THE SELECTED MACRO ECONOMIC VARIABLES AND STOCK MARKET VOLATILITY: EMPIRICAL EVIDENCE FROM INDIA

S. SABAMAITHILY[1], **Dr. N. S. PANDEY**[2]

[1]Doctoral Research Scholar,   [2]Assistant Professor (Selection Grade)

P.G & RESEARCH DEPARTMENT OF COMMERCE, KANCHI MAMUNIVAR CENTRE FOR POST GRADUATE STUDIES, PUDUCHERRY

Email - maithilysaba@gmail.com,   drnspandey@gmail.com

Abstract: This paper is to empirically examine The Selected Macro Economic Variables And Stock Market Volatility: in India. It focuses on the stock market volatility and Macro Economic Factors throughout various factors affecting the Macro Economic Factors. The period of study is considered the 10 years data from 2006-2016. This study is based on secondary data is limited to the Reserve Bank of India. Three independent variables viz. Interest Rate , Oil Price, Exchange Rate (IR, OP and ER) and one dependent variable i.e. Stock Return (SR) have been tested using (Eviews) software Descriptive statistics, Regression, Correlation, estimate ARCH Model and Unit Root Test have been used for this analysis.. The findings of the study shows that there is a significant effect of Stock Return in respect of selected macroeconomic variables (IR,OP and ER) have significant impact on the SR chosen by Stock Market Volatility in India for the study period.

Key words: Stock Market Volatility, Macroeconomic, Stock Return, Interest Rate, Oil Price, Exchange Rate.

1. INTRODUCTION:

The present study focuses on The Selected Macro Economic Variables and Stock Market Volatility: Empirical Evidence Form India. Stock market plays a crucial role in any country's economic growth and development. A healthy and flourishing stock market has been considered relevant for the nation's economic growth by channelizing capital towards investors and entrepreneurs. The Stock Market is the market in which shares of publicly held companies are issued and traded either through exchanges or over-the-counter markets. Also known as the equity market, the stock market is one of the most vital components of a free-market economy.

2. STOCK MARKET VOLATILITY:

When the Stock Market Goes up one day, and then goes down for the next five, then up again, and then down (Changes) again that is called Stock Market Volatility.

3. MACROECONOMIC POLICY:

Macroeconomic policy is usually implemented through two sets of tools: fiscal and monetary policy. Bothe forms of policy are used to stabilize the economy, which can mean boosting the economy to the level of GDP consistent with full employment. Macroeconomic policy focuses on limiting the effects of the business cycle to achieve the economic goals of price stability, full employment and growth.

4. LITERATURE REVIEWS:

Ramin and Mohamad (2004) "Relationship between Macroeconomic Variables and Stock Market Indices: Co-integration Evidence from Stock Exchange of Singapore's All –S Sector Indices" this study was concluded that Singapore's stock market and property index from co-integration relationship with changes in the short and long-term interest rates, industrial production, price levels, exchange rate and money supply. **Minsoo Lee et al. (2006)** "Macroeconomic Variable and Stock Market Interactions: New Zealand Evidence" this study was indicated Interest rate, money supply and real GDP and there is no significant evidence that the New Zealand Stock Index is a leading indicator for changes in macroeconomic variables. **Humpe and Peter (2007)** "Can Macroeconomic Variables Explain Long term Stock Market Movements? A Comparison of the US and Japan" tools used in this

study Unit Root Tests, Johansen Co-integration test, Granger Causality test Stock prices are influenced positively by industrial production and negatively by the money supply. For the second co-integration vector find industrial production to be negatively influenced but the consumer price index and a long term interest rate. **Gee Chan and Abd Karim (2010)** "Bank Efficiency and Macro – Economic Factors: The Case of Developing Countries" this study finding that Banks cost inefficiency in the Middle East/North Africa is negatively related to trade openness but is positively related to market concentration suggesting that banking market in this region should be more open to competition.

Yu Hsing (2011) "The Stock Market and Macroeconomic Variables in A BRICS Country and Policy Implications" South Africa stock market index is positively influenced by the growth rate of real GDP. **Oseni and Philip (2011)** "Stock Market Volatility and Macroeconomic Variables Volatility in Nigeria: An Exponential GARCH Approach" that there exists a bi-casual relationship between stock market volatility and real GDP volatility in Nigeria. **Mahedi (2012)** "Impact of the Macroeconomic Variables on the Stock Market Returns: The Case of Germany and the United Kingdom" Indicate that there are both short and long run causal relationships between stock prices and macroeconomic variables. The existence of short-term adjustments and long-tem dynamics for both the UK and the German stock market returns and the certain macroeconomic fundamentals. **Ozlen and Ergun (2012)** "Macroeconomic Factors and Stock Returns" findings of this study Indicates that exchange rate and interest rate are the most significant factors in the stock price fluctuations of the companies .

Samveg (2012) "The Effect of Macroeconomic Determinants on the Performance of the Indian Stock Market" Interest Rate, Sensex, Nifty , Exchange Rate, Index of Industrial Production, Gold Price, Silver Price and Oil Price , Inflation and Money supply are also found the long run relationship between macroeconomic variables and stock market indices. **Joseph Ato (2013)** "Selected Macroeconomic Variables and Stock Market Movements: Empirical Evidence From Thailand (SETI)" tools used in this study Unit Root Tests, Co integration and Granger Causality Test SETI and selected macroeconomic variables are co integrated. Findings of the study significant equilibrium relationship over the long run and money supply demonstrate a strong positive relationship with the SET Index. **Tagne Talla (2013)** "Impact of Macroeconomic Variables on the Stock Market Price of the Stockholm Stock Exchange" tools used in this study Co- integration, Unit Root Tests, Granger – Causality and concluded that Inflation and currency depreciation have a significant negative influence on stock prices. In addition, interest rate is negatively related to stock price.

Charles (2014) "The Effect of Macroeconomic Variables on Stock Market Returns in Ghana (2000-2013)" the estimate the tested tools in this study Co- integration, Unit Root Tests, Granger – Causality and findings of the study Interest rates and money supply had a significant negative effect on stock market returns however; exchange rate had a significant positive effect on stock market returns. **Tripathi and Seth (2014)** "Stock Market Performance and Macroeconomic Factors: The Study of Indian Equity Market" tools was used in this study Factor analysis, ADF and PP Unit root tests, Regression, ARCH model, Granger causality and Johansen Co-integration test Stock prices movement is not only the result of behavior of key macroeconomic variables but it is also one of the important reasons of movement in other macro dimension in the economy. **Gurusamy (2015)** "Exploring the Stock Market Volatility with BRIC Countries- An Empirical Investigation" tools used in this study ARCH model, Granger causality and Johansen Co-integration test. Result found in this study Credit rating agencies play an significant part in providing one source of information that aids accuracy and market capability, plummeting the imbalance of information among the stock market investors.

5. OBJECTIVES OF THE STUDY:

- To study the Long Term relationship between stock Market Volatility (Stock Return) and Macro economic factors from India.
- To find out the impact of Stock Market Volatility (Stock Return) on Macro economic factors from India.

6. HYPOTHESIS OF THIS STUDY:

H_0^1:   There is no long-run relationship between Stock Returns and Interest Rate.

H_0^2:   There is no long-run relationship between Stock Return and Crude oil price.

H_0^3:   There is no long-run relationship between Stock Return and Exchange rate.

H_0^4:   There is no significant impact between Stock Returns and Interest Rate.

H_0^5:   There is no significant impact of Stock Return on Crude oil price.

H_0^6:   There is no significant impact of Stock Return on Exchange rate.

H_0^7:   There is no significant relationship among Stock Return, Oil Price and Interest Rate.

7. DATA COLLECTED AND RESEARCH METHODOLOGY:

- **Type of Data:** The stock market volatility (Stock Return) and macroeconomic variables with reference are based on secondary data which have collected from RBI during this period from the year 2006-2016.

- To explore the relationship between Stock Return and macroeconomic variables: Interest rate, Crude oil price ($ per barrel), Exchange Rate (Rs per $) during the period for the year 2006-2016.

- The data consist of Monthly data observations regarding the macroeconomic variables namely IR, OP and ER. Stock market indicators, namely BSE India Sensex, BSE Indian market capitalization and BSE India market turnover covering the10 years period from 2006-2016. The data for economy activity have been collected from RBI (Reserve Bank of India).

- Besides the Eviews analysis, descriptive statistics, correlation and estimate ARCH model Unit-Root-Test have been used for this analysis.

Table 1
Macro economic variables

Variables are used	
Dependent variable	Stock returns
Independent variable	Interest rate, Crude oil price ($ per barrel), Exchange Rate (Rs per $)
Tools used:- Descriptive Statistics. Correlation, Estimate equation ARCH model, Unit Root test.	

Analysis and Interpretation of this Study

Table 2
Descriptive statistics of Stock Market Volatility and Macro economic variables in India

Variables	SR	IR	ER	OP
Mean	5694.30	16.58	56.90	51.00
Median	1266.57	27.24	34.39	35.23
Minimum	3998.38	6.94	10.44	10.87
Maximum	8331.30	94.11	97.68	93.84
Skewness	0.895	2.665	-0.052	-0.384
Kurtosis	3.141	8.106	1.267	1.689
Jarque-Bera	1.344	22.70	1.254	0.962
Probability	0.510	0.000	0.533	0.618
Observation	10	10	10	10

Source: Computed results based on compiled data collected from RBI.

The descriptive statistics above table shows that Stock Return has the highest mean value and it indicated that the Stock Market various highly with the variables. The next highest mean is Crude Oil which shows that the Indian stock market varies highly within the variables. Stock Return have higher Standard Deviation indicating that the Indian Stock Market effectively Exchange Rate and followed by Crude Oil also high Standard Deviation but Interest Rate have low Standard Deviation from the mean value indicating that there is low in Interest Rate.

Correlation of Stock Market Volatility and in India
The descriptive statistics show the stock market volatility and macroeconomic variables in India. The correlation analysis is done to analyze the relationship between the Stock market volatility and macroeconomic variables. To examine the relationship among these variables, correlation coefficients are calculated from Eviews.

Table 3
Correlation analysis of Stock Market Volatility and Macro economic variables in India

	Stock Return	Exchange rate	Interest rate	Crude oil
Stock Return	1			
Exchange rate	0.620	1		
Interest rate	0.740	0.228	1	
Crude oil	-0.002*	-0.312	0.030**	1

* Correlation is significant at the 0.01 level. ** Correlation is significant at the 0.05 level.

Table 4
Heteroskedasticity Test: ARCH Model

Dependent Variable	Obs*R-squared	Prob. Chi-square(1)
Exchange Rate	0.339723	0.5600
Interest Rate	0.332559	0.5642
Oil Price	2.202449	0.1378

Source: Authors' computation.

Table 5
Result of Unit Root Test on Level and On First Difference of Log Variables.

	On Levels		On First Difference	
Variables	ADF	PP	ADF	PP
Log Stock Return	-2.848707***	-5.673603*	-2.933728***	-2.132826
Log Exchange Rate	-0.466442	-1.030114	-6.108578*	-9.767385*
Log Interest Rate	-178.3770*	-160.0252*	-139.1523*	-374.4955*
Log Oil Price	-2.072746	-2.078368	-3.916676**	-3.916676**

*Significant at the 0.01 level. **Significant at the 0.05 level. ***Significant at the 0.10 level.
The first order differencing for all these variables, the null hypothesis for non-stationary was rejected for al variables at the same confidence level lending continuity in the modeling process. (**ADF** Augmented Dickey-Fuller test statistic **PP** Probabilities).

Table 5
Statement of Result

S.No	Hypotheses	Statement of Hypotheses	Accepted/ Rejected	Result
1	H_0^1	There is no long-run relationship between Stock Returns and Interest Rate	Rejected	Significant
2	H_0^2	There is no long-run relationship between Stock Return and Crude oil price.	Accepted	Not Significant
3	H_0^3	There is no long-run relationship between Stock Return and Exchange rate	Rejected	Significant
4	H_0^4	There is no significant impact between Stock Returns and Interest Rate.	Rejected	Significant
5	H_0^5	There is no significant impact between Stock Return and Crude oil price.	Accepted	Not Significant
6	H_0^6	There is no significant impact between Stock Return and Exchange rate.	Rejected	Significant
7	H_0^7	There is no significant relationship between Stock Return, Oil Price and Interest Rate.	Rejected	Significant

7. LIMITATIONS OF THE STUDY

- The Study is limited to 10 years i.e. from 2006-16 Therefore; a detailed trend covering a lengthy period is not possible.
- The study is based on Secondary Data collected from RBI and BSE. Therefore, the quality of the study depends purely upon the accuracy, reliability and availability of secondary data.
- The Study is limited to the Stock Market Volatility and macroeconomic variable are taken by RBI and Bombay Stock Exchange. Therefore, the accuracy of results is purely based on the availability of data.

8. CONCLUSION:

The casual relationship between stock market performance and macroeconomic variables namely Interest Rate, Exchange Rate, Oil price using monthly data that span from January 2006- December 2016. Monthly index values of BSE Sensex are used as a proxy for aggregate stock returns. The overall Descriptive statistics, Regression, Correlation, ARCH model and Unit Root test model. The results are mixed but interesting. There is significant correlation among stock market variables and macroeconomic factors. This study clearly indicates that it is not the real economic variables that precede stock market movements but, stock market performance precedes the real economy more. These findings are reinforced by the graphs generated by impulse response analysis. Stock return is used as the dependent variable in order to test the impact of Stock Market Volatility and Macroeconomic variables in India. However, on whole macroeconomic variables are more efficient in this study.

9. SCOPE FOR FURTHER STUDIES:

Any advanced researches probably will be accepted on the comparable area with large number of macroeconomic variable and expansion the years of the sample.

- Study may further more be in other stock market variables in different macroeconomic variables and huge number of sample.
- Further extensive research may done other macroeconomic variables etc.
- Study might be undertaken by taking large number of sample covering and more number of years.

REFERENCES:

1. Ramin Cooper Maysami and Mohamad Atkin Hamzah (2004) "Relationship between Macroeconomic Variables and Stock Market Indices: Co-integration Evidence from Stock Exchange of Singapore's All – S Sector Indices" *Jurnal Pengurusan. Singapore*.86-94.

2. Christoher Gan, Minsoo Lee, Hua Hwa Au Yong and Jun Zhang (2006) Macroeconomic Variable and Stock Market Interactions: New Zealand Evidence" *Investment Management and Financial Innovations*, 3(4). 89-101.

3. Andreas Humpe and Peter Macmillan (2007) "Can Macroeconomic Variables Explain Long term Stock Market Movements? A Comparison of the US and Japan" *School of Economics and Finance, University of Andrews UK*. 1-26.47-77.

4. Sok Gee Chan and Mohd Zaini Abd Karim (2010) "Bank Efficiency and Macro – Economic Factors: The Case of Developing Countries", *Global Economic Review*. 39(3). 269-289.

5. Yu Hsing (2011). "The Stock Market and Macroeconomic Variables in A BRICS Country and Policy Implications", *International Journal of Economics and Financial Issues*. 1(1). 12-18.

6. Oseni and Philip (2011) "Stock Market Volatility and Macroeconomic Variables Volatility in Nigeria: An Exponential GARCH Approach" *Journal of Economics and Sustainable Development,* 2(10). 28-43.

7. Mahedi (2012) "Impact of the Macroeconomic Variables on the Stock Market Returns: The Case of Germany and the United Kingdom" *Global Journal of Management and Business Research (USA),* 12(16). 24-34.

8. Serife Ozlen and Ugur Ergun (2012) "Macroeconomic Factors and Stock Returns", *International Journal of Academic Research in Business and Social Sciences*. 2(9). 315-343.

9. Samveg Patel (2012) "The Effect of Macroeconomic Determinants on the Performance of the Indian Stock Market" *KMIMS Management Review,* 971(22). 117-127.

10. Joseph Ato Forson and Jakkaphong Janrattanagul (2013) "Selected Macroeconomic Variables and Stock Market Movements: Empirical Evidence from Thailand (SETI)" *Graduate School of Public Administration, Bangkok.* 8(2). 154-174.

11. Joseph Tagne Talla (2013) "Impact of Macroeconomic Variables on the Stock Market Price of the Stockholm Stock Exchange" *Jonkoping International Business School.* 1-48.

12. Charles Barnor (2014) "The Effect of Macroeconomic Variables on Stock Market Returns in Ghana (2000-2013)" *Banking and Finance, Walden University of Ghana.* 1-220.

13. Vanita Tripathi and Ritika Seth. (2014). "Stock Market Performance and Macroeconomic Factors: The Study of Indian Equity Market", *Global Business Review, New Delhi: SAGE Publications*. 15(2). June: 291-316.

14. Hemavathy and S. Gurusamy (2015) "Exploring The Stock Market Volatility With BRIC Countries- An Empirical Investigation", School of Management and Science. 11(1). 16-30.