Impact of Macro Economic Indicators affecting Indian Stock Markets: Evidence from Pre- and Post-Crisis

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Abstract.Volatility is quite evident in stock market fluctuations and often economic factors results in share prices movements. However, there are some fundamental elements, which have a strong impact over the fluctuations of the stock market by and large. This study empirically tested the interconnection between macro-economic factors and Indian stock market. By applying multivariate regression analysis, the effect of macro-economic factors on Indian stock market is tested. The explanatory variables are Wholesale Price Index (WPI), Index of Industrial Production (IIP), Money Supply (M3), Consumer Price Index (CPI), Exchange Rate (ER), Call Money Rate (CMR), Gold Price (GP), Foreign Institutional Investment (FII) and Trade Balance (TB) while explained factors are average monthly closing prices of BSE Sensex and S&P Nifty. Further, for testing the interconnection between macro-economic factors and Indian stock market Pearson's correlation, Factor Analysis and Multiple Regression test have been applied. Three variables namely Economy Rates, Macro Environment and Foreign Investment are obtained by using Principal Component Technique (varimax pivot). It shows that all elements play critical role in affecting the stock market.

Keywords: Macroeconomic Determinants, Indian Stock Market Return, Economic Growth, Money Supply, Foreign Institutional Investment, Index of Industrial Production

I. Introduction

In the development of Indian economy, stock market plays a very crucial role. Every moment in the stock market brings an impact on the economy. The stock market is the place where funds are invested from the purview of generating capital appreciation. The investors decision of keeping their funds invested or withdrawing it depends upon various factors. One of the such factors are macroeconomic variables. Analyzing the nation's economy as a whole is what we understand from macroeconomics. Thus, the factors that make stock markets more volatile should be considered well because that will impact the economic performance of the country. A strong relationship exists among instability and market performance. Volatility is inversely related to stock market, that is, with increase in stock market volatility declines and vice-versa. With the increase in volatility, risk

gets increased and returns get decreased. This study aims to identify and investigate the effect of macroeconomic variables on Indian stock market.

Independent Variables

A concise portrayal of the identified macro-economic variables of Indian economy contribution and its impact on stock market's working is shown underneath:

- **Inflation (CPI & WPI)**

Increased inflation can be seen in general price levels or by decreased value of money. Almost every day all citizens of India in the form of investor, depositor, borrower or lender in common gets affected by inflation. Two commonly used measures of Inflation in India are used for this study are Consumer Price Index (CPI) and Wholesale Price Index (WPI)

- **Interest Rates (CMR)**

Apparently, very commonly watched variable in day-to-day conduct of monetary operations is the inter-bank or overnight call money market rates and they often becomes an operating strategy for policy makers. These rates are absolutely market driven and rely on the relationship of demand and supply. Thus, Indian stock markets gets affected by changes in CMR.

- **Exchange Rate (Dollar Price)**

The trade levels are very crucial to all the free market economies of the world and they are vitally dependent upon exchange rates. However, among all the economic variable the exchange rates are highly examined, observed and manipulated.

- **Foreign Institutional Investment (FII)**

Any investor or investor's fund registered outside the country in which it is making investment is termed as FII. In India, FII can only be done through stock exchange in the form of debt or equity, which means FII is allowed to be sold or purchased on daily basis. To an enormous degree the purpose for the stock market volatility is daily transaction of FII. SENSEX is directly related to inflow of FIIs and vice-versa.

- **Money Supply (M3)**

It is a variable which is used for guaranteed exchanges and to balance out the economy. Thus, it is very significant. The amount of money accessible within the economy to purchase goods and services is termed as money supply.

- **Trade Balance (TB)**

The difference between exports and imports monetary value is trade balance. The currency relative value is affected by the trade balances. Favorable trade balances attract investors.

- **Index of Industrial Production (IIP)**

IIP is picked as a standard of real yield and is an intermediary to GDP since this examination relies on monthly information and as a result of the availability of simply quarterly, half yearly and yearly GDP data. As IIP numbers present a balance of comprehensive economic activity in the economic system and effect stock prices through its impact on expected future cash streams.

- **Gold Price (GP)**

Gold being the world's most seasoned universal currency option and a significant component of worldwide monetary reserves in this way it is fundamentally a fiscal resource rather only an item. For Indian investors it is a substitute investment avenue, with the increase in gold prices Indian investors reduces investment in stocks causing fall in stock prices. Subsequently, a negative relationship is normal between stock and gold's prices and thus it becomes a significant macro-economic variable.

II. Literature Review

The connection between macro-economic variables and movements of the stock market from the previous decades is visualized by numerous investigators. Several descriptive and empirical studies have identified the existence of a relationship between stock prices and macroeconomic factors. Hither, in this section various such studies are discussed.

Makan *et.al.* (2012) analyzed that three factors namely –"exchange rate, foreign institutional investment and call rate out of seven variables are relatively more significant and thus influence Indian stock market. FII and Call Rate has shown positive relationship with Sensex whereas a negative relation is depicted between exchange rate and Sensex". In a study conducted by Pooja

Singh (2014) it is established that "there is significant impact of macroeconomic determinants on Indian stock market. The significantly impacting factors on the stock market selected in this study were money supply, gold, exchange rates and foreign institutional investors."

Mohanamani & Sivagnanasithi (2014) examined that "money supply, whole sale price index and industrial productivity are positively however inflow of FII and exchange rate are found to be insignificantly related to Indian stock market". A study conducted by Rakesh Kumar (2013) provided that "Indian stock market is highly responsive to the macro environment and favourable macro environment in India is good for the stock market". Ouma and Muriu (2014) investigated that "exchange rates, money supply, and inflation affect the stock market returns in Kenya. Interest rates are considered not significant in determining long run returns in the NSE, while Exchange rates are found to possess a negative impact on fund returns. Inflation and money supply are found to be significant determinants of the returns at NSE". Another study done by M. Subramanian (2015) found that "the macro economic variables i.e. GDP, Inflation, CRR, Index on industrial production, and USD (US dollars, forex) are influencing the stock market index (Sensex)".

Venkatraja (2014) explored that the "BSE stock market performance has a strong positive influence from any variation in the value of IIP, REER, WPI and FII. While, a decrease in price of gold is found bring a positive effect in stock market and vice versa. Interest rate, unemployment rate, inflation rate and GDP have a relationship with the stock index". One survey found that "inflation rate and the unemployment rate are positively correlated with Nifty while GDP and interest rate are negatively correlated with Nifty" (Kumuda and Verghese, 2015). However, Sanningammanavara *et.al.* (2014) concluded that the share prices fell due to depreciation shown by Rupee against the Dollar. Since Rupee-Dollar depreciation puts "a negative impact on livestock prices and hence the pace of rising prices led to decrease in share prices". Gupta and Siddiqui (2010) have also analysed the impact of various macro-economic factors onstcok markets to find the degree of effciency.

A study by Reddy (2012) explained that "the variance in stock prices is due to explanatory variables (95.6%) which is established by regression analysis. While increased stock prices are resulted by a reduction in interest and inflation rate, yet positive impact is due to increased RDGP.

All the studies referred above provided that the Indian stock market functioning is significantly affected by macro-economic variables (gold price, exchange rate, money supply, mounting prices and foreign institutional investment).

III. Research Methodology

A research method is a systematic plan for directing inquiry.

Objectives

- To look at whether the stock market of India is affected by picking macro-economic factors, in particular Foreign Institutional Investment (FII), Inflation (WPI and CPI), the Index of Industrial Production (IIP), Exchange Rate, Money Supply, Call Money Rate, Trade Balance and Gold cost have an impingement on the Indian Stock Market. BSE SENSEX and NSE NIFTY has been viewed as depicting the stock market of India.
- To examine the degree and direction of the relationship between Indian stock market and selected macroeconomic variables.

Sample Size and Period

In this study, the Average Closing monthly data of Sensex and Nifty, from the year April 1993-December 2017 is taken. Similarly, for all Macroeconomic Variable, monthly data is taken from April 1993 - December 2017 totaling 297 months for each variable.

Data Source

In this work, the secondary data are extracted from the bona fide sources that are the sites of the RBI and TRADINGECONOMICS. Macroeconomic data, such as Exchange rate (Rs/USD), Gold Price, Call Money Rate, Money Supply (M3), Trade Balance, Foreign Institutional Investment was taken from the official site of RBI's Data Base on Indian Economy (DBIE). BSE SENSEX and NIFTY monthly average value was also taken from the official site of RBI's Data Base on Indian Economy (DBIE). The monthly percentage change values for Inflation rate (WPI) Inflation rate (CPI), the Index of Industrial Production are obtained from the "trading economics" website.

Variable Name	Proxy Used	Symbol Used
Interest Rate	Weighted Average Call Money Rates	IR
Exchange rate	Monthly Average Rupees per unit of US $	ER
Inflation	Consumer Price Index (CPI), Wholesale Price Index (WPI)	IF
Index of Industrial Production	General Index of Industrial Production (%)	IIP
Foreign Institutional Investors	Monthly Net Investments in Rs. Crores	FII
Money Supply	Broad Money (M3) Rs. Billion	MS
Trade Balance	Monthly Trade Balance in Rs. Billion	TB
Gold Price	Mumbai Average Price Rupees per 10gms.	GP
Stock Indices	Sensex and Nifty Monthly Average Price	BSE, NIFTY

Need for the study

The Study of macroeconomic variables has been significant as many foreign investors before making any investment always analyze the factors like Inflation rate, Interest rate, Industrial Production, GDP rate etc. of the country, so it is important that this factor must be stable which will increase the foreign investment and it will increase the growth of the country.

Hypothesis

The following hypothesis have been made:

H_{01}: There is no significant relation between SENSEX and all the macro-economic variables.

H_{02}: There is no significant relation among NIFTY and all the macro-economic variables.

Data Analytical Tools & Techniques

to untangle the linkage between stock market indices and macroeconomic variables this study applied correlation, factor analysis and multiple regression analysis.

- **Correlation Analysis –** In this examination, it depicts the connection between stock market of India and macro-economic variables which have been investigated utilizing Pearson's relationship investigation.
- **Factor analysis** – This approach of data reduction that has been applied to overcome the problem of severe multicollinearity.

- **Regression analysis** – It is a statistical measure which tries to determine relationships between a dependent variable and the other independent variables. The multiple linear regression model has been applied recognize the impact of macro-economic variables on stock market of India.

IV. Empirical Results

Macro-Economic Variables and Stock Market (BSE SENSEX)

Table 1: Correlation Matrix of macroeconomic variables and stock market

	BSE SENSEX	EXRATE USDIND	FII	IIP	INF CPI	INF WPI	MONEY SUPPLY	CALL MONEY	TRADE BALANCE	GOLD PRICE
BSE SENSEX	1									
EXRATE USDIND	.781 .000	1								
FII	.328 .000	.195 .001	1							
IIP	- .208 .000	- .446 .001	- .025 .671	1						
INFL CPI	.048 .414	- .236 .000	.068 .242	- .049 .396	1					
INFL WPI	- .362 .000	- .568 .000	- .083 .155	.183 .002	.712 .000	1				
MONEY SUPPLY	.960 .000	.882 .000	.279 .000	- .380 .000	.016 .786	- .398 .000	1			
CALL MONEY RATE	- .176 .002	- .253 .000	- .098 .093	.069 .233	.217 .000	.322 .000	- .174 .003	1		
TRADE BALANCE	- .873 .000	- .704 .000	- .316 .000	.303 .000	- .154 .008	.195 .001	- .879 .000	.137 .018	1	
GOLD PRICE	.917 .000	.800 .000	.326 .000	- .406 .000	.140 .016	- .246 .000	.963 .000	- .113 .052	- .919 .000	1

The connection between stock market of India and macro-economic variables have been analyzed using Pearson's correlation analysis. The correlation results during the study period reveal the positive association of BSE Sensex with Consumer Price Index, Money Supply, Gold price, Exchange Rate, and Foreign Institutional Investors while negative with Trade Balance, Wholesale Price Index, Interest Rate and Industrial Production. But significantly positive relationship is for Exchange Rate, Foreign Institutional Investors, Money Supply, and Gold price with BSE Sensex. Therefore, these variables have significant connection with stock index (SENSEX). The Exchange rate has a significant positive association with FII (0.195).

During the entire period of study, money supply has highly significant positive association with exchange rate (0.882) and also with gold prices (0.963) at the 5 % point of implication. Money

supply and Foreign Institutional Investors (0.279) demonstrated a significant positive relationship. Some other variable that exhibits positive association with Foreign Institutional Investors (0.326) at the 5 % point of significance is gold prices. The IIP has a significant positive association with the Trade Balance (0.303).

Macro-Economic Variables and NIFTY

Correlation Analysis

It is expected that variables identified as macroeconomic in the analysis are correlated among themselves. The table 2 shows the correlation matrix of Nifty with various macroeconomic variables.

Table 2: Correlation Matrix

	NIFTY	EXRATE USDIND	FII	IIP	INF CPI	INF WPI	MONEY SUPPLY	CALL MONEY RATE	TRADE BALANCE	GOLD PRICE
NIFTY	1									
EXRATE USDIND	.790 .000	1								
FII	.325 .000	.195 .001	1							
IIP	- .218 .000	- .446 .001	- .025 .671	1						
INFL CPI	.037 .525	- .236 000	.068 .242	- .049 .396	1					
INFL WPI	- .372 .000	- .568 .000	- .083 .155	.183 .002	.712 .000	1				
MONEY SUPPLY	.965 .000	.882 .000	.279 .000	- .380 .000	.016 .786	- .398 .000	1			
CALL MONEY RATE	- .181 .002	- .253 .000	- .098 .093	.069 .233	.217 .000	.322 .000	- .174 .003	1		
TRADE BALANCE	- .872 .000	- .704 .000	- .316 .000	.303 .000	- .154 .008	.195 .001	- .879 .000	.137 .018	1	
GOLD PRICE	.920 .000	.800 .000	.326 .000	- .406 .000	.140 .016	- .246 .000	.963 .000	- .113 .052	- .919 .000	1

The relationships between macroeconomic variables and stock market have been analyzed using Pearson's correlation analysis. The correlation results during the considered period reveals the positive association of Nifty with Gold price, Exchange Rate, Consumer Price Index, Money Supply, and Foreign Institutional Investors while negative with Trade Balance, Wholesale Price Index, Interest Rate and Industrial Production. But significant positive relationship for Gold price, Exchange Rate, Foreign Institutional Investors Money Supply with Nifty. Thus, these

variables have significant association with stock index (NIFTY). During the entire period of study, exchange rate and gold have a highly significant positive association with exchange rate (0.800) at the 5 % point of implication. Correlation coefficients are applied to analyze multi-collinearity and short-run co-movements among variables. Some variables in Sensex and Nifty showed greater than 0.8 correlation coefficient, which indicates that multi-collinearity exists. In order to have effective results and to overcome multi-collinearity problem, data reduction is done through factor analysis.

Factor Analysis

Factor analysis condenses a great number of variables into a smaller circle. Prior to factor analysis, in order to test sampling adequacy Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity were conducted to judge the applicability of factor analysis. A small KMO Value (Less than 0.5) indicates the factor analysis is non applicable.

Table 3 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.722
Bartlett's Test of Sphericity	Approx. Chi-Square	2509.084
	df	36
	Sig.	.000

The KMO value is 0.722 which exceeds 0.5, hence KMO test provides confirmation about the correlation amongst the macroeconomic variables and feasibility of applying factor analysis (Table-3). Besides this, the results of Bartlett's Test of Sphericity applied for testing null hypothesis of spherical matrix has been rejected at all levels of significance, which also support the application of factor analysis. In this, factor extraction is done through Principal Component Analysis (PCA) method with a Kaiser rule of dropping all components with less than 1.0 eigen value. Varimax rotation is employed in this work since each factor tends to receive either low or large loadings of any special variable and it provided solutions in which it became possible to distinguish each variable with an individual component. Factor score series is derived after factoring are extracted and Sensex & Nifty series are than regressed on factor score series.

Table 4 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	4.130	45.888	45.888	4.130	45.888	45.888	3.881	43.126	43.126
2	1.865	20.724	66.612	1.865	20.724	66.612	2.031	22.571	65.697
3	1.010	11.224	77.836	1.010	11.224	77.836	1.093	12.140	77.836
4	.820	9.107	86.944						
5	.710	7.889	94.833						
6	.207	2.297	97.130						
7	.170	1.893	99.023						
8	.072	.796	99.819						
9	.016	.181	100.000						

Extraction Method: Principal Component Analysis.

The effects of the principal component analysis technique using Kaiser criterion are shown in the Table-4 above. The table explained about 77.8 percent of the variance in 3 out of 9 variables, handling 43.1 % explained by factor-1, 22.5 % by factor-2 and 12.1% by factor-3.

Table 5 Component Matrix[a]

	Component		
	1	2	3
MONEYSUPPLYM3	.964		
GOPLDPRICE	.935		
EXRATEUSDIND	.922		
TRADEBALANCE	-.875	-.307	
INFLATIONCPI		.910	
INFLATIONWPI	-.507	.775	
CALLMONEYRATE		.428	-.337
FII	.353		.754
IIP	-.491		.554

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Further, the factor loading is done by creating relationships between the variables included in the analysis and the extracted factors through principal component analysis (PCA) method. Unrotated component matrix results are shown in table-5 above, which clearly indicates the relationship, but grouping of variables with the factors is not clearly identified. For instance, some variables are showing high values for more than one factor loadings, thus orthogonal factor extraction is not possible and if continue these extractions it will not wipe out our problem.

Table 6 Rotated Component Matrix[a]

	Component		
	1	2	3
GOLDPRICE	.963		
MONEYSUPPLYM3	.952		
TRADEBALANCE	-.897		
EXRATEUSDIND	.855		
IIP	-.583		
INFLATIONCPI		.897	
INFLATIONWPI		.880	
CALLMONEYRATE		.520	
FII			.814

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 4 iterations.

In such to generate the orthogonal factors, the facility of factor rotation is provided by factor analysis, thus, the varimax technique of orthogonal rotation with Kaiser Normalization is applied here (Table-6). The orthogonal transformation is clearly established and clearly distinguish each variable with only one factor by the values of factor loadings. Variables Gold price (GP), Money Supply (M3), Trade Balance (TB), the Index of Industrial Production (IIP), and Exchange Rate (ER) are identified by factor-1. Inflation (CPI & WPI) and Call Money Rate (CMR) are identified by factor-2 and factor-3 incorporates Foreign Institutional Investor (FII). Now, all variables are identified with one variable only thus with rotating component matrix provides clarity

Twelve variables are included in this field, due to their interrelated nature are changed over into three components. Factor (F1) is the Macro environment in the economy; Factor (F2) is Economy Rates and Factor (F3) is the Foreign Investment (Table-7)

Table 7: Identifying Macro Economic Variables Grouped by Factors

Factor	Variables	Name Assigned to the Factor
F1	M3, GP, ER, TB, IIP	Macro Environment

F2	CPI, WPI, CMR	Economy Rates
F3	FII	Foreign Investment

It has been shown in the above mentioned results that variables in the field can be thinned to three factors with 78 percent explanation of variation among themselves (Table 7). Since we are concerned here the impact of such factors on the execution of Indian stock market. In this setting, the SENSEX & NIFTY index has been regressed on these three factors whose factor score series have been furnished by the SPSS while deriving the factors. Final regression is carried out between BSE Sensex with respect to Factor1, Factor2 and Factor3.

Multiple Regression Analysis

Table 8 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.920[a]	.846	.845	3245.14033

a. Predictors: (Constant), factor 3 (FII), factor 2 (CPI, WPI, Call Money Rate), factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance)

b. Dependent Variable: BSESENSEX

Table 9 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16997461466.460	3	5665820488.820	538.017	.000[b]
	Residual	3085564175.428	293	10530935.752		
	Total	20083025641.888	296			

a. Dependent Variable: BSESENSEX

b. Predictors: (Constant), factor 3 (FII), factor 2 (CPI, WPI, Call Money Rate), factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance)

Table 10 Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	10577.392	188.302		56.172	.000
factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance)	7178.634	188.620	.872	38.059	.000
factor 2 (CPI, WPI, Call Money Rate)	-962.792	188.620	-.117	-5.104	.000
factor 3 (FII)	2228.026	188.620	.270	11.812	.000

a. Dependent Variable: BSESENSEX

"BSE SENSEX" = 10577.392 + 7178.634*FACTOR 1(i.e. GOLD PRICE, EXCHANGE RATE, IIP, MONEY SUPPLY & TRADE BALANCE) – 962.792*FACTOR 2(i.e. CPI, WPI & CALL MONEY RATE) + 2228.026*FACTOR 3(FII)

In this case, the overall model is statistically significant. The coefficient of simple determination, R2 (84.6%) expresses the dependent variable's extent of variation uniquely or jointly by the independent variables. ANOVA at the significance level of 5% shows that there is a model fit for the multiple regression model and F value is greater than the table value (538.017). Thus, **at the 5 % level of significance** the **null hypothesis is rejected,** which provides that movement in Sensex has a significant connection with all macro-economic variables. Further the correlation value between BSE-Sensex and macro-economic variables is 0.984, which elaborated a highly positive relationship.

The substantial value of the F-statistic and very high value of R squared (0.846) justify the good example. Multicollinearity problem has already been separated out. Apart from the macro economic factors stock market is affected by the performance of the company as well as unforeseen events. As the value of the constant in the fitted model (Table-8) is highly significant. The coefficient of factor F1 (7178.634) turned out to be highly significant meaning thereby that macro environment provides high level responsiveness to the Indian stock market. Further, the performance of the stock market shown in the table for factor F3 (2228.026) is significantly positive and for F2 (-962.792) is significantly negative. Final regression is carried out between Nifty with respect to Factor1, Factor2 and Factor3.

Table 11 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.923[a]	.852	.851	960.00161

a. Predictors: (Constant), factor 2 (CPI, WPI, Call Money Rate), factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance), factor 3 (FII)

b. Dependent Variable: NSENIFTY

Table 12 ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1558781594.462	3	519593864.821	563.794	.000[b]
Residual	270029703.026	293	921603.082		
Total	1828811297.489	296			

a. Dependent Variable: NSENIFTY

b. Predictors: (Constant), factor 2 (CPI, WPI, Call Money Rate), factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance), factor 3 (FII)

Table 13 Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	3187.242	55.705		57.216	.000
factor 3 (FII)	652.541	55.799	.263	11.694	.000
factor 1 (Gold Price, Exchange Rate, IIP, Money Supply, Trade Balance)	2177.011	55.799	.876	39.015	.000
factor 2 (CPI, WPI, Call Money Rate)	-317.754	55.799	-.128	-5.695	.000

a. Dependent Variable: NSENIFTY

"NIFTY" = 3187.242 + 2177.011*FACTOR 1(i.e. GOLD PRICE, EXCHANGE RATE, IIP, MONEY SUPPLY & TRADE BALANCE) – 317.754*FACTOR 2(i.e. CPI, WPI & CALL MONEY RATE) + 652.541*FACTOR 3(FII)

In this case, the overall model is statistically significant. R square is the coefficient of determination. It shows the extent of variance in the dependent variable as explained uniquely or jointly by the independent variables. It explains 85.2% of the variance in the dependent variables by the independent variables. The ANOVA table shows the significant level of 5% indicating that there is a model fit for the multiple regression model. The table indicates that the F value is 563.794 which is larger than the table value, the null hypothesis is rejected at 5 % significance level which means that there is a strong connection between all macro-economic variables and movement in Nifty.

Further, to find out the connection among macro-economic variables and Nifty, from table, it is demonstrated that correlation between macro-economic variables and Nifty is 0.923. This indicates that there is a highly positive relationship. The substantial value of the F-statistic and very high value of R squared (0.852) justify the good example. Multicollinearity problem has already been separated out. Certain unforeseen events along with the company's performance also affects stock markets apart from macro-economic factors. As the value of the constant in the fitted model (Table-13) is extremely important.

The coefficient of factor F1 (2177.011) turned out to be highly significant meaning thereby Indian stock market is extremely reactive to the macro environment. The table shows that factor F3 (652.521) has significantly positively reflected in the performance of the stock market. The table shows that factor F2 (-317.754) significantly negatively reflected in the performance of the stock market.

V. Conclusion

This work investigates the connection between the stock market of India and a set of macro-economic variables by using monthly data from April 1993 to December 2017. The macro-economic variables are mapped by the wholesale price index, interest rate (call money rate), exchange rate, consumer price index, gold price, industrial production index, trade balance, foreign institutional investment and Money supply. It is believed that, the chosen macro-economic variables are a representative set of factors of the economic system. The BSE Sensex & Nifty is used to interpret the indicators of stock market of India. The paper employed correlation analysis, Factor analysis and multi regression analysis to examine such relationships.

Results suggested that Indian stock market suffers a significant positive relationship with Gold price, Exchange Rate, Foreign Institutional Investors and Money Supply. Nevertheless, significant negative relationship is exhibited by the variables, namely Trade Balance, Wholesale price Index, Call Money rate and IIP with Indian stock market. The macro-economic variables that showed high correlation confirmed multicollinearity issues. Therefore, to derive the common factors data reduction technique of Factor analysis method with Principal Component Analysis has been applied. This highlighted that among the nine variables that are included in the study three factors are adequate to clarify the variance. Varimax rotation has clearly set the variables in the factors as foreign investment, macro environment and economy rates. From the results, it can be shown that stock market in is profoundly emphatically receptive to the economy rates, macro environment, and foreign investment.

Various other factors like Government Policies, political turbulence, investor trust and social variables affects fluctuations in BSE Sensex and Nifty. The survey supports the beliefs stock market in India are affected by the macro-economic factors.

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