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MOVEMENT OF STOCK MARKETS IN INDIA: INFLUENCE OF MACROECONOMIC FACTORS

Dr. Hari Leela Vemula
Associate Professor, Faculty of Management Science,
Mahatma Gandhi Institute of Technology, Hyderabad, Telangana
vharileela_ms@mgit.ac.in

ABSTRACT

In modern times, stock markets are considered to be important part of financial markets and it revealsthe health of the economy. In fact, they are also referred to as barometer of an economy. Share prices do not move in vacuum rather their movement is affected by a large number of heterogeneous factors. The main objective of the study is to identify important factors that affect the movement of Indian stock markets and the degree of impact of these factors on the same. For conducting this study, BSE Sensex has been used to represent the movement of stock market in India. The study deals with time series data and consist of ten variables i.e. Crude Oil Prices, FII Investment, Foreign Exchange(USD/INR)Rate, Foreign Exchange Reserve, Inflation (Wholesale Price Index as a proxy for inflation), S&P 500, NASDAQ Composite, FTSE 100, Nikkei 225, and BSE Sensex. Principal Component Analysis and Regression Analysis are used in the studyto draw the conclusions. All these variables have been clubbed into two broad factors labeled as Factor1 (F1) and Factor2 (F2). The study reveals that both these factors have significant impact on movement of BSE Sensex.

Keywords: Indian Stock Market, BSE Sensex Macroeconomic factors,

INTRODUCTION

Under the major economic reform of 1991, Indian financial markets have gone through several changes. As a result, its importance is growing in domestic as well as global market and it plays a significant role in the economic growth of the country. Stock market has been a vital and one of the most vibrant components of stability of an economy that could be measured through the performance of its indices. The reforms has globalized as well as liberalized the economy and enhanced its international integration.

Globalization of the economy resulted in global connectivity of markets, thus, risk has also enhanced. And this risk is channelized from the world market to domestic market in the form of several factors that have effect on the functioning of domestic stock market. The fluctuations in stock prices can influence numerous factors in the economy such as consumer and business confidence which can, in turn, have a positive or negative impact on the economy as a whole.

These factors include economic, political and international environment and other macroeconomic factors. These macro-economic factors which are associated with the functioning of economy play a major role in governing the functions and the growth of stock market.

The performance of an individual company varies in the stock market due to news about its performance, such as earnings reports and acquisition announcements, there are external

influences which affect stocks and the market as a whole. In an efficient market, stock prices would be determined primarily by fundamentals, which, at the basic level, refer to:

- The level of the earnings base (represented by measures such as EPS, cash flow per share, dividends per share)
- The expected growth in the earnings base
- The discount rate, which is itself a function of inflation
- The perceived risk of the stock

Macro-economic factors such as interest rates, inflation, unemployment, and economic outlook, economic and political shocks, changes in the policies, disasters(natural & Man made), foreign markets, and market philosophy etc. often move stock markets. Stock markets are always rooting for more economic growth, because it usually means more profits for companies, and more profits tend to grow the value of stocks. Declining interest rates often send markets higher, because they are seen as a harbinger of economic growth. High inflation has the opposite effect, because it signals that interest rates will be rising in the immediate or near future, thus slowing economic growth. Rising unemployment foreshadows lower economic growth, and falling unemployment tells stock investors that growth is on the way. When these data are reported, they can move stocks, but they may not if the numbers are more or less what investors expected. Nevertheless, to invest in stocks, it's important to keep an eye on these numbers. They can often predict whether the market as a whole will go up or down.

Movements in the stock market can be quite volatile and sometimes movements in share prices can seem divorced from economic factors. However, there are certain underlying factors which have a strong influence on the movement of share prices and the stock market in general. These include Crude Oil, Foreign Institutional Investors(FII), Foreign Exchange Reserves, Inflation, NASDAQ, S&P500, The Financial Times Stock Exchange(FTSE) , NIKKIE, BSE SENSEX etc.

REVIEW OF LITERATURE:

Many academic Researchers, financial and industry analysts and practitioners have tried to envisage the relationship between Macroeconomic variables and Stock Market movement s from the past decades. They have done several empirical and descriptive studies to check the effect of macroeconomic variables on Stock prices or vice-verse and the existing relationship between the two. The different inferences have been drawn by the various studies based o the selection of variables, methodologies, techniques and tests used. Here, we discussed some previous Research works and their conclusions that are related to our Research work.

Enormous literature on the association between macroeconomic variables and stock returns is present. Even though results are differing, many studied have shown substantiated that there are significant relationships between macroeconomic variables and stock returns. Research in this regard was by initiated Chen et al.(1986) in a paper . 'Simple and intuitive financial theory'.as they put it, is a well-known phrase in literature Economic news can be measured as innovations in variables. They explored the economic variables that influence stock returns and the asset pricing. These variables were priori, sources of systematic risk. Economic variables which were significant in explaining stock returns were industrial production, changes in risk premium, twists in yield curve and also measures of unanticipated inflation and changes in

expected inflation during periods of high volatility. The actual per capita consumption and index of oil price became insignificant.

NalinipravaTripathy (2011) investigated the market efficiency and casual relationship between selected Macroeconomic variables and the Indian Stock The study confirms the presence of auto correlation in the Indian stock market and macroeconomic variables which implies that the market fell into form of Efficient Market Hypothesis. Further the Granger- Causality test shows evidence of bidirectional relationship between Interest rate-stock market, Exchange rate-stock market, International stock market- BSE volume and Exchange rate- BSE volume. The study also reported unidirectional causality running from International Stock Market to Domestic Stock Market, Interest Rates, Exchange Rate and Inflation Rate indicating sizeable influence in the stock market movement in the considered period. The study emphasized that the Indian stock market is more sensitive for the changes in the International market, Exchange rate and interest rate in the economy and they can be used to predict stock market price fluctuations.

Kiran kumar kotha, Bhawna Sahu(2016) opined, the rapid growth of Indian economy during the last two decades rises empirical questions regarding the fundamental connection between stock price and key macroeconomic indicators. This paper aims to examine long and short run relations between selected macroeconomic indicators and stock market returns with reference to India.The study revealed the presence of long run relation between the BSE sensex and select macroeconomic indicators viz., exchange rates, wholesale price index, T- bill rates and M3.

Sharma, Gagan Deep and Mahendru Mandeep(2010) analyzed long-term relationship between BSE and macroeconomic variables, via-à-vis, change in exchange rate, foreign exchange reserve, inflation rate and gold price. The multiple regression equation models (Galton, 1877) in order to investigate the relationship these factors.. Results revealed that there is high correlation between the exchange rate and gold prices which highly effect the stock prices on the other hand the influence of foreign exchange reserves and inflation on the stock price is to a limited extent only.

Samveg Patel(2012) investigated the effect of macroeconomic determinants on the performance of Indian stock market using monthly data for eight macroeconomic variables viz. Inflation, Interest rate, Exchange rate, industrial production index, Money supply , prices of Gold and Silver , Oil price, Two stock market indices namely: Sensex and S&P CNX Nifty. It also proves the long run relationship between macroeconomic variables and stock market indices. The study also revealed the causality run from exchange rate stock market indices to IIP and oil price.

Agrawalla, Raman K and Tuteja. S.K (Dec 2008) attempted to examine the casual relationships between the share price index and industrial production for India in a multivariate vector error correlation model which involves crucial macroeconomic variables such as money supply, credit

to the private sector, exchange rate, wholesale price index and money market rate in order to have right and robust model specification. The study reported causality running from economic growth proxies by industrial production to share price index and not the other way round.

Rajesh and Bhaskar (2015): analyzed the effect of macroeconomics variables on the movement of the share price. This study indicates that return on stocks show different behavior at firm level and at industry level. The effect of variations in macroeconomic factors on stock returns is more substantial and strong and industry level than at the firm level.

Dharmendra Singh(2010): In the research paper, attempt has been made to explore the relation especially the causal relation between stock market index i.e. BSE sensex and three key macroeconomic variables of Indian economy by using correlation, unit root stationary tests and Granger Causality Test. Monthly data has been used from April, 1995 to March, 2009 for all the variables, like, BSE sensex, wholesale price index (WPI), index of industrial production (IIP) and exchange rates. Results proved that the stock market index, the industrial production index, exchange rate, and wholesale price index were integrated. Granger Casuality test was then employed. The Granger Causality test indicated that IIP is the only variable having bilateral causal relationship with BSE sensex. WPI is having strong correlation with Sensex but it is having unilateral causality with BSESensex. Therefore, it is concluded that, Indian stock market is approaching towards information efficiency at least with respect to two macroeconomic variables, viz., Exchange rate and inflation (WPI).

Tripathi et al.(2014):studied the impact of various macroeconomic variables on Indian sectoral indices. They selected five macroeconomics variables i.e. crude oil prices, current Account balance, Exchange rate (USD/INR), foreign exchange reserves and foreign institutional investments and examined their impact on different sectoral indices of National stock exchange (NSE) namely CNX Auto index, CNX bank index, CNX energy index, CNX FMCG index and CNX IT index. The study reveals that amongst all the selected macro economic variables, foreign institutional investment affects all these indices however rest of the macro economic variables affect different sectoral indices selectively.

Sarkar P(2005): In the research article the researcher examined that if any meaningful relation between growth and capital accumulation exists in case of India. Annual data was used for various variables such as nominal and real share price, share market turnover ratio, number of firms listed in the stock market, formation of fixed capital , real GDP growth and industrial output. It was revealed that no positive relationship exist between real and stock market variables either in short run or long run during 1950-51 to 2005.

Naik (2012), the Researcher investigated the effect of selected macro-economic variables on Indian Stock market. Results indicate that stock market index and macro-economic variables are co-integrated. At the same time there exists a long run associated between the index and these variables. The Indian stock market is directly related to the money supply and index of

industrial production but it is inversely related to inflation. It was also found that exchange rate and short term interest rate had an insignificant relationship with stock prices.

Pethe and Karnik(2000): In the research article using Indian data for April 1992 to December 1997, attempts to find the way in which stock price indices are affected by and affect other critical macroeconomic variables in India. But the study runs causality test in an error correction framework on non-co integrated variables, which is inappropriate and not econometrically sound and correct. The study reveals that it is not legitimate to test for causality between a pair of variables when there is no co-integration and it does so in view of the importance involved in the relation between the state of economy and stock markets. In the study weak causality running from IIP to share price index (sensex and nifty) but not the other way round was reported. In other words, the state of economy affects the stock prices.

Kanakaraj et al. (2013): In their research article the researcher examined the trend of stock prices and various macroeconomic variables between the time periods 1997- 2007. They have tried to explore up on and answer that if the recent stock market boom can be explained in the term of macroeconomic fundamentals and have concluded by recommending a strong relationship between the two. The growth of GDP in India was consistent at high levels reaching the highest average from 2003-04 to 2006-07 since independence, and is strongly supported by growth in manufacturing and services sectors. Under controlled inflation, Gross domestic investment and gross domestic savings as percentage of GDP have also grown immensely.

Malhotra and tendon (2013): conducted a study of 95 companies listed at National stock Exchange to determine various factors that influence stock prices. They found that book value of Firm, EPS and P-E ratio have significant positive relationship with the stock price of the firm while dividend yield has significant negative relationship with the stock price of the firm.

Kumar (2013): examined the impact of macroeconomic factors on stock market performance in India. He took 12 macroeconomic variables in his study which were grouped in three factors named as Macro economics, industrial performance and policy rates. The study concludes that industrial performance plays more important role in affecting the stock market. Although policy rates also have some impact but this impact does not appear to be sustainable. The study also indicates that stock markets rely more on optimistic macroeconomic environment.

Hossain et al. (2013): explored long as well as short run relationship between economics growth of Malaysia and the stock market of the same. Study shows that both short as well as long term association exists between stock market index and economic growth. It was found that stock market index can be a predictor to future economic growth of Malaysia but economic growth cannot predict the movement of the stock market index.

Sangmi and Hassan (2013): studied the effect of macroeconomic factors on Indian stock market in APT frame work. Result indicates that macroeconomic factors have stock prices are significantly affected by macroeconomic factors.

Naik and Padhi (2012): In the study, the researcher examined the associated between Indian share market index(BSE Sensex) and five different macro-economic variables i.e. exchange rates, industrial production index, money supply, treasury bills rates and wholesale price index. This study reveals that macroeconomic variables and BSE Sensex are co-integrated. The study also indicated that prices of stocks are directly associated to industrial production and money supply but negatively associated to whole price index. At the same time, Treasury bill rates and exchanges rates are not found to be significant in deciding stock prices.

Singh (2012): The Researcher examined the nature of relationship between Nifty and key macroeconomic variables. The study indicated that the volatility of stock market index i.e. Nifty is due to the behavior of key macroeconomic variables along with the change in other macro factors in the economy.

Kumar (2011): The Author studied the relationship between key macroeconomic variables representing real as well as financial sector of Indian economy and prices of stock. This study reveals that boom periods of share market were not supported by real economic activity rather it depends on some other external factors.

Sahu and Dhiman(2011): The researcher studied the causal relationship between selected macro-economic factors and Indian stock market indicators. The study indicates that no causal relationship exists among stock market indicator Sensex and real gross domestic product of India.

Tripathy(2011): The Researcher explored the relationship between Indian share market and the selected macroeconomic factors. Results indicate that share market in India is influenced by many macroeconomic variables e.g. exchange rate, inflation rate and the prevailing interest rate in the economy. So, we can infer that these macroeconomic variables can be used as predictor to variations in Indian stock market.

Agrawal et al.(2010): The researcher conducted a study on exchange rates movement and stock market volatility. They tried to analyse the relationship between Indian rupee-US Dollar Exchange Rates and Nifty returns. In the study, the Correlation between exchange rates and Nifty returns was found to be negative. The study also indicated unidirectional relationship between return on Nifty and exchange rates running from the first one to the second.

Singh(2010): The researcher examined the causal relationship between Sensex and the three macro-economic variables i.e. wholesale price index (WPI), exchange rate and index of industrial production(IIP). The study reveals that IIP and WPI are strongly correlated with

Sensex not with Exchange rate. Sensex and IIP exhibited a bilateral causal relationship which proves that movements of Sensex can be predicted by IIP results.

Mukhopadhyay and Sarkar (2003): The Researcher studied the effect of macro-economic factors in explaining the variation in Indian stock market. They found that factors such as growth in money supply, real economic activity, foreign direct investment, inflation and foreign capital market activity have significant impact on stock markets in post liberalization period. On the other hand, only exchange rate had significant effect on Indian stock market in pre-liberalization period.

RESEARCH METHODOLOGY

RESEARCH PROBLEM

The study is related to macro-economic environment in India which is based on the underlying assumption that stock markets cannot overlook the prevailing macro-economic environment which is prevalent for their effective performance in the country. There are a number of angles one could take when looking at the constraints in order to ensure proper focus in the study. It tries to concentrate on national macro-economic variables as they related to the stock exchange.

OBJECTIVES OF THE STUDY

1. To study the important factors that affects the movement of Indian stock market.
2. To study the impact of macro-economic variables on the movement of BSE Sensex.

SOURCES OF DATA

Data used for the study is secondary in nature and consists of 10 variables namely Crude oil prices, FII investment, Foreign Exchange Reserve, Foreign Exchange Rate ,Inflation (whole price index as a proxy for inflation), S&P 500, NASDAQ composite, FTSE 100, Nikkei 225 and BSE Sensex. Here monthly prices of BSE sensex and other factors are taken.

TOOLS FOR ANALYSIS

- Natural logarithm
- Factor Analysis
- Correlation
- Regression

DATA ANALYSIS AND INTERPRETATION

The data for the study have been collected on monthly basis from April 2017 to March 2021. The data collected for all the variables are of different levels, some values are too large for some periods and other values are too small for other periods. This problem is known as scale effect, in order remove the same Natural Logarithm of the data is obtained. Thus obtained data is taken for further analysis.

Factor Analysis:

The variables selected for the purpose of study contribute to the growth and development of Indian stock market. There could be an inter-linkage between these variables which might lead to the problem of multi co linearity. To address this issue, Factor analysis has been used to categorize many variables into few factors. The principal component analysis with varimax rotation has been performed on nine independent variables.

Table no.1: Showing KMO and Barlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.874
Bartlett's Test of Sphericity	Approx. Chi-Square	611.070
	df	45
	Sig.	.000

To measure the sample adequacy and proportion of variance in the data, Kaiser-Meyer-Olkin (KMO) measure of adequacy and Bartlett's test of Sphericity are measured and the result in Table No:1shows a high value of KMO i.e 0.874 which is more than 0.50, indicates that the sample used is adequate for the study. The Bartlett's measure of sphericity test at 5% level of significance indicates that there exists a relation among the variables and the data are not identical.

Factor loadings: Factor analysis provides an in-depth examination of factor loadings and the related factor-loading matrix will facilitate a better understanding and use of the technique. The criterion used for factor extraction is the variables with factor loadings of 0.05 and above.

Table No. 2 Factor loadings

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance
1.Crude oil	6.740	67.403	67.403	6.740	67.403
2.FII	1.459	14.586	81.989	1.459	14.586
3.Forex res	.775	7.751	89.740		
4.Forex rate	.435	4.352	94.092		
5.Inflation	.328	3.285	97.377		
6.S&P 500	.152	1.523	98.900		
7.NASDAQ	.055	.552	99.452		
8.FTSE	.039	.385	99.837		
9.Nikkei	.013	.132	99.969		
10.BSE	.003	.031	100.000		

The Table No.3 represents the loading of variables. Inflation, foreign exchange reserve, FII investment, foreign exchange rate and crude oil prices are loaded on Factor1(F1). The variables loaded on Factor2 (F2) are Nikkei 225, S&P 500, NASDAQ composite and FTSE100.

Correlation: To measure the relation between the two variables correlation coefficient is calculated

Table No.3: Correlation Matrix

Correlation Matrix			
	Sensex	MEF	INF
Sensex	1.00		
F1	0.322	1.00	
F2	0.941	0.274	1.000

The coefficients of correlation given in above table no: 3, shows bivariate relationship among the variables. These values indicate that the predictor variables (F1 and F2) are positively related with the criterion variable (Sensex). There is positive relationship between F1 and Sensex (0.322), whereas there is a very high positive relationship between F2 and Sensex (0.941). The result indicates that F1 is more closely associated with movement of Indian stock market. On the other hand, Indian stock market is also associated with F1 but this association is not found to be very strong (It's not weak either). The variables have been found to be stationary at 1% and 5% level of significance.

HYPOTHESIS AND MODEL BUILDING

In the study a model has been framed considering BSE Sensex as dependent variable and Factor1 (F1) and Factor2 (F2) as independent variables to judge the impact of these two factors on the movement of sensex.

Following equation is drawn from the suggested model:

logSensex= C+ alogF1+blogF2+e……(1)

where, C is a constant, a and b are coefficients and e is the white noise error term.

Null Hypotheses

1. H01: There is no significant impact of F1 (i.e. Crude oil prices, Foreign Exchange Reserve, Foreign Exchange Rate, Inflation(WPI), FII investment) on Sensex.
2. H02: There is no significant impact of F2 (i.e. S&P 500, Nikkei 225, NASDAQ Composite, FTSE 100) on Sensex.

Alternate Hypotheses

1. H1: There is significant impact of F1(i.e. Crude oil prices, Foreign Exchange Reserve, Foreign Exchange Rate, Inflation(WPI), FII investment) on Sensex.
2. H2: There is significant impact of F2 (i.e. S&P 500, Nikkei 225, NASDAQ Composite, FTSE 100) on Sensex.

Table No.4 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.601	.510		1.179	.243
	f1	.013	.015	.042	.894	.375
	f2	1.096	.054	.955	20.172	.000

Coefficients[a]

Model		Correlations			Collinearity Statistics	
		Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)					
	f1	-.274	.118	.040	.890	1.124
	f2	.941	.937	.901	.890	1.124

Before applying regression analysis, it is important to diagnose the problem of co-linearity among the variables. There are two statistics, Tolerance and VIF to examine the co-linearity. The value of VIF should be less than 10 and value of tolerance should be more than 0.2 (Sultana & Pardhasaradhi, 2012). In Table7, both the values are satisfying the underlying condition. It means that there is no co-linearity problem among the variables and data is appropriate for regression analysis.

Further in the above table Beta coefficient predicts the relative strength of independent variables within the model. In the table 4, F1(Beta= 0.042 , $p<0.05$) and (Beta= 0.955,$p<0.05$) have beta coefficient values which are found to be significant at 5% significance level. Finally, the final regression model has been drawn on the basis of data analysis to reach the conclusion. To understand the relationship between the independent variables(F1 and F2) and the dependent variable Sensex, regression analysis is done and the regression model thus obtained is tabulated in Table No:5

Table No.5 Regression Model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.970[a]	.942	.926	.0450628	1.144

The value R indicates the correlation coefficient and degree of association between dependent variable (sensex) and independent variables (F1 and F2). The value of R square is 0.942 which indicates that 94.2% of the variance of sensex can be predicted with the help of F1 and F2. The value of adjusted R square (0.926) is very close to the value of R square (0.942) and it indicates the fitness of the model.

To analyse if the combination of independent variables helps in predicting the variation in the dependent variable ANOVA is conducted at 10% level of significance and the test results are tabulated in Table No:6

Table No. 6 ANOVA

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.985	8	.123	60.646	.000[b]
	Residual	.061	30	.002		
	Total	1.046	38			

From the above table 6 the F value is 60.646 at $P<0.00$ indicates the acceptability of the proposed model at 10% level of significance.

On the basis of above Table 5, it is concluded that both the null hypothesis i.e. H01 and H02 have been rejected whereas alternate hypothesis H1 and H2 have been accepted in the study. The p-value should be less than its accepted significance level and in this study the beta values of both the independent variables have been found to be significant at 5% level of significance.

Thus it is concluded that Factor1 (F1) and Factor2 (F2) are significant predictors of Sensex. Out of these two factors, the first factor i.e. F1 is having more the impact on movement of Sensex.

CONCLUSION

From the study it appears that the correlation influence of Crude oil prices, FII investment, Foreign Exchange Reserve, Foreign Exchange Rates, and Inflation on Stock Market is strong and S&P 500, FTSE 100, NASDAQ Composite, Nikkei 225 on Stock Market has very strong influence on the stock market performance. The variables such as Inflation, Foreign Exchange Rate, Foreign Exchange Reserve, FII investment, Crude oil Prices are loaded on Factor1(F1). The variables loaded on Factor2 (F2) are Nikkei 225, S&P 500, NASDAQ Composite and FTSE 100.

There is positive relationship between F1 and Sensex (0.322), whereas there is a very high positive relationship between F2 and Sensex (0.941).Tolerance and VIF to examine the co-linearity, proved that there is no co-linearity problem among the variables and the data is appropriate for regression analysis.

The value of R square is 0.942. This indicates that 94.2% of the variance of sensex can be predicted with the help of F1 and F2. The value ($F=60.646$ at $P<0.001$) points out the acceptability of the proposed model at the higher significance level of 10%. It predicts the relative strength of independent variables within the model. In the table 7, F1 (Beta= 0.042 , $p<0.05$) and (Beta= 0.955,$p<0.05$) have large beta coefficient values which are found to be significant at 5% significance level.

This indicates that there is a strong influence of the macroeconomic factors on the movement of stock market performance.

It is important for countries to take measures to maximize their growth through more and more FII Investment, Exchange Rates, Inflation, Foreign Exchange Reserves inflow. Benefits from FII Investment, Exchange Rates, Inflation, Foreign Exchange Reserves could be maximized if efforts are concentrated on attracting long term productivity. To attract quality FII Investment, Exchange Rates, Inflation, a developing country must ensure a sound macroeconomic environment which requires adequate infrastructural facilities, stability of exchange rate, political stability, strong administration will, market perfection and control over inflation.

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