Nexus Between Macro Economic Factors And S&P Sensex Movements

Kafila, R. Vijaya Srinivas, M. Rajyalaxmi

Abstract: The Indian stock market is vibrant and dynamic in nature; it has been going through many economic reforms structural changes after liberalization Indian economy since 1991 to till date. The Indian economy follows free market economic system, which enhance the scope of investing into stock market. Thereby stock market (Sensex) performance influenced by macroeconomic fundamentals, the present paper has investigate the nexus between Sensex and macro economic factors GDP growth rate, Exchange rate, inflation rate, Gold Prices, IIP and FII. The stationarity between macro economic factors and Sensex movements measured through employing ADF stationarity test, and Engle-Granger Co-integration to test the long run relation.

Key words: Sensex, macroeconomic factors, long run relation, co-integration, Correlation.

I. INTRODUCTION

The world economies moving towards free and open market system to integrate their individual economies into world economies by removing structural barriers from their respective economic system, in a similar phase Indian economy was open its socialistic economic system to open and market driven economic system though LPG policy in 1991. This market driven economy brought many structural transformation in Indian capital markets, which is key to success of economic growth of the nation. Hence the stock market is key constituent to mobilize funds from lenders, investors to borrowers or corporate entities. Therefore existence of stock market played a significant role in promoting the growth of the economy, hence forth the stock market performance depends on corporate performance, whereas corporate performance depends on investors expected returns, cash flows and opportunity cost of capital, market demand and supply, these factors influenced by underlying macroeconomic factors Gross Domestic Production (GDP), Foreign Exchange rates, Foreign Investments India (FII), Inflation, Gold Prices, Indian Industrial Production (IIP) etc, therefore stock market performance influenced by significantly for a small change in these macroeconomic factors.

The macroeconomic factors and stock market performance as well relation exists among the factors measures through stock index movements in SENSEX and Nifty. The SENSEX used as proxy for assessing the performance indicator for economic efficiency in generating capital formation and enhance the corporate performance of the economy of any country. The SENSEX composes in 1986 with the base index year 1978-79 as 100, this index compiled by selection of 30 scripts, which representing the 12 different industries, further sample selection considered highly liquid in every day trading and the true represent their respective industry with high market capitalization weight age in respective industry as a mirror for entire industrial performance thereby economy of India. The BSE SENSEX is observed as vital indicator to assess the change in the price of securities, the Sensex movement ups and downs cause the sensitive issues related to company and economic fundamentals of the country, hence the Sensex movements reflects by change in the macroeconomic factors, which helps the investors to assess the movement of stock market and corporate world too.

II. REVIEW OF LITERATURE

1   R Mookergy and Q.Yu[1] (1997) analyzed the relationship between four macro economic factors M3 supply, Forex reserves, M1 and Forex rate and Singapore Stock return, they found Forex reserve, M3 and M1 money long-run relation exists with securities return, whereas Forex rate to stock return not found in long term relation

2   Sangeeta Chakravarthy[2] (2005) study conducted to analyze the association exists among stock exchange return to macroeconomic determinants over a period of 1991 to 2005, she found the positive impact of inflation, money supply and IIP causality on index return, on the other hand no relationships exists in exchange rate, gold price with stock return

3   Wong et al[3] (2005) their study results of co-integration shown there is no relationship exists with money supply and interest rates in US, whereas in Singapore it found long run equilibrium with macroeconomic factors.

4   K Pal and R Mittal[4] (2011) had studied co-integration among macroeconomic factors forex rate, inflation rate, domestic savings and interest rates, the result found forex rate and inflation show significance impact on Sensex, whereas there is no integration between domestic and interest rates.

5   Pimenta Junior, Hironobu and Higuchi[5] (2008) conducted a research on relationship among Portuguese index and macroeconomic determinants, it was found that exchange rate causes on Ibovespa, this results virtually true, rest of the factors not shown the significance.

6   Sezgin et al[6] (2008) analyzed relationship of Istanbul exchange and macroeconomic dynamics, results of the study found that unidirectional relationship macroeconomic factors

and stock exchange and as well as long run relationship.

7 Joseph Tagne Talla[7] (2013) had analyzed the significance of macroeconomic dynamics on index return of Stockholm exchange, the outcome seen inverse relation between stock return and currency dilution as well as inflation, on the other hand interest rate had partial negative impact on the stock returns, similarly with money supply and stock returns, whereas bidirectional causality found in selected macroeconomic factors to stock returns

8 Mgammal[8] (2012) analyzed the effect of various macroeconomic factors inflation, forex rate and interest rate on security prices of KSA and UAE, it found that short run stock price index of KSA is negatively influenced exchange rate, further it is positively influenced by the exchange rate, the long term shown stock price index of UAE is negatively affected by the exchange rate

9 Mahmood Yahyadehfar et al[9] (2012) investigate significance of macroeconomic dynamics on Iranian stock prices, the study results that stock prices were auto correlated and house prices main cause of stock price fluctuation

10 Srinivas Aluvala et al[10] (2014) have made a study about linkages to create an algorithm to find out the effects of the local macro-economic factors like consumer price index and gross domestic product and the global factors like foreign exchange rates.

11 Nagender Yamsani[11] (2017) has investigated the use of macro-economic variables using the concept of data mining.

12 Kafila[12] and Dr.Vijaya Srinivas (2018) have conducted a study to find out the impact of FII's on Sensex movements using regression analysis and the investigations suggested that very meager or no impact was found during the period of the study.

III.   RESEARCH METHODOLOGY

3.1 Need and Significance of The Study

There are mammoth research has been done so far on macroeconomic factors influencing on Stock market and as well as the association amongst them, but there all these studies were focused only two to three factors either inflation rate, exchange rate, or interest rate or GDP rate, this research gap to fulfill a large number of macroeconomic factors take into consider are GDP growth rate, Inflation rate, Exchange rate, Gold Prices, IIP and FII. The present study focuses dynamism of macroeconomic determinants influence on the SENSEX performance and as well as relationship exists among them. This study can helps to investors and policy makers to manage the macroeconomic factors on corporate performance and invest in controlled investment environment.

3.2 Objective of The Research

To study the association among Sensex and GDP growth rate, CPI Inflation rate, Forex rate, Gold Prices, IIP as well as FII.

3.3 Data Collection and Methodology

Data collected through secondary source through Bombay Stock Exchange, SEBI and RBI, the data collected on annual basis for the period of twenty five years 1993-94 to 2017-18. The factors consider for the study are BSE Sensex returns as depend factors and macroeconomic factors GDP growth rate, CPI Inflation rate, Forex rate, Gold Prices, IIP and FII as influencing factors.

3.4 Tools Used for The Study

Economic theories are often proving that a relationship exists in a series of economic factors, thus the series of economic factors follows a short dynamics in price movements due to economic and other forces influence on price movements, but over a due course of times the series of economic factors possess the long run equilibrium (M-M Approach on Arbitrage).

The data analyzed through descriptive statistics and correlation and regression analysis, ADF test and Engle-Granger Co-integration test used for measuring the objective of the study.

IV.   DATA ANALYSIS AND DISCUSSION

4.1 Data presented of Sensex and macroeconomic factors for the period of study 1993-94 to 2017-18

Table -1
Sensex and macroeconomic factors (IRS Billion)

YEAR	SENSEX	Forex R US D	GOLD P	net fII	BOP
1992-93	2280.52	31.24	4094.39	**0.04**	-8.81
1993-94	3778.99	31.37	4247.79	**54.45**	267.81
1994-95	3260.96	31.50	4268.60	**47.75**	181.60
1995-96	3366.61	34.35	4330.00	**67.21**	-40.50
1996-97	3360.89	35.92	4541.60	**73.87**	242.20
1997-98	3892.75	39.50	4598.19	**59.10**	166.53
1998-99	3739.96	42.44	4660.65	**-7.29**	182.45
1999-00	5001.28	43.61	4788.70	**97.65**	277.70

2000-01	3604.38	46.64	4920.21	**96.82**	276.43
2001-02	3469.35	48.80	5199.55	**82.73**	565.93
2002-03	3048.72	47.51	5432.71	**26.69**	820.37
2003-04	5590.60	43.45	5986.48	**440.01**	1439.93
2004-05	6492.82	43.76	6262.20	**414.18**	1159.07
2005-06	11279.96	44.61	8059.40	**486.50**	658.96
2006-07	13072.10	43.60	9369.60	**237.55**	1636.34
2007-08	15644.44	39.99	12631.74	**625.83**	3696.89
2008-09	9708.50	50.95	15232.20	**-433.36**	-971.14
2009-10	17527.77	45.14	16613.96	**1149.02**	642.36
2010-11	19445.22	44.65	20835.00	**1107.59**	594.51
2011-12	17404.20	51.16	26167.83	**499.16**	-685.03
2012-13	18835.77	54.39	27853.95	**1406.25**	207.02
2013-14	22386.27	60.10	28758.18	**855.22**	960.54
2014-15	27957.49	62.59	28794.25	**1102.43**	3779.25
2015-16	25341.86	66.33	29513.75	**-48.82**	1158.30
2016-17	29620.50	64.84	29831.88	**583.26**	1442.34
2017-18	32968.68	65.04	30419.72	**265.87**	2808.16

Table -2
Sensex and Macroeconomic factors growth rates

YEAR	SENSEX r	GDP g	INF r	IIP g	GOLD r	USD r	FII g
1993-94	50.505	4.80	2.49	13.10	3.693	0.438	202.87
1994-95	-14.744	6.70	4.97	9.10	0.493	0.39	21.39
1995-96	3.188	7.60	5.88	14.24	1.419	8.677	1.42
1996-97	-0.17	7.50	6.37	7.49	4.78	4.455	28.56
1997-98	14.691	4.00	10.92	8.69	1.225	9.502	-8.42
1998-99	-4.004	6.20	9.30	5.72	1.361	7.18	-68.38
1999-00	29.062	8.80	8.87	9.61	2.709	2.72	79.87
2000-01	-32.754	3.80	12.11	7.60	2.699	6.729	32.32
2001-02	-3.818	4.80	10.83	4.54	5.535	4.527	22.59
2002-03	-12.925	3.80	8.32	9.65	4.383	-2.69	-28.94
2003-04	60.636	7.90	6.39	12.33	9.693	-8.934	90.77
2004-05	14.961	7.90	5.79	22.15	4.508	0.711	-4.39
2005-06	55.233	9.30	4.25	8.62	25.229	1.924	31.9
2006-07	14.745	9.30	3.77	14.01	15.072	-2.29	35.22
2007-08	17.964	9.80	3.81	19.05	29.872	-8.644	61.53
2008-09	-47.711	3.90	4.31	3.55	18.717	24.224	-93.7
2009-10	59.078	8.50	3.77	7.68	8.685	-12.109	121.44
2010-11	10.381	10.30	4.02	12.58	22.639	-1.092	-513.85
2011-12	-11.089	6.60	4.84	4.78	22.79	13.622	-2.48
2012-13	7.905	5.50	13.17	3.33	6.244	6.121	29.95
2013-14	17.269	6.40	7.25	3.39	3.194	9.984	-46.69
2014-15	22.224	7.40	8.98	4.29	0.125	4.061	103.42
2015-16	-9.823	8.20	10.22	3.70	2.47	5.807	-76.69
2016-17	15.601	7.10	10.24	4.60	1.072	-2.278	32.75
2017-18	10.709	7.36	6.31	4.40	1.952	0.316	15.43

Table -3
Sensex and Macroeconomic factors growth rates
Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
SENSEX	25	-47.71	60.64	10.6846	5.33121	26.65604	.145	.464	.267	.902
GDP	25	3.80	10.30	6.9384	.38933	1.94663	-.221	.464	-.881	.902
FII	25	-513.85	202.87	2.7156	25.11998	125.59988	-2.915	.464	12.368	.902
INF	25	2.49	13.17	7.0832	.60191	3.00957	.408	.464	-.979	.902
IIP	25	3.33	22.15	8.7280	1.00412	5.02059	1.088	.464	.877	.902
GOLD	25	.13	29.87	8.0224	1.77286	8.86430	1.317	.464	.443	.902
USD EX	25	-12.11	24.22	2.9340	1.51621	7.58104	.486	.464	1.714	.902
Valid N (listwise)	25									

Results and Discussion

The analysis shows that the mean values of Sensex and macroeconomic factors were 10.6846 and GDP 6.9384, FII 25.11, Inflation .601, IIP 1.0, Gold 8.02, USD exchange rate 1.51 respectively. But standard deviation of FII value 125.59 was much higher than Sensex value at 25.65 it indicates Sensex is more stable than FIIs. The symmetry of found negative for Sensex and FII, on the other hand kurtosis coefficient of inflation and GDP found platykurtic curve.

Table -4
Correlation matrix between Sensex and Macroeconomic factors growth rates

SENSEXr	GDPg	INFr	IIPg	GOLDr	USDr	FIIg	
1.0000	0.4918	-0.3085	0.2995	0.0874	-0.6555	0.3637	SENSEXr
	1.0000	-0.4556	0.3980	0.4222	-0.5162	-0.1954	GDPg
		1.0000	-0.4845	-0.5564	0.2316	0.0401	INFr
			1.0000	0.2711	-0.4649	0.0180	IIPg
				1.0000	-0.0641	-0.2948	GOLDr
					1.0000	-0.2133	USDr
						1.0000	FIIg

Correlation coefficients, using the observations 1994 - 2018

H_0: There is no significant correlation between Sensex and macroeconomic factors

Table – 5
Test of significance of Correlations between Sensex and macroeconomic factors
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.757[a]	.574	.432	20.09423	.574	4.039	6	18	.010	2.213

a. Predictors: (Constant), EXUSD, GOLD, FII, IIP, INF, GDP
b. Dependent Factors: SENSEX

Results and Discussion

Table 4&5 presents the analysis of correlation between the Senses and macroeconomic factors. The analysis clearly depicts that Sensex possesses a positive correlation with GDP, IIP, GOLD and FII whereas Inflation and USD exchange shown negative correlation. Hence it can be concluded from the analysis that GDP, IIP and GOLD moving in same direction and having reciprocal impact. Whereas Inflation and USD exchange rate moving in contrary direction, whereas R square 57.4 percent and Adjusted R square 43.2 percent only having the impact of macroeconomic factors on Sensex, Hence, the correlation coefficient between Sensex and macroeconomic factors found significant as Durbin-Watson statistics value is 2.213 with significance change in F

VI. EMPIRICAL ANALYSIS OF THE LONG-TERM ASSOCIATION AMONG SENSEX AND MACROECONOMIC FACTORS.

Engle-Granger's (1987) co-integration test is used to find the long term association among Sensex and macroeconomic factors.

Table – 8
Engle-Granger co-integrating Analysis of Sensex and Macroeconomic factors

	Coefficient	std. error	t-ratio	p-value
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const	−1.85420	31.4613	−0.05894	0.9537
GDPg	4.38528	2.94821	1.487	0.1542
INFr	−1.21156	1.86502	−0.6496	0.5241
IIPg	−0.498443	1.02813	−0.4848	0.6337
GOLDr	−0.0843341	0.603428	−0.1398	0.8904
USDr *	−1.52225	0.732594	−2.078	0.0523
FIIg *	0.0706449	0.0370530	1.907	0.0727

Mean dependent var	10.68456	S.D. dependent var	26.65604
Sum squared resid	7265.504	S.E. of regression	20.09077
R-squared	0.573947	Adjusted R-squared	0.431930
Log-likelihood	−106.3737	Akaike criterion	226.7474
Schwarz criterion	235.2795	Hannan-Quinn	229.1138
rho	−0.168765	Durbin-Watson	2.213820

OLS, using observations 1994-2018 (T = 25)
Dependent factors: SENSEX r
Model: $(1-L)y = (a-1)*y(-1) + e$
estimated value of (a - 1): -1.16876
test statistic: $tau\_c(7) = -5.97267$
p-value 0.04069
1st-order autocorrelation coeff. for e: 0.132

H_0: No co-integration between Sensex and Macroeconomic factors in long run.

Results and Discussion

The Engle-granger test results presents through the table -8, that the test statistics of Sensex and macroeconomic factors presents through value compare with p value and the coefficient value of USD exchange and FII were more than zero. It was found by rejecting null no co-integration among Sensex and USD forex rate and FIIs, therefore accept the alternate hypothesis as there is co-integration, on the other hand rest of the factors GDP, Inflation rate, IIP and Gold price not found the long run relationship with Sensex.

VII. FINDING AND CONCLUSION

The analysis presented that the analysis of GDP, IIP and GOLD moving in same direction and having reciprocal impact on Sensex. Whereas Inflation and USD exchange rate moving in contrary direction with Sensex, it was found that Sensex influenced by USD forex rate and FII, whereas other factors GDP, Inflation rate, IIP and Gold price were not found the significance impact on Sensex. It can be concludes that Sensex and USD exchange rate and FIIs having the long run relationship, on the other hand rest of the factors GDP, Inflation rate, IIP and Gold price not found the long run relationship with Sensex. The study concludes that the international macroeconomic factors USD exchange rate and FIIs have impact on Sensex and reaching the long run equilibrium, whereas domestic economic factors GDP, Inflation rate, IIP and Gold Prices relation found at negative impact and very slow impact on long run.

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