.759324*	0.341829
NIFTY_CL	-1.638304 0.4554	-6.201501* 0.0000*	-1.727747 0.4110	-6.205292* 0.0000*	0.145549	0.086579
REER	-0.958878 0.7602	-5.515513* 0.0000*	-1.236302 0.6510	-5.591141* 0.0000*	0.422529***	0.184626
IIP	0.234639 0.9719	-8.117466* 0.0000*	-1.213731 0.6609	-13.32941* 0.0000*	0.823505*	0.133640
WPI	-0.812230 0.8061	-3.547469** 0.0109**	-0.756054 0.8220	-3.643894* 0.0085*	0.860559*	0.046077
FDI	-3.962301 0.0035*	-10.05718* 0.0000*	-3.955949 0.0035*	-10.26543* 0.0000*	0.378648***	0.065507
Asymptotic critical values*:						
1% Level	-3.48		-3.48		0.74	
5% Level	-2.88		-2.88		0.46	
10% Level	-2.57		-2.57		0.35	

Table 2: Unit Root Test

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
NIFTY_CL – BOT(1)					
Trace	0	0	0	0	0
Max Eig	0	0	0	0	0
NIFTY_CL – FER(1)					
Trace	0	0	0	0	0
Max Eig	0	0	0	0	0
NIFTY_CL – REER(1)					
Trace	0	0	0	0	0
Max Eig	0	0	0	0	0
NIFTY_CL – IIP(2)					
Trace	0	0	0	0	0
Max Eig	0	0	0	0	0
NIFTY_CL – WPI(2)					
Trace	0	0	0	1	2
Max Eig	0	0	0	1	2

Table 3: Johansen Co-Integration Test: Nifty and Other Macro Variables (Number of Cointegrating Relations by Model)

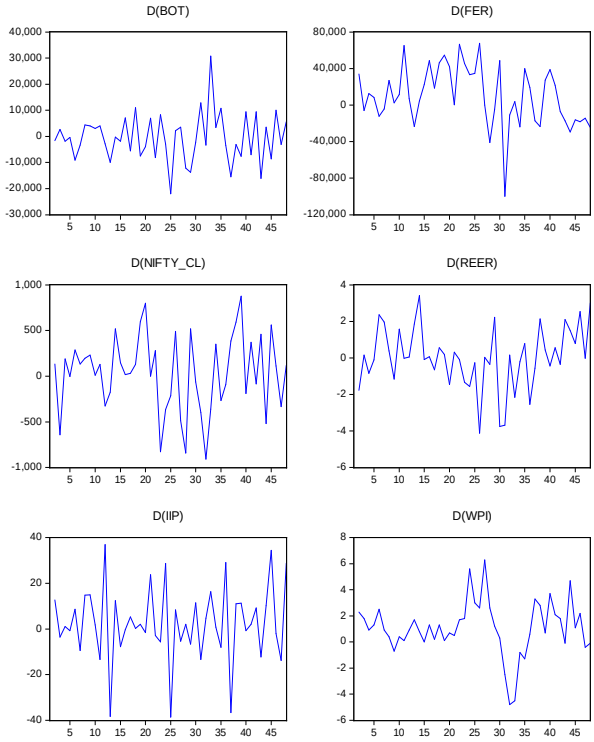


Figure 2: Dataset Graph

Johansen's test of cointegration is applied to discover any long-run relationship between Indian stock markets (NSE) and chosen macro economic variables i.e. exports, exchange rate, index of industrial production, foreign direct investment, interest rate and money supply. The number of lags in cointegration analysis is chosen on the basis of Hannan-Quinn Information Criterion. Before discussing the results, it is important to discuss what it implies when two variables are cointegrated and when they are not. When two variables are cointegrated, it implies that the two time series cannot wander off in opposite directions for very long without coming back to a mean distance eventually. But it does not mean that on a daily basis the two series have to move in synchrony at all. When two series are not cointegrated it implies that the two time series can wander off in opposite directions for very long without coming back to a mean distance eventually.

As is concluded by unit root tests that all the variables considered except the Foreign Direct Investment (FDI) are I(1), while the FDI is I(0). So for the testing of cointegration among the variables, the FDI is dropped from the further analysis.

Results indicate that Nifty and Wholesale Price Index may be cointegrated in the long run as the results vary depending on the varying assumption about trend and intercept. However, all other variables and Nifty are not cointegrated in the long run under all

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): **2231 –5268**
www.ijcsms.com

assumptions. In case of Balance of Trade - Nifty, Foreign Exchange Reserve - Nifty, Real Effective Exchange Rate - Nifty and Index of Industrial production – Nifty, there is no evidence of co-integration. (See table-3).

*Critical values based on MacKinnon-Haug-Michelis (1999)

**Appropriate lag is given in parentheses on the basis of Hannan-Quinn Information Criteria

Table 4: Pairwise Granger Causality Tests

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(WPI) does not Granger Cause D(NIFTY_CL)	45	0.38604	0.6822
D(NIFTY_CL) does not Granger Cause D(WPI)		0.99976	0.3770

Since there is no evidence of cointegration in the macro economic variables and Nifty series the test of Granger Causality is not applied between Nifty and such variables except Wholesale Price Index which is cointegrated with Nifty under the model of Linear Trend & Intercept and Quadratic Trend & Intercept. The test results in table 4 suggest that we fail to reject the null hypothesis of *Granger non-causality* from WPI to NIFTY_CL as well as the null hypothesis of *Granger non-causality* from NIFTY_CL to WPI. The results suggest that the NSE Index Nifty neither leads Wholesale Price Index nor Wholesale Price Index lead the Nifty. This implies that the stock market cannot be used as a leading indicator for future growth in wholesale price index in India.

IV. Concluding Remarks

The purpose of the present study is to explore the relationships between stock prices and the key macro variables representing real and financial sector of the Indian economy. These variables are the index of industrial production, foreign exchange reserves, foreign direct investment, balance of trade, real effective exchange rate, wholesale price index and NSE Nifty. The present analysis is based on monthly data from April, 2006 to March, 2010.

Although there seems to be a significant relationship between macro economic variables and stock market but results of our study show that stock market boom is not much supported by the real economic fundamentals. Even there is no sign of causality between the variables which are integrated of same order which further concretizes the issue that Indian stock market is still in its childhood phase as the impact of stock market on real economic variables is less than that is visible in developed countries and also the influence of real economic aggregates is negligible on stock index. To solve this problem monthly data was used from April 2006 to March 2010 and the basic and believed to be "indicator" variables were used and studied and analysed by first applying the basic statistical and analytical tools such as unit root test, cointegration and finally Granger causality.

The results shows that series of variables used are not stationary at levels but at first difference. Further, there is no evidence of cointegration among the economic indicators chosen and Indian stock market except with inflation (Wholesale Price Index). Granger Causality test was applied between the two variables found integrated of same level I(1) i.e. Nifty and WPI. The analysis pointed that there are no sign of causality between the two variables and neither Nifty Granger causes WPI nor WPI causes Nifty. Thus implying that real sector is not causing the vibes in stock market and even the volatility in it is due to some other external factors and not these real economic factors. Adding to it, is one more reason that just 2 to 3% of the Indian population invests in stock market which makes it not so good representative of the Indian financial health.

References

[1] Abdalla, I. S. A. and V. Murinde (1996), Exchange rate and stock prices interactions in emerging financial markets: Evidence on India, Korea, Pakistan and Philippines. *Applied Financial Economics*, 7, 25-35.

[2]Ahmed Shahid (2008), Aggregate Economic Variables and Stock Markets in India, *International Research Journal of Finance and Economics*, Issue 14.

[3] Ajayi, R. A. and M. Mougoue (1996), On the Dynamic Relation between Stock Prices and Exchange Rates, *Journal of Financial Research*, 19, 193-207.

[4] Bahmani-Oskooee, M. and A. Sohrabian (1992), Stock Prices and the Effective Exchange Rate of the Dollar, *Applied Economics*, 24, 4, 459-464.

[5] Bhattacharya B and Mukherjee J. (2002), Causal relationship between stock market and exchange rate, foreign exchange reserves and value of trade balance: A case study for India, www.igidr.ac.in

[6] Bodie, Zvi. (1976), "Common Stocks as A Hedge against Inflation," *Journal of Finance*, 31(2), 459-470.

[7] Chang, E. C. and J. M. Pinegar (1989), Seasonal Fluctuations in Industrial Production and Stock Market Seasonals, *Journal of Financial and Quantitative Analysis*, 59-74.

[8] Chen, N, R. Roll, and S. Ross (1986), Economic Forces and the Stock Market, *Journal of Business* 59, 383-403.

[9] Chou, Y L (1969): *Statistical Analysts*, Holt Rinehart and Winston, London.

[10] Cutler, D. M., J. M. Poterba, and L. H. Summers (1989), What moves stock prices? *Journal of Portfolio Management*, 15, 4-12.

[11] Dickey, D. A. and W. A. Fuller (1979), Distribution of the Estimators for Autoregressive Time Series with a Unit Root, *Journal of the American Statistical Association*, 74, 355-367, 427-431.

IJCSMS International Journal of Computer Science & Management Studies, Vol. 11, Issue 01, May 2011
ISSN (Online): **2231 –5268**
www.ijcsms.com

[12] Dickey, D. A. and W. A. Fuller (1981), *Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root*, Econometrica 49, 1057-1072.

[13] Engle, R. F. and C. W. J. Granger (1987), *Co-integration and error-correction: Representation, estimation and testing,* Econometrica, 55, 251—276.

[14] Fama, E. F. (1981), Stock Returns, Real Activity, Inflation, and Money, *American Economic Review*, 71(4), 545-565.

[15] Geske, R. and R. Roll (1983), The Fiscal and Monetary Linkage between Stock Returns and Inflation, *Journal of Finance*, 38(1), 1-34, 164

[16] Granger, C. W. J. (1988), Some Recent Developments in the Concept of Causality, *Journal of Econometrics*, 39, 199-211.

[17] Granger, C. W. J. and Newbold, P. (1974), Spurious Regression in Econometrics, *Journal of Econometrics*, 2, 111-120.

[18] Granger, C.W.J., 1969, Investigating Causal Relations by Econometric Models and Cross-Spectral Methods, *Econometrica*, 37, 428-438.

[19] Gujarati, D.N.(2003), Basic Econometrics, McGraw Hill, India.

[20] Humpe, A., Peter, M.; (2009), Can Macroeconomic Variables Explain Long-term Stock Market Movements? A Comparison of the US and Japan, *Applied Financial Economics.* 19, 111-119