Research Paper Management

Influences of Macroeconomic Variables on the Performance of Indian Stock Market

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ABSTRACT

This paper is an attempt to investigate the linkage between stock market & macroeconomic variables in the Indian context using techniques like correlation, regression, ADF test & Unit root test, Granger causality test. A time span has been chosen for this study from January, 2004 to February, 2015 uses 134 monthly data to portray a larger view of the relationship. The result of the study shows that four out of eight variables are relatively more significant and likely to influence Indian stock market. These factors are Exchange Rate, Gold Price and M3 and IIP. There is a positive relation between Exchange rate and SENSEX, Gold rate and SENSEX, and Money supply(M3) and SENSEX whereas BoT and SENSEX shows a negative relation. Regression analysis in which Exchange Rate and Gold Price and M3 affecting the stock market. All variables in this study are not stationary at level, but become stationary at first difference. The result has been concluded on the bases of the granger causality test in which Crude oil price has been seen as affecting stock market.

This study will be useful for the investors who might be able to identify some basic economic variables that they should focus on while investing in stock market and will have an advantage to make their own suitable investment decisions.

KEYWORDS Stock Market, FII, Crude oil, Macroeconomic Variables

INTRODUCTION

The stock market is the key indicator of growth and development of the country. Indian stock market has developed in terms of number of stock exchanges and other intermediaries, the number of listed stocks, market capitalization, trading volumes, turnover of the stock exchanges, investor population and price indices. One of the important events has been the decision allowing Foreign Institutional Investors (FIIs) directly on the Indian Stock markets since 1992. It is well recognized that their presence has contributed significantly to the advancement of increasing sophistication of our markets. But it is argued that the trading behavior of FIIs reflects a sort of myopia, which causes excess volatility in the domestic stock markets. In other words, these investors are shortsighted, highly speculative and move large amounts of funds into and out of the country's stock markets with no regard for fundamentals. Such a development has important implications for macroeconomic management as the trading pattern of these investors may create excess volatility in the Indian stock market. Stock market volatility has been a major cause of concern for policy makers, investors and academia throughout the world, especially for the last two decades. Rapid financial innovations, regulatory and non-regulatory reforms, SEBI interventions, globalization of Indian capital market, new classes of investors, etc. have all shown a great impact on the behavior of share prices in India.

REVIEW OF LITERATURE

Raj Kumar and Bhartendu Singh (1998) observed that the joint impact of trading volume, rate of exchange and the rate of gold standard was highly significant on SENSEX. The individual effect of rate of exchange and rate of gold standard on SENSEX were also found highly significant but the individual effect of trading volume was not found significant.

Pethe and Karnik (2000), The study reported weak causality running from IIP to share price indices (i.e., SENSEX and S&P CNX Nifty) but not the other way round. In other words, it holds the view that the state of economy had affected stock prices.

Naka, Mukherjee and Tufte (2001) studied and found that the five variables were co-integrated and there exists three long-term equilibrium relationships among these variables. The results of the study also suggested that domestic inflation was the most severe deterrent to Indian stock markets performance, and domestic output growth as its predominant driving force.

Bhattacharya and Mukherjee (2002) studied and found that there was no causal linkage between stock prices and money supply, national income and interest rate while IIP lead the stock price, and there was two- way causation between stock price and inflation rate.

Bhupender Singh (2005) examined the effect of significant macroeconomic variables, inflation and exchange rate on the inflows of FII in India, and also tried to develop a theoretical framework to analyze such inter-relationship.

Anand Bansal and J.S. Pasricha (2009) studied the impact of market opening to FIIs on Indian stock market behaviour. They empirically analyze the change of market return and volatility after the entry of FIIs to Indian capital market and found that while there is no significant change in the Indian stock market average returns; volatility is significantly reduced after India unlocked its stock market to foreign investors.

Krishna Reddy (2010) studied the movements in BSE Sensex in relation to FII investments and identified that FIIs are significant factor determining the liquidity and volatility in the stock market prices.

Mohapatra and Panda (2012) correlated top ten rises and top ten falls of SENSEX with corresponding net flows of FIIs and also tested the impact of other macroeconomic factors along with FIIs affecting SENSEX for a 10 year period and found that IIP and Exchange rate(INR/USD) have a higher influence than FIIs on the stock markets.

Luthra and Mahajan (2014) conclude that inflation, exchange rate and GDP growth rate affect the Bankex positively. However Gold Prices affect BSE Bankex negatively but none of these variables have a significant impact on the stock prices of

banks.

Santhosh Kumar P (July-December 2014)
They were found out that there is a co-integration between money supply and stock price returns. Through ADF, it was found that there can be a long-run relationship which can be used to predict movements in stock prices.

OBJECTIVE OF THE STUDY
The study has been attempted to find the following objectives:

- To investigates the relationship among macroeconomic variables and Indian stock market.
- To analyze the impact of macroeconomic variables on Indian Stock market.
- To identify the causal relationship among Indian stock market and macroeconomic variables.

The null hypothesis that is considered in the study includes:

Ho: There is no significant impact of macroeconomic variables on the stock market**.**

Ho: There is no any causal relationship among macroeconomic variables and stock market.

RESEARCH METHODOLOGY
Research Design: - This research is based on the descriptive research.

Data Collection:
This research is based on the secondary data. Data has been collected for Indian stock index (SENSEX) and macroeconomics variable January 2004 to February 2015. Monthly observations of SENSEX and macroeconomics variable was gathered from historical data section of www.moneycontrol.com, www.rbi.org.in and www.investing.com & www.sebi.gov.in

Sample Size: - 134 monthly data of variables are used as a sample from January 2004 to February 2015.

Statistical Tools:
The Statistical tools have been used in the study for Analysis involves correlation, multivariate stepwise regression, unit root test and Granger's causality test.

ANALYSIS & INTERPRETATION
Correlation Analysis
Correlation matrix of stock exchanges indices and macroeconomic variables. Correlations of all variables with their difference have been reported. Here, Pearson's correlation analysis with two tailed and 5% significant level is used.

Table 1: Correlation matrix (Pearson)

Variables	SENSEX	CRUDE	GOLD	FII	BoT	FOREX	WPI	IIP	M3
SENSEX	1								
CRUDE	.627	1							
GOLD	.733	0.673	1						
FII	.446	0.089	0.306	1					
BoT	-.704	-0.637	-0.847	-0.314	1				
FOREX	.593	0.249	0.536	0.260	-0.614	1			
WPI	.860	0.624	0.867	0.361	-0.852	0.836	1		
IIP	.869	0.687	0.893	0.360	-0.771	0.580	0.890	1	
M3	.876	0.566	0.842	0.389	-0.823	0.850	0.993	0.888	1
Correlation is significant at the 0.05 level (2-tailed)									

Source: Computed;

Interpretation:
SENSEX has positive, higher degree correlation with WPI, IIP and M3. It means that SENSEX has positive relationship between WPI, IIP and M3. SENSEX has positive, moderate degree correlation with the Crude oil and Gold price & Foreign Exchange Rate. SENSEX has positive, low degree correlation with the FII. SENSEX has negative, moderate degree correlation with the Balance of Trade.

Regression Analysis
H0: not significant relationship between SENSEX and, macroeconomics variables (p valve > 5% significant level).
Ha: significant relationship between SENSEX and, macroeconomics variables (p valve < 5% significant level).

Table 2: SENSEX Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.876[a]	.767	.765	2830.26973	.342
2	.922[b]	.849	.847	2286.26846	
3	.953[c]	.909	.907	1786.01455	

Source: Computed;

a. Predictors: (Constant), M3
b. Predictors: (Constant), M3, FOREX
c. Predictors: (Constant), M3, FOREX, GOLD
d. Dependent Variable: SENSEX.

Table 3: ANOVA[d] of SENSEX

Model		Sum of Squares	Df	Mean Square	F	Sig
1	Regression	3.482E9	1	3.482E9	434.711	.000[a]
	Residual	1.057E9	132	8010426.747		
	Total	4.540E9	133			
2	Regression	3.855E9	2	1.927E9	368.743	.000[b]
	Residual	6.847E8	131	5227023.483		
	Total	4.540E9	133			
3	Regression	4.125E9	3	1.375E9	431.046	.000[c]
	Residual	4.147E8	130	3189847.964		
	Total	4.540E9	133			

Source: Computed;

a. Predictors: (Constant), M3
b. Predictors: (Constant), M3, FOREX
c. Predictors: (Constant), M3, FOREX, GOLD
d. Dependent Variable: SENSEX

Interpretation:
Simple regression test for eight macroeconomic variables and SENSEX. It was found through P-value and F-sign that there is significant relationship between Foreign Exchange Rate and SENSEX, Gold price and SENSEX and Money Supply and SENSEX. Hence, means Foreign Exchange Rate, Gold price and M3 does affect SENSEX. We can accept the alternative hypothesis. R square shows the model fitness of a regression equation and Crude Oil Price, FII, BoT , WPI, IIP, explain very low variation in SENSEX while M3, Foreign Exchange, Gold Price, explain 87.6% and 92.2% and 95.3% of variation in SENSEX respectively. Durbin-Watson values always lie between 0 and 4. If the Durbin Watson static is substantially less than 2, there is positive serial correlation. The Durbin Watson value is 0.342 which indicated successive error terms are, on average, closes in value to one another, or positively correlated.

It tests the acceptability of the model from a statistical perspective. The Regression row displays information about the variation accounted for by the model. The Residual row displays information about the variation that has not been accounted by the model. The regression is much less than residual sums of squares, which indicates that around 76.69% (1) and 84.9% (2) and 90.9% (3) of the variation in SENSEX is explained by the model. However, F statistic is found significant, since the p value (0.000) less than 0.05. The result of regression is shown in table 2&3.

Unit Root Test

The unit root test is applied to test the stationarity of the data. The application of unit root test is initial step before proceeding to the Granger's causality test. All the selected variables are not stationary at the level but they all are stationary at the first difference. This analyzes that the series is integrated of order one, I (1). The result of unit root test is given in table 4.

Table 4: Unit root test

Variable	At level				At 1st difference				Decision
	ADF test statistics	Critical Value		P	ADF test statistics	Critical Value		P	
SENSEX	-2.6620	1% Level	-4.0307	0.2542	-4.2432	1%Level	-4.0313	0.0052	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
CRUDE	-3.5939	1%Level	-4.0307	0.0342	-5.6444	1%Level	-4.0313	0.0000	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
GOLD	-0.2921	1%Level	-4.0307	0.9901	-5.2247	1%Level	-4.0313	0.0002	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5%Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
FII	-4.1901	1%Level	-4.0307	0.0061	-6.9547	1%Level	-4.0313	0.0000	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
BoT	-3.2511	1%Level	-4.0307	0.0793	-6.4645	1%Level	-4.0313	0.0000	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
FOREX	-1.8090	1%Level	-4.0307	0.6948	-4.9906	1%Level	-4.0313	0.0004	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% level	-3.1473			10% Level	-3.1475		
WPI	-1.9067	1%Level	-4.0307	0.6453	-4.5881	1%Level	-4.0313	0.0016	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
IIP	-3.5312	1%Level	-4.0307	0.0403	-6.5778	1%Level	-4.0313	0.0000	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		
M3	-2.7947	1%Level	-4.0307	0.2020	-6.8058	1%Level	-4.0313	0.0000	Reject Null hypothesis of no unit root
		5% Level	-3.4450			5% Level	-3.4453		
		10% Level	-3.1473			10% Level	-3.1475		

Source: Computed; NULL HYPOTHESIS: Variables have unit root test.

Interpretation of Unit Root Test

The null hypothesis of all variables are accepted at the level because all variables have p value which is >5% and ADF test statistic values are less than the critical values at 10%, 5% and 1% levels of significances. Except FII, FII reject the null hypothesis at level with trend and intercept. The null hypothesis of all variables are rejected at the 1st difference because all variables have p value which is< 5% and ADF test statistic values are more than the critical values at 10%, 5% and 1% levels of significances. Thus, the variables are stationary and integrated of same order, i.e., I (1) with trend and intercept.

Granger Causality Test

The null hypothesis has been tested on the basis of the P-value. If the P-value is less than the critical P value at 5% than the null hypothesis is rejected and there will be a significant relation between the variables. First differencing of the variables has been used to apply granger causality test.

Table 5: Granger Causality Test of SENSEX

Null hypothesis	Observation	F statistics	P value	Decision
Crude does not granger cause SENSEX	130	5.53510	0.0004	Rejected
SENSEX does not granger cause crude	130	2.23346	0.0693	Accepted
Gold does not granger cause SENSEX	130	1.06358	0.3776	Accepted
SENSEX does not granger cause Gold	130	0.42235	0.7923	Accepted

FII does not granger cause SENSEX	130	1.15337	0.3349	Accepted
SENSEX does not granger cause FII	130	1.87861	0.1185	Accepted
BoT does not granger cause SENSEX	130	0.79023	0.5337	Accepted
SENSEX does not granger cause BoT	130	2.79044	0.0294	Accepted
FOREX does not granger cause SENSEX	130	3.02456	0.0204	Accepted
SENSEX does not granger cause FOREX	130	1.86820	0.1204	Accepted
WPI does not granger cause SENSEX	130	1.05559	0.3816	Accepted
SENSEX does not granger cause WPI	130	0.10510	0.9805	Accepted
IIP does not granger cause SENSEX	130	0.19226	0.9420	Accepted
SENSEX does not granger cause IIP	130	4.05468	0.0040	Rejected
M3 does not granger cause SENSEX	130	1.39355	0.2402	Accepted
SENSEX does not granger cause M3	130	1.77603	0.1380	Accepted

Source: Computed;

Interpretation:
As results shown in table 5, the null hypothesis of no causal relationship is accepted in all the cases except in crude oil price. The hypothesis is rejected in case of Crude oil price. This signifies that causality is running from Crude oil price to SENSEX. Thus the crude oil price do Granger cause index. Any change in crude oil price can be used to predict stock market. There is no any relationship among the macroeconomic determinants and stock market.

CONCLUSION

On the basis of overall analysis it can be concluded that four out of eight variables are relatively more significant and likely to influence Indian stock market. These factors are Exchange Rate, Gold Price and M3 and IIP. There is a positive relation between Exchange rate and SENSEX, Gold rate and SENSEX, and M3 and SENSEX whereas BoT and SENSEX shows a negative relation. Regression analysis in which Exchange Rate and Gold Price and M3 affecting the stock market. All variables in this study are not stationary at level, but become stationary at first difference. The result has been concluded on the bases of the granger causality test in which Crude oil price has been seen as affecting stock market.

The results of this analysis should not be treated as conclusive for an investment. Apart from understanding Indian stock market based on the contributions of the significant variables, there remain other important issues that affect the return generating process. These issues are the cost of equity capital, asset valuation, industry analysis, a firm's management and operational efficiency analysis, and so on. Any investor should consider all relevant sources of information when making an investment decision.

SUGGESTIONS & RECOMMENDATION

- Money supply has positive impact on the stock market that reveals that lager money in circulation has favorable impact on stock market, so monetary policy should be constant and favorable in terms of stock market.
- High fluctuations in the exchange rate may cause FIIs investment more volatile which create speculation and manipulation, thus destabilized the stock market. So, there is a need to stabilize the frequent ups and downs in the exchange rate for better management of FIIs flows.
- The initiatives need to be taken by the government to reduce the consumption of gold and enhance the investment in share market through improving the confidence of investors in the share market. The foreign investors need to remain stable in the Indian market as their movement effects the stock prices.
- Improving the IIP policies and controlling the inflation rates, this will help in to stabilize the stock market.
- Variables are depends on each other it should be considered.

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