



Impact of macroeconomic variables on the selected Indian sectoral indices: An empirical analysis

Mrunali Jambotkar¹, Guntur Anjana Raju²

¹ Student, Department of Commerce, Faculty of Commerce and Management Studies, Goa University, Goa, India

² Professor, Department of Commerce, Faculty of Commerce and Management Studies, Goa University, Goa, India

Abstract

Economic variables are interrelated with each other and such interplay amongst them produces a significant effect on the Investment pattern and brings stability in the business and economy. The present study has analysed the impact of Macroeconomic aggregates namely the Bank Interest Rate, Exchange Rate, Inflation (WPI), Crude oil prices and the Foreign Exchange Reserves of India on the selected NSE Sectoral Indices Series. For accomplishing the objective, the monthly time series data for the period of 10 years from January 2007 to December 2016 was analysed through the application of econometric techniques like Unit Root test, Ordinary least square model (OLS) and Correlation. The results stated that the combined effects of the macroeconomic variables on each of the Sector Indices were significant but the selected Macro factors had less explanatory powers. Finally, the analyses concluded a high strength of the relationship among all the selected sectors on account of close linkages among the various sectors which serves as an important tool for the investor to diversify their portfolio.

Keywords: macroeconomic variables, sectoral indices, stock prices and ordinary least square

Introduction

Stock market segment reflects economy's health and its stability and plays a very significant role in channelizing funds from savers (investors) to the needy sectors. It undertakes various functions like accelerating the savings for Investment in listed companies for their expansion requirements and also provide for easy liquidity, safety and higher returns in the interest of the Investors. The market price of the Stock is based on the demand and supply conditions. If the market participants identifies the future growth prospects then the demand will rise as a result of which prices will also rise, supply being constant.

The movement of Stock indices is highly sensitive and is greatly influenced by the macroeconomic factors such as domestic and international economic, social or political events; market sentiments/ expectations about future economic growth trajectory or critical budgetary, monetary and fiscal policy announcements etc. All these variables including expectations, sentiments, political developments, international Events etc. will transmit their effect and produces volatility in Stock market. As a result it has motivated the many researchers and academicians to investigate the impact of macroeconomic aggregates on the stock prices. The outcome of this study will assists to various parties including Individual Investors, Portfolio Managers, Institutional Investors, Foreign Investors, Mutual Funds as well as Policy Makers with respect to Investment and other necessary decisions related to various sectors of the economy.

Literature Review

There exist a numerous studies conducted by (Chen, Roll, & Ross, 1986) ^[2], (Ashaolu, T.O. and Ogunmuyiwa, 2011) ^[1], (Ratanapakorn & Sharma, 2007) ^[10], (Gan, Lee, Hwa, Yong,

& Zhang, 2006) ^[4] both for developed and emerging economies to examine the dynamic effect of macroeconomic variables on the stock prices. (Wongbangpo & Sharma, 2002) ^[14], Supported the inter-linkages between the macroeconomic aggregates and stock markets of five South Asian countries. The empirical evidence concludes a long run negative association between money supply and Stock prices of Indonesia and Philippines. It was also seen that Exchange rate affects the Stock prices positively in case of Indonesia, Philippines and Malaysia and negatively in case of Thailand and Singapore.

Economic variables are interrelated to each other. The combined effect as a result of interplay among these variables will provide different implications as compared to independent effect of a specific variable on the Investment pattern. There are some existing reviews by (Rapach, 2002) ^[9], (Jawaid & Haq, 2012) ^[5], (Rahman & Uddin, 2009) ^[8], (Filis, Degiannakis, & Floros, 2011) ^[3], (Suganthi & Dharshanaa, 2014) ^[13], (Österholm, 2016) ^[7] to understand such behaviour and provide divergent results. All such studies were with respect to General Index so the present study attempts to fill this gap.

(Saeed, 2012) ^[11] In her paper focused on the impact of macroeconomic variables on stock returns of nine sectoral indices listed on Karachi stock exchange by applying multifactor model within an APT frame work. The study is conducted for a time frame ranging from June 2000- June 2010 and concluded that macroeconomic variables have significant impact on the sectoral stock returns but the variation in the returns is very small. Only short-term interest rate has significant influence on returns of all sectors whereas Exchange Rate and Oil prices have significant impact on the returns of specific sectors.

(Zhu, 2012) ^[15] The purpose of this study is to investigate the performance of APT in Shanghai Stock Exchange (SEE) and to discover the association between a set of macroeconomic variables and stock return. The study considers nine macroeconomic variables i.e. inflation, money supply (M2), exchange rate, industrial production, bond, export, import, foreign reserve and unemployment rate. Monthly data for a time span of seven years i.e. from January 2005 to December 2011 was considered. Most of the time series data can be either stationary or non-stationary hence unit root technique was employed for stationary analyses. For further analyses correlation matrix and estimate equation through OLS is undertaken. After analyses the results concluded the that exchange rate, exports, foreign reserve and unemployment rate have effects on the stock return of energy sector in Shanghai stock market.

(Singh, 2014) ^[12] The paper tends to investigate the relationship between economic variables and stock market of India. Various econometric techniques such as Pearson’s Correlation matrix, Granger’s causality test and Multiple regression test is applied to examine the influence and dynamic causal relationship among the variables. The results exhibit significant impact of macroeconomic variables on Indian stock market. The Granger causality test signifies that there exists causal relationship from FII to stock market. Apart from this, there is no any causal relationship among the variables.

(Luthra & Mahajan, 2014) ^[6], examines the impact of macroeconomic factors on BSE Bankex. The study considers the various variables data during the period from 2002 to 2013. The BSE BANKEX Index is launched by Bombay Stock Exchange Limited (BSE).It includes major public and private sector banks and keeps track on the performance of the leading banking sector stocks listed on the BSE. The present study employs Multiple Regression Model for analyses and concludes that there exists a negative effect of Gold prices and positive effect of Exchange rate, Inflation and GDP growth rate on the stock prices of banks. The results also reveal less explanatory powers of these variables to bring variation in stock prices of BSE Bankex.

(Dinkergok, 2016)The study examines the relationship between Macroeconomic aggregates namely Oil prices, Interest rate, Exchange rates, Industrial Production, World equity Index and Borsa Istanbul sector indices in Turkey. The study applies Ordinary Least Square Method on monthly averages of all the described variables and the results revealed that all the macroeconomic variables except oil prices have a significant impact on the returns on sector indices. The findings suggest that interest rates and exchange rates affect all sector returns negatively whereas World Equity Index shows negative implications only on the returns of BIST National Technology Sector Index.

The review of literature reveals that numerous studies were

conducted to analyse the impact of macroeconomic variables on composite stock index but studies relating to impact of macroeconomic variables on selected sector indices are very limited. A different methodology, time frame, economic indicators gives different results under different scenarios. So the study intends to undertake further enquiry to fill this gap between present and existing research.

Objectives of the study

1. To examine the existence of Correlation between the macroeconomic indicators and returns of sector indices in National Stock Exchange (NSE).
2. To analyze the impact of macroeconomic variables on the returns of different sector indices in National Stock Exchange (NSE).

Research hypothesis

The following Null hypotheses were considered under the study.

1. The series under consideration has a unit root. (Calculated value <critical value)
2. There is no significant relationship between macroeconomic indicators and returns of sector indices in National Stock Exchange (NSE).
3. There is no significant impact of macroeconomic variables on the returns of sector indices in National Stock Exchange (NSE).

Methodology

The study is based on quantitative data in the form of Secondary sources of data collection. The present study is an attempt to test the impact of various macro factors on the NSE Sector indices covering the period of ten years from 1st January 2007 to 31st December 2016.The sample data considered for the study are 9 sector indices from the 12 sector indices at the national stock exchange of India (NSE) and five explanatory variables. The daily closing prices were converted into monthly by taking average for further analyses. The sample size accounts for around 108 monthly closing prices of sector indices at NSE and macroeconomic variables (9 years × 12 months). All the analyses were carried out in E-views. For the purpose of Regression Analysis, different Sectoral Indices at National Stock Exchange (NSE) namely NIFTY Auto Index, NIFTY Bank Index, NIFTY Financial Services Index, NIFTY FMCG Index, NIFTY IT index, NIFTY Metal Index, NIFTY Pharma Index, NIFTY Private Bank Index and NIFTY PSU Bank Index has been taken as Dependent Variable while various Macroeconomic Variables namely Crude oil prices, Foreign Exchange rate, Foreign Exchange Reserves, Bank Interest Rate and Wholesale Price index (WPI) has been considered as Independent Variables. The various sources of data collection for all the variables under study are as follows:

Table 1

Data	Unit of measurement	Source
Sectoral Indices	Indian Rupees	www.nseindia.com
Crude oil prices	Indian rupees per barrel	www.mcxindia.com
Foreign Exchange rate	Rupees per Dollar	www.rbi.org.in

Foreign Exchange Reserves	Rupees billion	www.rbi.org.in
Bank Interest Rate	Percentage	Database of Indian economy (RBI)
Wholesale Price index (WPI)	Index	Bloomberg

All the data was transformed into Natural logarithm and the monthly returns of closing prices of Sectoral Indices were computed as $R_t = \ln(I_t / I_{t-1})$, where I_t stands for Index values at time t and I_{t-1} stands for Index values at time $t-1$. The following economic model has been formulated for above analyses.

\ln Sectoral Indices = $\beta_0 + \beta_1 \ln$ Exchange rate + $\beta_2 \ln$ Bank rate + $\beta_3 \ln$ Crude oil prices + $\beta_4 \ln$ Forex reserves + $\beta_5 \ln$ WPI + ϵ .

For the purpose of Analysing and Interpreting the data, the tools and techniques employed are Descriptive Techniques, Unit root test, Correlation Matrix and Ordinary Least Square.

Empirical Analyses

The description of all the econometric techniques and the outcomes expected from the relationship between

macroeconomic variables and sectoral stock prices are presented below.

1. Descriptive Statistics

Descriptive statistics describes the temporal properties of the data set. The nature, characteristics and features of the variables described through the descriptive statistics provides quick understanding and interpretation of data set covered under the study. For the purpose of the quantitative description some common measures like Measures of Central tendency (Mean), Measures of dispersion like Standard deviation(or variance), Maximum and Minimum value, Kurtosis, Skewness and Jarque-Bera Test has been used. Table 2 presents the quantitative Summary Statistics of general trends and patterns of all the variables.

Table 2: Summary of Descriptive Statistics

Particular	Mean	Maximum	Minimum	Standard deviation	Skewness	Kurtosis	Jarque-Bera
Descriptive Statistics of Sectoral Indices							
Nifty Auto	4527.74	10164.92	1030.868	2536.476	0.6406	2.151	11.8113 (0.0027)
Nifty Bank	11269.	19869.64	3788.152	4303.775	0.403134	2.1939	6.499 (0.2207)
Nifty FMCG	12317.7	22425.47	4816.093	5984.435	0.20134	1.4627	12.628 (0.0018)
Nifty Metal	3260.69	40222.2	1367.885	3826.767	9.703602	102.241	51127.5 (0.0000)
Nifty IT	7112.48	12379.61	2141.839	2803.213	0.289231	1.9826	6.84808 (0.0326)
Nifty Pharma	6190.68	13209.01	2047.335	3412.79	0.681187	2.0389	13.8988 (0.0009)
Nifty Private Bank	5397.26	11126.36	1313.589	2727.978	0.614194	2.1853	10.8627 (0.0044)
Nifty PSU bank	3005.64	5001.675	1440.452	770.3362	0.128261	2.6350	0.99084 (0.6080)
Nifty Financial service	4628.94	8174.575	1549.873	1745.62	0.3889	2.209	6.15 (0.0461)
Descriptive Statistics of Macroeconomic Variables							
Forex Reserve	15976.8	24701.05	7888.330	4478.142	0.4470	2.308458	6.38807 (0.041)
WPI	154.098	185.9	112.4	24.482	-0.2921	1.552	12.194 (0.0023)
Bank rate	7.208	10.25	6	1.362	0.455	1.521	15.0751 (0.0005)
Exchange rate	53.007	68.238	39.375	9.9036	0.2103	1.65	9.9749 (0.0068)
Crude oil prices	4076.92	6853.565	1955.54	1212.12	0.36328	2.0897	6.7826 (0.0337)

Source: Computed Values by Author

The mean values of all the variables indicates that Nifty FMCG sector has a highest average value whereas Nifty PSU Bank Sector has a lowest mean value among all other sectors. Nifty Metal sector has the maximum value whereas nifty PSU Bank sector has the minimum value. The variability in closing prices is measured through Standard deviation. It is observed that Nifty FMCG, Nifty Metal, Nifty Bank shows high variation in their closing but Nifty PSU shows lowest fluctuations in its stock prices. All the macroeconomic variables show higher volatility. The measure of Skewness designated that data points are symmetric for all the variables except for Nifty Metal as the data point lies outside +/- 1 range. Among all macroeconomic indicators WPI it is negatively skewed. All the variables except Nifty Metal has a kurtosis value less than 3 indicating a flatter tail and lower

peak than normal distribution. The Jarque-Bera test indicates whether the time series is normally distributed or not. The null hypotheses except in case of Nifty PSU bank and Nifty Bank are rejected indicating that the series is not normally distributed.

2. Unit root test

Stationary of data series is crucial for determining the validity of the classical regression results and to draw meaningful conclusions with respect to a trend in a time series analyses i.e. to know whether the trend in a time series is deterministic or stochastic in nature. It indicates the order of integration. The selected variables are analysed through the most commonly used Augmented Dickey-Fuller (ADF) test to determine their stationary either at level or at first difference.

Table 3: Unit Root Test of Macroeconomic Variables and Sectoral Indices series

Null Hypothesis: Macroeconomic Variables and Sectoral Indices series have unit root						
Particulars	t-statistics	Test Critical Values			Prob.*	Decision
		1% level	5% level	10% level		
Nifty Auto	-8.63167	-3.48655	-2.88607	-2.57993	0.0000	Reject
Nifty Bank	-5.14471	-3.48755	-2.88659	-2.58016	0.0000	Reject
Nifty FMCG	-10.4909	-3.48655	-2.88607	-2.57993	0.0000	Reject
Nifty IT	-7.23312	-3.48655	-2.88607	-2.57993	0.0000	Reject
Nifty Metal	-16.2389	-3.48655	-2.88607	-2.57993	0.0000	Reject
Nifty Pharma	-8.08615	-3.48865	-2.88607	-2.57993	0.0000	Reject
Nifty PSU bank	-8.03818	-3.48705	-2.88629	-2.58005	0.0000	Reject
Nifty Private Bank	-5.15168	-3.48755	-2.88651	-2.58016	0.0000	Reject
Nifty Financial service	-7.85910	-3.48705	-2.88629	-2.58005	0.0000	Reject
Forex Reserve	-8.71334	-3.48655	-2.88607	-2.57993	0.0000	Reject
WPI	-6.17747	-3.48655	-2.88607	-2.57993	0.0000	Reject
Bank rate	-8.50891	-3.48705	-2.88629	-2.58005	0.0000	Reject
Exchange rate	-8.00935	-3.48655	-2.88607	-2.57993	0.0000	Reject
Crude oil prices	-7.32573	-3.48636	-2.88607	-2.57993	0.0000	Reject

Source: Computed Values by Author

The above data of sectoral indices at NSE and macroeconomic variables were tested for unit root and the null hypothesis for the above test is that sectoral indices series as well as macroeconomic variables series has a unit root. The results shows that the values of T statistics of all the variables is more than the critical values at 1%,5% and 10% significance level. The P- values are also 0.000 in all the cases therefore the null hypothesis that unit root exist in data is rejected and alternate hypotheses is accepted concluding that the series is stationary at first difference.

3. Correlation

Correlation Matrix analyses is a statistical measure to indicate the extent to which two or more variables move together. Correlation coefficient ranges between -1 to +1. A positive correlation implies the extent to which variables increase or decrease together in the same direction, while a negative correlation implies the extent to which one variable increases as the other decreases i.e. variables move in opposite direction. If correlation between two variables is -1 then variables are perfectly negatively correlated, +1 indicates perfectly positively correlated and when the coefficient is zero it indicates that there is no relation between the two variables.

Table 4: Correlation Matrix of Macroeconomic Variables and Sectoral Indices series.

	Nifty Auto	Nifty Bank	Nifty Financial services	Nifty FMCG	Nifty IT	Nifty Metal	Nifty Pharma	Nifty Private bank	Nifty PSU bank	Bank rate	Crude oil prices	Exchange rate	Forex Reseve	WPI
Nifty Auto	1	0.61	0.67	0.50	0.60	0.11	0.56	0.66	0.57	-0.15	0.32	-0.32	0.04	0.13
Nifty Bank	0.61	1	0.95	0.56	0.42	0.13	0.47	0.95	0.89	0.02	0.07	-0.57	-0.17	-0.04
Nifty Financial Service	0.67	0.95	1	0.61	0.48	0.14	0.56	0.99	0.88	0.00	0.16	-0.60	-0.16	-0.04
Nifty FMCG	0.50	0.56	0.61	1	0.37	0.07	0.58	0.61	0.48	0.01	0.14	-0.33	-0.08	0.00
Nifty IT	0.60	0.42	0.48	0.37	1	0.10	0.61	0.49	0.27	0.11	0.34	-0.26	-0.10	0.17
Nifty Metal	0.11	0.13	0.14	0.07	0.10	1	0.05	0.16	0.13	0.01	0.07	-0.11	0.03	-0.02
Nifty Pharma	0.56	0.47	0.56	0.58	0.61	0.05	1	0.56	0.34	0.00	0.25	-0.38	-0.06	0.19
Nifty Private bank	0.66	0.95	0.99	0.61	0.49	0.16	0.56	1	0.85	0.00	0.17	-0.60	-0.14	-0.03
Nifty PSU bank	0.57	0.89	0.88	0.48	0.27	0.13	0.34	0.85	1	0.03	0.03	-0.56	-0.20	-0.05
Bank rate	-0.15	0.02	0.00	0.01	0.11	0.01	0.00	0.00	0.03	1	0.07	0.01	-0.08	0.09
Crude oil prices	0.32	0.07	0.16	0.14	0.34	0.07	0.25	0.17	0.03	0.07	1	-0.07	0.24	0.52
Exchange rate	-0.32	-0.57	-0.60	-0.33	-0.26	-0.11	-0.38	-0.60	-0.56	0.01	-0.07	1	0.41	-0.03
Forex reserve	0.04	-0.17	-0.16	-0.08	-0.10	0.03	-0.06	-0.14	-0.20	-0.08	0.24	0.41	1	0.16
WPI	0.13	-0.04	-0.04	0.00	0.17	-0.02	0.19	-0.03	-0.05	0.09	0.52	-0.03	0.16	1

Source: Computed Values by Author

The outcome of the pairwise correlation matrix exhibiting the strength and association among the selected macroeconomic variables and NSE sectoral indices has been reported in the Table 4. From the derived results it can be seen that there exist a strong correlation among the Nifty financial service sector, Nifty PSU Bank and Nifty Private Bank. Since all these sectors are inter-related and forms part of Indian Financial System the strength of relationship among these sectors is

very high. There exists a moderate correlation among rest of the sectors except Nifty Metal sector. The results suggest evidence of weak influence of bank rate on variables considered under the study whereas exchange rate shows a strong negative influence of all the sectoral indices. The Correlation coefficient values indicate a positive association between crude oil prices and all the sector indices. In case of Forex reserves the results exhibits that Forex reserves is

negatively correlated with all the sectors except Nifty Auto. With respect to WPI it was found that with increase in the inflation the stock prices of Nifty Auto, Nifty Pharma and Nifty IT will also move in the same direction whereas stock prices of other indices will move in opposite direction.

4. Ordinary Least Square (OLS)

OLS is a generalized linear modelling technique i.e. used to model a single response variable which has been recorded at

least interval scale. The technique must be applied to single or multiple explanatory variables also categorical explanatory variables that have been appropriately coded. It helps in understanding the impact of change in prices of one variable on the other. The present Analyses consider OLS Model to examine the effect of macroeconomic variables on the returns of sectoral indices at the NSE and to also compute the degree of association between them.

Table 5: OLS results of macroeconomic variables and sectoral indices series

Dependent variable	Independent variable	Coefficient	Prob*	R-squared	Durbin Watson stat
Nifty Auto	C	0.013884	0.0599	0.2258	1.6223
	Ln crude oil prices	0.227837	0.0032		
	Ln exchange rate	-1.146061	0.0004		
	Ln forex reserve	0.317713	0.2905		
	Ln bank rate	-0.303046	0.0579		
	Ln WPI	-0.392417	0.6671		
Nifty Bank	C	0.018459	0.0131	0.3403	1.57157
	Ln crude oil prices	0.04696	0.5373		
	Ln exchange rate	-2.245222	0.0000		
	Ln forex reserve	0.296442	0.3251		
	Ln bank rate	0.067296	0.6721		
	Ln WPI	-1.024593	0.2637		
Nifty IT	C	0.009200	0.1713	0.188472	1.371195
	Ln bank rate	0.142158	0.3280		
	Ln crude oil prices	0.238708	0.0008		
	Ln exchange rate	-0.594359	0.0424		
	Ln forex reserve	-0.260820	0.3426		
	Ln WPI	-0.111603	0.8936		
Nifty Financial service	C	0.021074	0.0028	0.395418	1.390467
	Ln bank rate	0.031783	0.8320		
	Ln crude oil prices	0.136993	0.0579		
	Ln exchange rate	-2.285769	0.0000		
	Ln forex reserve	0.278372	0.3270		
	Ln WPI	-1.586321	0.0677		
Nifty PSU	C	0.015106	0.0888	0.320664	1.524174
	Ln bank rate	0.112042	0.5578		
	Ln crude oil prices	0.011903	0.8963		
	Ln exchange rate	-2.560047	0.0000		
	Ln forex reserve	0.226266	0.5314		
	Ln WPI	-1.003621	0.3618		
Nifty Energy	C	0.012230	0.0222	0.437295	1.529992
	Ln bank rate	0.215286	0.6267		
	Ln crude oil prices	0.305739	0.0001		
	Ln exchange rate	0.0222	0.0000		
	Ln forex reserve	0.0001	0.1597		
	Ln WPI	0.1597	0.0503		
Nifty Metal	C	0.010418	0.7577	0.026108	2.863594
	Ln bank rate	0.117935	0.8719		
	Ln crude oil prices	0.245334	0.4834		
	Ln exchange rate	-2.019089	0.1693		
	Ln forex reserve	1.094318	0.4294		
	Ln WPI	-3.200763	0.4472		
Nifty FMCG	C	0.015232	0.0010	0.130062	1.776647
	Ln bank rate	0.014930	0.8790		
	Ln crude oil prices	0.068639	0.1451		
	Ln exchange rate	-0.669370	0.0009		
	Ln forex reserve	0.067257	0.7169		
	Ln WPI	-0.550745	0.3297		
Nifty Private bank	C	0.024312	0.0015	0.397	1.389
	Ln bank rate	0.034124	0.8330		

	Ln crude oil prices	0.149963	0.0546		
	Ln exchange rate	-2.495180	0.0000		
	Ln forex reserve	0.370388	0.2277		
	Ln WPI	-1.639340	0.0802		
Nifty Pharma	C	0.011207	0.0301	0.200342	1.435273
	Ln bank rate	-0.017772	0.8725		
	Ln crude oil prices	0.092111	0.0840		
	Ln exchange rate	-0.887688	0.0001		
	Ln forex reserve	0.085422	0.6834		
	Ln WPI	0.503596	0.4297		

Source: Computed Values by Author

The Table 5 shows the generated coefficients of the constant, Inflation rate (WPI), Exchange rate, Crude oil prices, Bank Interest rate, and Forex reserves for all the sector indices. The OLS results of Nifty Auto indicates that Bank rate, Crude oil prices and the exchange rate has significant influence on the stock market returns as their p-values are less than 0.05 significance level. A 1% change in bank rate, crude oil prices and the exchange rate would lead to 0.2278 %, -1.146%, -0.3030% change in the returns in this industry. The results revealed that exchange rate and crude oil prices will move the returns of in opposite direction. R-Squared value indicates that 22.58 % of the variation in stock returns is explained by the factors considered in this study implying that remaining 77.02% of the variation in the returns is caused by the variables outside the preview of this study. The value of Durbin Watson statistics is lies between 1 and 2 i.e. 1.6223 so there does not exist a problem of autocorrelation.

In case of Nifty Bank Index, the probability values revealed that only exchange rate has a significant effect on the returns of nifty bank index. The value of R-square indicates a moderate variation in the in the nifty bank return is explained by the factors considered under this study. In this study the closing prices of Nifty IT index has been regressed on the macroeconomic variables. In the above model P value at 5% significance level have been considered. If the Probability values are less than 5% significance level then the formulated null hypothesis will be rejected. In the above model the probability value is less than 0.05 significance level only in case of exchange rate and crude oil prices so we reject the null hypotheses that only exchange rate and crude oil prices has significant influence on the dependent variable i.e. closing prices of nifty IT index. The value of R-squared is 0.18847 indicating that the 18.84% of the change in prices of nifty IT index is caused by the macroeconomic variables considered under the study (explanatory variable) and rest is due to the other variables outside the preview of this study. We can conclude that the model is not a good fit i.e. model is not significantly explaining the variation in dependent variable with respect to independent variable as the explanatory power of the model is just 15.26%.

The results of OLS Model for Nifty Financial Service Index, exhibits that the probability value of all the macro factors except crude oil prices was above 0.05% significance level which indicates that only crude oil prices have a positive and significant influence on returns of nifty financial service sector. The value of r-square is 40% which indicates a moderate impact of macroeconomic variables on returns of Nifty Financial Service Index. In case of Nifty Metal sector it

was found that the p-value of all the macro factors was above 0.05 significance level. Even the value of R-square is really low indicating that the contribution of each and every macroeconomic factor to bring variation in the returns of Sectoral indices is too small. When individually all the macroeconomic factors were considered it was found that not even a single factor bears a significant relationship with the returns of nifty metal index. The above table depicts that in case of Nifty Private Bank index, the probability value is less than 0.05 in case of crude oil prices and exchange rate indicating a significant negative a between the exchange rate, and the stock returns. However crude oil prices has a positive impact on the returns indicating that a unit change in crude oil prices will result in increase in the returns of nifty private bank by 0.149. As per Durbin Watson statistic, statistic is better if it is closer to 2 so there is no cause of concern. The value of r-square is 39% indicating its moderate impact.

The findings of the study prove that exchange rate has an impact on return of Nifty Pharma sector. The exchange rate influences the stock return at 1% significant level. It shows coefficient value of -0.888 which depicts a negative relationship with the returns of Pharma sector. The stock returns will decrease by 0.888 points as Indian rupees are depreciated against the US dollar by 1 point. Other variables considered under the study doesn't have a significant effect on the returns of the Pharma sectoral Indices The r-squared value for the above model is not a good fit and only 20% of the variation in dependent variable is explained by independent variable. The Durbin Watson t statistic is 1.53 so there is no problem of autocorrelation. The OLS result of Nifty PSU Bank reveals that the coefficient for the exchange rate is equal to -2.56 i.e. 1% change in the exchange rate would lead to -2.560% changes in the returns in this industry. There exist an inverse relation among the exchange rate and the sector returns. R-Squared value indicates that 32.06% of the variation in stock returns is explained by the factors considered in this study. The value of Durbin Watson statistics is lies between 1 and 2 i.e. 1.524 so there does not exist a problem of autocorrelation. In case of Nifty FMCG the probability value is less than 0.05 significance level for exchange rate so the null hypotheses that exchange rate has no significant impact on Nifty FMCG is rejected and we accept the alternate hypothesis that only exchange rate has significant influence on the dependent variable i.e. closing prices of nifty FMCG. The coefficient value (-0.6694) shows that INR/USD exchange rate has inverse relationship with stock return of FMCG sector. It implies a negative direction indicating that returns of energy sector will decrease by 0.6694 point when

the exchange rate increases by 1 point.

Conclusion

The present study analyzed the effect of macroeconomic factors on the returns of selected NSE sector indices at the sector level for a time span of 10 years from January 2007 to December 2016. Finally, the analyses concluded that the strength of the relationship among the banking and the financial service sectors is very high whereas it is moderate with respect to all other sectors. The result was expected on account of market aggregation and close linkages among the markets and various sectors which serves as an important tool for the investor to diversify their portfolio. To study the impact of macroeconomic factors on closing prices of selected Sectoral Indices Ordinary least square model is applied and it reveals that Exchange rate has a significant but negative impact on all the sectors share prices indicating existence of inverse relationship among them. The combined effect of the macroeconomic variables on each of the Sector indices were significant. The value of R-square is a conclusive evidence that the selected Macro factors have less explanatory powers indicating that other factors which bring variability in selected Sectoral share prices were not considered. Therefore the finding doesn't reflect the conclusive evidence of investment. Apart from the above factors there are still some known and unknown factors that transmit their effect and drive the stock prices and affect the return generating capacity of companies. The present study undertakes evaluation at sector wise which is crucial for Investors to construct a well-diversified portfolio and the government and other regulators bodies to design the Monetary policy while keeping check on exchange rate, interest rates, inflation rate and safeguard the country against external shocks. So the present study will serve as an effective insight in effective decision making.

References

1. Ashaolu, TO, Ogunmuyiwa MS. An econometric analysis of the impact of macroeconomic variables on stock market movement in Nigeria." *Journal of Business Management*. 2011; 3(1):72-78.
2. Chen NF, Roll R, Ross SA. Economic Forces and the Stock Market Economic Forces and the Stock Market." *The Journal of Business*. 1986; 59:21236(3):383-403.
3. Filis G, Degiannakis S, Floros C. Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries." *International Review of Financial Analysis*. 2011; 20(3):152-164.
4. Gan C, Lee M, Hwa H, Yong A, Zhang J. Macroeconomic Variables and Stock Market Interactions: New Zealand Evidence." *Investment Management and Financial Innovations*. 2006; 3(4):89-101.
5. Jawaid ST, Haq AU. Effects of interest rate, exchange rate and their volatilities on stock prices: evidence from banking industry of Pakistan." *Theoretical and Applied Economics*. 2012; 19(8):153-166.
6. Luthra M, Mahajan S. Impact of Macro factors on BSE Bankex. 2014; 2(2):179-186.
7. Österholm P. The Long-run Relationship Between Stock Prices and GDP in Sweden" *Economic Notes*. 2016; 45(2):283-297.
8. Rahman L, Uddin J. Dynamic Relationship between Stock Prices and Exchange Rates: Evidence from Three South Asian Countries. *International Business Research*. 2009; 2(2):167-174.
9. Rapach DE. The long-run relationship between inflation and real stock prices." *Journal of Macroeconomics*. 2002; 24(3):331-351.
10. Ratanapakorn O, Sharma SC. Dynamic analysis between the US stock returns and the macroeconomic variables." *Applied Financial Economics*. 2007; 17(5):369-377.
11. Saeed S. Macroeconomic Factors and Sectoral Indices: A Study of Karachi Stock Exchange (Pakistan). *European Journal of Business and Management*. 2012; 4(17):132-152.
12. Singh P. An empirical relationship between selected Indian stock market indices and macroeconomic indicators." *International Journal of Research in Business Management*. 2014; 2(9):81-92.
13. Suganthi P, Dharshanaa C. Interrelationship between FII and Stock Market and their Causal Relationship with Selected Macroeconomic Variables in India." *TSM Business Review*. 2014; 2(1):29-46.
14. Wongbangpo P, Sharma SC. Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries." *Journal of Asian Economics*. 2002; 13(1):27-51.
15. Zhu B. The Effects of Macroeconomic Factors on Stock Return of Energy Sector in Shanghai Stock Market. *International Journal of Scientific and Research Publications*. 2012; 2(11):2250-3153.