CHAPTER VII
FINDINGS, SUGGESTIONS AND CONCLUSION

7.1 INTRODUCTION

The objective of this dissertation is to observe whether a set of macroeconomic factors contribute to the long run behavior stock markets. The asset pricing theory, i.e., the arbitrage price theory (APT) and efficient market hypothesis imply a relationship between the stock market and economic activity. However, these theories do not provide any evidence on which economic variables are likely to influence asset prices. An attempt has been made to find out the linkage between stock market returns and macroeconomic variables and the results of all the models applied are summarized in this chapter. Based on the findings, suggestions have also been given.

7.2 FINDINGS OF THE STUDY

The findings of each model applied on finding out the association between macroeconomic variables and stock market returns are summarized and presented in this chapter.

7.2.1 FINDINGS FROM THE DESCRIPTIVE STATISTICS

1. The descriptive statistics reveals that US stock market returns is highly volatile than the World stock market returns. Stock market indices, industrial production and Interest rate are negatively skewed, whereas the exchange rate, inflation, money supply, commodity prices and oil prices are positively skewed. The distribution of all macroeconomic variables considered for USA including the stock market returns is platykurtic and there is no randomness in the data.

2. The descriptive statistics applied for UK produced that FTSE 100 Index is less volatile than the world stock market index. The stock market indices, interest rate, money supply, exchange rate, industrial production are negatively skewed, while inflation, commodity prices, and oil prices are positively skewed. The distributions of the variables are far from being normal and it is platykurtic since the value of kurtosis is less than three.
3. The descriptive statistics applied for China produced that the china’s stock market index is highly volatile than the world stock market. Based on the skewness results, it is observed that inflation, interest rate, commodity prices and oil prices are positively skewed, while the negative values of stock market indices, exchange rate, and industrial production index are negatively skewed. The value of kurtosis of all variables is below three except China’s stock market index and inflation. The kurtosis value below three indicates that the distribution is platykurtic otherwise it is leptokurtic. The p-values associated with the Jarque-Bera statistics accepts the null hypotheses of that the variables are not normally distributed at 5% level of significance.

4. The mean and standard deviation of BSE SENSEX (Sensitive Index) are 8.77 and 0.797 respectively. The world index represented by MSCI index shows that the average value is 6.912 with the deviation of 0.348. The exchange rate and world index are negatively skewed while the other macroeconomic variables are positively skewed. The kurtosis shows that the distribution is platykurtic, while the interest rate and exchange rate are leptokurtic. The Jarque-Bera results indicates that the null hypothesis of normally distributed is strongly rejected at 5% significance level.

7.2.2 FINDINGS FROM THE STATIONARY TESTS

1. The stationary test of Augmented Dickey Fuller Test applied on the countries’ such as USA, UK, China and India produced evidence that all the variables in time series are not stationary in their levels and become stationary at first difference data. Therefore all the variables are considered as integrated of order one $I \sim (1)$.

2. The stationary test of Phillip Perron results is consistent with the Augmented Dickey fuller test results. The results show that all the variables in time series are not stationary in their levels and become stationary at first difference data. Therefore all the variables are considered as integrated of order one $I \sim (1)$.

7.2.3 FINDINGS FROM THE CORRELATION ANALYSIS

1. The correlation analysis applied on all the explanatory variables of selected countries such as USA, UK, China, and India shows that there is no multi co-linearity among the variables. None of the pair in the macroeconomic variables exhibits 0.8 or above
degree of correlation. Therefore, no variables were dropped due to the problem of multico-linearity.

7.2.4 FINDINGS FROM THE CO-INTEGRATION TEST- USA  
1. Lag order selection criteria applied for US data, that the sequential modified LR test statistic suggest lag eight, while Final Prediction Error, Akaike Information Criteria, Hannan –Quin information criterion suggest two lag lengths. Schwarz Information Criterion test recommends a lag length of one. Since three out of five tests recommended choosing lag length of two, the lag number two is selected to carry out Johansen- Juselius test of co-integration.

2. The Johansen Juselius test results produced that the trace test suggests that there should be two co-integrating equations at the 5% level of significance and the maximum Eigen value suggests that there is one co-integrating vector at the 5% level of significance, because, the calculated value 86.37684 is higher than the critical value 58.43354. Therefore, the null hypothesis no co-integration is rejected at 5% level of significance.

3. The Vector Error Correction model indicates that the value of t- statistics of ECT is -2.41 and its p value is 0.01. The speed of adjustment or error correction term with an expected negative sign indicates a significant long run causal effect at 5 percent level of significance. It shows that there is no short run causality between the stock market returns and macroeconomic variables chosen for USA.

7.2.5 FINDINGS FROM THE CO-INTEGRATION TEST- UK  
1. The lag order section criteria applied on macroeconomic variables considered for UK indicates that the sequential modified LR test statistic suggests lag seven, while Final Prediction Error, Akaike Information Criteria, Hannan –Quin information criteria suggest two lag lengths. Schwarz Information Criterion test recommends a lag length of one. Three out of five tests recommended choosing lag length of one that is selected to carry out Johansen- Juselius test of co-integration.

2. The results of the Johansen-Juselius co-integration applied on stock market returns in UK and macroeconomic variables selected for UK reveals that the trace test suggests that there are two co-integrating equations at the 5% level of significance.
Because, the calculated test value 244.7152 is higher than the critical value of 197.3709 and the second test value 172.1392 is higher than the critical value of 159.5297. It indicates that the null hypothesis of no co-integration between the variables is rejected at 5% level of significance. The maximum Eigen value suggests that there are two co-integrating vector at the 5% level of significance. Therefore the null hypothesis of no co-integration is highly rejected at 5 % level of significance. It is concluded from both the test that UK’s stock market returns and the respective macroeconomic variables have long run equilibrium relationship during the sample period.

3. The Vector Error Correction model applied on macroeconomic variables considered for UK shows that the value of t- statistics of ECT is -2.60 and its p value is 0.00. The speed of adjustment or error correction term with an expected negative sign indicates a significant long run causal effect at 5 percent level of significance. It is an evidence to use as an additional support of the results produced by Johansen Juselius co-integration test and confirm the presence of a stable long run causal relationship between stock price index and macroeconomic variables.

7.2.6 FINDINGS FROM THE CO-INTEGRATION TEST- CHINA

1. The appropriate lag for china is selected based on the five different criteria. The sequential modified LR test statistic shows the appropriate lag length is eight. The Final Prediction Error, Akaike Information Criteria recommend the lag length of two, while Schwarz information criterion and Hannan –Quin information criterion recommended one lag length. The most popular and widely accepted model of akaike information criteria is accepted and considered that the lag length of two is appropriate to apply for Johansen Juselius co-integration test and Vector Error Correction Model.

2. The Johansen Juselius co-integration test applied on macroeconomic variables shows existence of six co-integrating equations at 5% level of significance and the maximum Eigen value suggests that there are two co-integrating vector at the 5% level of significance. Therefore the null hypothesis of no co-integration is highly rejected at 5 % level of significance. It is concluded from both the test that stock
market returns and macroeconomic variables have long run relationship and their random walk moves together.

3. The Vector error correction model applied on stock market returns and macroeconomic variables considered for China displays that the value of t- statistics of ECT is -1.59 with the insignificant p value of 0.11. It shows that there exists insignificant long-run equilibrium relationship between china’s stock price index and selected macroeconomic variables.

7.2.7 FINDINGS FROM THE CO-INTEGRATION TEST - INDIA

1. The lag order selection criteria applied on stock market returns and macroeconomic variables in India reveals that the Schwarz Information Criterion test and Hannn – Quin information criterion suggest lag two, while Final Prediction Error, Akaike Information Criteria suggest four lag lengths. The sequential modified LR test statistic recommends a lag length of seven. The popular method of Akaike information criteria lag length is selected to proceed for johansen- juselius co-integration and vector error correction model estimation.

2. The trace statistics of Johansen test displays that four co-integrating equations between stock market index and macroeconomic variables at 5 percent significance level. The maximum Eigen value suggests that there are two co-integrating vector at the 5% level of significance. It is concluded from both the test that stock exchange index and macroeconomic variables have long run relationship and their random walk moves together in the long run. Hence, the null hypothesis of no co-integration between the stock market returns and macroeconomic variables considered for India is rejected at five percent level of significance.

3. The vector error correction model indicates that the value of t- statistics of ECT is -0.68 and with the insignificant p value of 0.49. The speed of adjustment or error correction term with an expected negative sign indicates an insignificant long run causal effect. It is an evidence to use as an additional support of the results produced by Johansen-Juselius co-integration test and confirm the presence of a stable long run relationship between the stock price returns and macroeconomic variables.
7.2.8 FINDINGS FROM THE REGRESSION ANALYSIS – USA
1. The results of the regression model indicate that the world stock return is the most significant factor influencing the stock market return at 5% significance level. The Durbin Watson statistics reveals that there is no auto or serial correlation in the data.

7.2.9 POST ESTIMATION DIAGNOSTIC TEST OF REGRESSION MODEL - USA
1. Residuals are extracted and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The results indicate that the null hypothesis of no serial correlation in the residuals is rejected at level data. At first difference data, it accepts the null hypothesis of no serial correlation during the sample period.
2. To find out the normality of residuals, Jarque Bera test has been applied on the residuals extracted using the regression model. The jarque bera value is 63.04301 with the p-value of 0.000000. Hence, the p-value is less than 5% level of significance, the null hypothesis of normally distributed can be rejected.
3. The Arch test highly rejects the null hypothesis of no arch effect in the time series data. The result shows that the data is suffering from the problem of heteroskedasticity. Because, he p value of Chi-Square is 0.0001 which is lower than the critical value of 0.05. The residual squared at lag one coefficient is 0.228543 with a significant p value of 0.0001. The Volatility Clustering is identified by using the residuals graph. It shows the presence of volatility clustering over the sample period.

7.2.10 FINDINGS FROM THE ARCH/GARCH/T-GARCH/E-GARCH (1, 1, 1) MODEL
1. From the results of the ARCH/GARCH (1, 1) model, it is understand that inflation, money supply exchange rate, industrial production and commodity prices are influencing the US stock market returns negatively, while, other macroeconomic variables such as interest rate, world stock market returns and oil prices are influencing the stock market returns positively. The world stock returns have positive significant impact on the stock market returns at 5% significance level.
Thus, it is concluded that US stock market is not an isolated market and the volatility of stock market returns are significantly influenced by world stock returns.

2. The positive sign of ARCH observed is go along with the result produced by Engle (1982) and Bollerslev(1986) and they emphasized on non-negative estimate of the ARCH. It is an additional evidence to support the presence of ARCH and GARCH effect on volatility of US stock market returns. The combined effect of ARCH and GARCH is 0.992802 which is averagely closed to one and it indicates the time varying volatility is persistent in US stock market returns.

3. The T-GARCH model applied for USA produced similar results as produced by GARCH model. The variance equation in T-GARCH model explains that the constant and T-GARCH co-efficient are insignificant while ARCH and GARCH coefficients are significant. The insignificant T-GARCH shows that there is insignificant leverage effect in the stock market returns and it can be concluded from the T-GARCH model that the stock market behavior is symmetric.

4. The mean equation of The E-GARCH model applied on macroeconomic variables considered for USA are consistent with the GARCH and T-GARCH models. But, the variance equation shows the magnitude of volatility and its co-efficient is high as well as significant at 5% level of significance. The leverage effect represented by the symbol of $\gamma$ is negative and insignificant. The EGARCH variance equation indicates that the stock market behavior of USA is symmetric due to insignificant leverage effects.

7.2.11 SELECTION OF APPROPRIATE MODEL –USA

1. The most widely accepted model of Akaike Information criteria is used to find out the appropriate model that explains the association between macroeconomic variables and US stock market returns. When comparing two or more models, the model with the lowest value of AIC is preferred. The lowest value of AIC is that -6.172063 of ARCH/ GARCH (1, 1), While the T-GARCH AND E-GARCH values are -6.165431 and -6.142341 respectively. Therefore, it is concluded from the table that the model that is best fit to forecast the future values of US stock market returns is that of ARCH/GARCH (1, 1) model.
7.2.12 POST ESTIMATION DIAGNOSTIC TEST OF ARCH/GARCH (1,1) MODEL -USA

1. Residuals are extracted from ARCH/GARCH model and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The result indicates that the residuals of the model are not serially correlated with lagged value of error terms. Hence, the null hypothesis of serially correlated is rejected at five percent level of significance.

2. To find out normality of residuals, Jarque Bera test has been applied on the residuals extracted from GARCH model. The jarque bera value is 1.298076 the p-value of 0.522548 Hence, the p-value is more than 5% level of significance, the null hypothesis of normally distributed is accepted. It means that the residuals are normally distributed.

3. The ARCH LM test results confirm that GARCH model mitigated the effect of heteroskedasticity. The post estimation diagnostics test is an evidence to support that there is no point of heteroskedasticity because the P value is 0.3559 which is greater than the critical value of chi-square of 0.05. Hence it is clearly evidenced that heteroskedasticity in the data has been modeled by the application of GARCH test.

7.2.13 FINDINGS FROM THE REGRESSION ANALYSIS -UK

1. The regression model applied on macroeconomic variables and stock market returns in UK explains that the exchange rate and world index are the most significant variables influencing the stock market returns in UK. The Durbin Watson statistics 2.122664 indicates that there is no auto or serial correlation in the time series of the data.

7.2.14 POST ESTIMATION DIAGNOSTIC TEST OF REGRESSION MODEL - UK

1. Residuals are extracted and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The results indicate that the null hypothesis of no serial correlation in the residuals is rejected at level regression model. But at first difference
regression model, the null hypothesis of no serial correlation is rejected at five percent level significance.

2. To find out the normality of residuals, Jarque Bera test has been applied on the residuals extracted using the regression model. The jarque bera value is 36.65018 the p-value of 0.000000 Hence, the p-value is less than 5% level of significance, the null hypothesis of normally distributed can not be accepted. It means that the residuals are not normally distributed.

3. The Arch test highly rejects the null hypothesis of no arch effect in the time series data. The result shows that the data is suffering from the problem of heteroskedasticity. The p vale of Chi-Square is 0.0176 which is lower than the critical value of 0.05. The residual squared at lag one coefficient is 0.141085 with a significant p value of 0.0175. Hence, it is concluded from the results that ARCH effect is present in the data which proves the presence of heteroskedasticity.

7.2.15 FINDINGS FROM THE ARCH/GARCH/T-GARCH/E-GARCH (1, 1, 1) MODEL -UK

1. The output of ARCH/GARCH (1,1) model indicates that Inflation, interest rate, commodity prices and oil prices are influencing the stock market returns negatively while the remaining macroeconomic variables such as money supply, exchange rate, production index and world stock market returns are positively influencing the stock market returns.

2. The combined effect of ARCH and GARCH is 0.9273 which is averagely closed to one and it indicates the time varying volatility is persistent in UK stock market returns. It follows a mean reverting variance process. The ARCH($\lambda_1$) is lower than GARCH ($\phi_1$), which shows that the volatility of the stock market is affected by past volatility more than the economic news from the previous period ($\phi_1$). The symmetric GARCH model do not find out the asymmetric effects of residuals on volatility of stock market returns.

3. The T-GARCH model applied for UK produced similar results as produced by GARCH model. From the variance equation, it is observed that the constant and ARCH remain insignificant. The Asymmetric T-GARCH co-efficient is 0.1166 and its p- value is 0.2441. Hence, the co-efficient is more than 0, it is understood that the
UK stock market is more volatile to bad news than the effect created by good news. The result indicates that the leverage effect is insignificant in UK stock market returns volatility.

4. The E-GARCH model applied on macroeconomic variables considered for UK results are consistent with the GARCH and T-GARCH models. The leverage effect represented by the symbol of $y$ is negative (-0.111515) and significant at 5% level of significance. The negative sign indicates that the bad news has a larger impact on volatility than the magnitude of the positive impact creates on volatility. The EGARCH variance equation indicates that there exists the asymmetric behavior in volatility which means that positive shocks are effecting, differently than the negative on volatility.

7.2.16 SELECTION OF APPROPRIATE MODEL –UK

1. The most widely accepted model of Akaike Information criteria is used to find out the best model that fits the data of UK’s macroeconomic variables and explains the stock market returns. When comparing two or more models, the model with the lowest value of AIC is preferred. The lowest value of AIC is -4.993031 of E-GARCH (1,1,1), While the ARCH/GARCH and T-GARCH values are -4.977207 and -4.993031 respectively. Therefore, it is concluded from the model that is best fit to forecast the future values of UK stock market returns is that of E-GARCH (1, 1, 1) model.

7.2.17 POST ESTIMATION DIAGNOSTIC TEST OF E-GARCH (1, 1, 1) MODEL - UK

1. Residuals are extracted from ARCH/E-GARCH model and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The result indicates that the residuals of the model are not serially correlated with lagged value of error terms. Hence, the residuals of the E-GARCH model is not serially correlated at five percent level of significance.

2. To find out normality of residuals, Jarque Bera test has been applied. The jarque bera value is 1.588318 the p-value of 0.451961. Hence, the p-value is more than 5% level
of significance, the null hypothesis of normally distributed can be accepted. It means that the residuals are normally distributed.

3. The ARCH LM test results confirm that GARCH model mitigated the effect of Heteroskedasticity. The post estimation diagnostics test is an evidence to support that there is no point of heteroskedasticity because the P value is 0.8770 which is greater than the critical value of chi-square of 0.05. Hence it is clearly evidenced that heterodkedasticity in the data has been modeled by the application of EGARCH test.

7.2.18 FINDINGS FROM THE REGRESSION ANALYSIS –CHINA

1. In China, the regression analysis reveals that the inflation, interest rate, exchange rate and oil prices are influencing the stock market returns negatively, while other macroeconomic variables such as money supply, industrial production index, world stock market returns, and commodity prices are influencing the stock market returns positively. Inflation and world stock market returns are significantly influencing the stock market returns in China.

7.2.19 POST ESTIMATION DIAGNOSTIC TEST OF REGRESSION MODEL - CHINA

1. Residuals are extracted and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The results indicate that the null hypothesis of no serial correlation in the residuals is rejected at level data regression model. The null hypothesis of no serial correlation in the residuals is accepted at first difference data regression model.

2. To find out the normality of residuals, Jarque Bera test has been applied on the residuals extracted using the regression model. The jarque bera value is 3458.617 with the p-value of 0.0000. Hence, the p-value is greater than 5% level of significance, the null hypothesis of normally distributed can be rejected. It means that the residuals are not normally distributed.

3. The Arch test accepts the null hypothesis of no arch effect in the time series data. The p value of Chi-Square 0.1461, which is higher than the critical value of 0.05. It indicates that the residuals generated from the regression model are homoskedastic that implies that the error variance is constant over the time period taken for the
study. Hence, it is concluded from the results that ARCH effect is not present in the data which proves the presence of homoskedasticity. The best model that can explain the stock market returns and can forecast the stock returns accurately is the linear regression model.

7.2.20 SELECTION OF APPROPRIATE MODEL - CHINA
1. The macroeconomic variables are stationary at first difference and free from the problems of multicollinearity and heteroskedasticity. Therefore, the best model that fits the data and can explain the china stock market returns is that the linear regression model.

7.2.21 FINDINGS FROM THE REGRESSION ANALYSIS – INDIA
1. The regression analysis applied on India’s stock market returns and selected macroeconomic variables reveals that the interest rate and world stock index are the significant variables explaining the stock market variations in India. The Durbin Watson statistic denotes that the time series are not facing any serial or auto correlation.

7.2.22 POST ESTIMATION DIAGNOSTIC TEST OF REGRESSION MODEL – INDIA
1. Residuals are extracted and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The results indicate that the null hypothesis of no serial correlation in the residuals is rejected at level data regression model. But the null hypothesis of no serial correlation in the residuals extracted at first difference data regression model is accepted.
2. To find out the normality of residuals, Jarque Bera test has been applied on the residuals extracted using the regression model. The jarque bera value is 160.1336 with the p-value of 0.000000 Hence, the p-value is more than 5% level of significance, the null hypothesis of normally distributed cannot be accepted. It means that the residuals are not normally distributed.
3. The Arch test highly rejects the null hypothesis of no arch effect in the time series data. The result shows the residuals generated from the regression analysis applied
on India’s stock market returns and macroeconomic variables are suffering from the problem of heteroskedasticity. The p value of Chi-Square is 0.01 which is lower than the critical value of 0.05. Hence, it is concluded from the results that ARCH effect is present in the data which proves the presence of heteroskedasticity.

7.2.23 FINDINGS FROM THE ARCH/GARCH/T-GARCH/E-GARCH (1, 1, 1) MODEL - INDIA

1. From the results of the ARCH/GARCH (1, 1) model, it is understand that inflation, interest rate, exchange rate and commodity prices are influencing the stock market returns negatively whereas, other macroeconomic variables such as money supply, industrial production, world stock market returns and oil prices are influencing the stock market returns positively. The inflation, exchange rate world stock returns have significant impact on the stock market returns at 5% significance level. Thus, it is concluded that Indian stock market is not an isolated market from the world stock market.

2. The positive sign of ARCH observed is go along with the result produced by Engle (1982) and Bollerslev(1986) and they emphasized on non-negative estimate of the ARCH. The combined effect of ARCH and GARCH is 0.979567 which is averagely closed to one and it indicates that the time varying volatility is persistent in India’s stock market returns. It follows a mean reverting variance process. The ARCH($\lambda_1$) is lower than GARCH ($\phi_1$), which shows that the volatility of the stock market is affected by past volatility more than the economic news from the previous period ($\phi_2$). The large coefficient of GARCH (1.01) explains that shocks to the conditional variance takes a long time to go out of the error terms.

3. The T-GARCH model has been applied on stock market returns and macroeconomic variables considered for India and produced similar results as produced by GARCH model. The variance equation explains that the ARCH and GARCH co-efficient are significant. The insignificant TARCH shows that the leverage effect in India is insignificant. The stock market behavior in India is symmetric at five percent level of significance. It indicates that the negative news and positive news impact on the stock market returns are in a similar magnitude.
4. The E-GARCH model reveals that the symbol of beta $\beta$ is the ARCH co-efficient is high and significant at 1% level of significance. The leverage effect represented by the symbol of $\gamma$ is negative and insignificant. The E-GARCH variance equation indicates that the stock market behavior of India is symmetric due to insignificant leverage effects.

**7.2.24 SELECTION OF APPROPRIATE MODEL –INDIA**

1. The AIC criterion is useful in comparing two or more competing models. The model with the lowest AIC is usually chosen. The lowest of value of AIC is -2.624803 which is lower than the T-GARCH and E-GARCH AIC values. It is understood from the analysis that the appropriate model that fits the Indian stock market returns forecasting is ARCH/GARCH (1, 1) model.

**7.2.25 POST ESTIMATION DIAGNOSTIC TEST OF ARCH/GARCH (1, 1) MODEL -INDIA**

1. Residuals are extracted from ARCH/GARCH model and tested using Ljung-box q statistics to find out the auto or serial correlation coefficients. The result indicates that the residuals of the model are not serially correlated with lagged value of error terms. Hence, the null hypothesis of serially correlated is rejected at five percent level of significance.

2. To find out normality of residuals, Jarque Bera test is applied on the residuals extracted from GARCH model. The jarque bera value is 0.337886 with the p-value of 0.844557. Hence, the p-value is more than 5% level of significance, the null hypothesis of normally distributed can be accepted. It means that the residuals are normally distributed.

3. The ARCH LM test results confirm that the GARCH model mitigated the effect of heteroskedasticity. The post estimation diagnostics test is an evidence to support that there is no point of heteroskedasticity because the P value is 0.5485 which is greater than the critical value of chi-square of 0.05. Hence it is clearly evidenced that heteroskedasticity in the data has been modeled by the application of GARCH test. The result of ARCH LM test has produced a clear evidence to support the fact of no heteroskedasticity.

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7.2.26 FINDINGS FROM THE PAIRWISE GRANGER CAUSALITY ANALYSIS

1. The pair wise granger causality tests applied on stock market returns and chosen macroeconomic variables considered for USA shows that unidirectional causality exists between the pairs of stock returns and exchange rate, stock returns and oil price index and stock returns and production index. Bi-directional causality exists between the pairs of stock returns and interest rate and stock returns and money supply. Therefore, it is concluded from the analysis that unidirectional and bi-directional causal relationship exists between the US stock market returns and some of the macroeconomic variables.

2. The pair wise granger causality test applied on UK’s stock market returns and macroeconomic variables displays that unidirectional causal relationship exists between the pairs of stock returns and exchange rate, stock returns and interest rate, stock returns and oil price index and stock returns and production index. Moreover, from the analysis, it is understood that there is no bi-directional causality between stock market returns and macroeconomic variables.

3. The pair wise granger causality test applied on China’s stock market returns and macroeconomic variables highlights the existence of unidirectional granger causality between the pairs of stock returns with the inflation, stock returns and interest rate and stock returns and money supply stock returns and world stock returns and stock returns with the oil price index. Therefore, it is understood from the analysis that there is no significant bi-directional granger causality between stock returns and other selected macroeconomic variables.

4. The pair wise granger causality applied on India shows the existence of unidirectional causal relationship between the pairs of stock returns and interest rate, stock returns and money supply, stock returns and production index, stock returns and commodity prices. Bi-directional causality exists between the pairs of stock returns and exchange rate and stock returns and oil price index. It is concluded from the analysis that unidirectional and bi-directional casual relationships are present between India’s stock market returns with the few selected macroeconomic variables.
7.2.27 FINDINGS FROM THE IMPULSE RESPONSE FUNCTION

Impulse response function is applied to examine the response of stock market returns to one standard error shocks given to the macroeconomic variables which has significant relationship with the stock market returns.

1. The response of USA’s stock market return declines in the third and fourth months but rises back in the sixth month. It rises in the seventh month and reverts to equilibrium in the subsequent months. The result is consistent with the findings from GARCH(1,1) model that the stock returns were positively associated with the world stock market returns.

2. The response of stock market returns to inflation in UK declines in the first three months but maintains the stable position till the last month. The response of stock market returns as a result of the shock in the inflation is consistent with the findings of the E-GARCH (1,1,1) model that the stock market returns are negatively correlated with the UK stock market returns.

3. The response of stock market return to shock in exchange rate in UK initially decrease but rises back to its equilibrium position. Though the result is inconsistent with the findings of E-GARCH model that the stock returns were positively associated with the interest rate, gradually the Interest rate reverts back to its original position.

4. The response stock market returns to shock in world stock market returns decreases throughout the study period considered for the analysis. Though the result is inconsistent with the EGARCH model that the world stock market returns were positive in determining the UK’s stock market returns, perhaps the response of stock market returns could be positive in the additional months of the sample period.

5. The response stock market returns to shock in interest rate in China is negative. It indicates that when the interest rate is increased, the stock market returns will be decreased. Similar result was produced by the regression model applied on china’s stock market returns and macroeconomic variables.

6. The response of stock market returns in China is positive to shock given to world stock market returns. It indicates that China’s stock market return will be increased
as the world stock market returns increased. The result of the impulse response function is consistent with the regression model.

7. In India, the response of stock market returns to one standard deviation shock given to inflation rate is negative in the impulse response function. In the first two months the response was negative and revert back to equilibrium in the six and seventh months. Subsequently, the response of stock market returns was negative in the 10th month as well. The result is consistent with the findings of the GARCH model.

8. The response of stock market returns to shock in exchange rate decreased in the initial two months and maintain the same position till the end the tenth month. It indicates that the result is consistent with the findings produced by the GARCH (1,1) model

9. In India, the response of stock market returns to shock given to world stock market returns rises in the first month and maintains a stable condition in the subsequent months. The result is consistent with the findings from GARCH(1,1) model that the stock returns were positively associated with the world stock market returns.

7.2.28 FINDINGS FROM THE JOHANSEN JUSELIUS CO-INTEGRATION TEST

1. The Johansen-Juselius test applied on BSE SENSEX and NYSE Composite Index reveals that there is no co-integrating equation at 5% level of significance. Because, the trace statistics 4.035090 is lower than the critical value of 15.49471. It depicts that there is no significant long run equilibrium relationship between the BSE SENSEX and NYSE Composite indices at 5% significance level. Therefore, the null hypothesis of no co-integration between Indian stock market returns represented by BSE SENSEX and NYSE composite Index can be accepted.

2. The Johansen test applied on BSE SENSEX and FTSE 100 displays that there is no significant long run equilibrium relationship between the BSE SENSEX and FTSE 100 indices at 5% significance level. Therefore, the null hypothesis of no co-integration between the Indian stock market index represented by BSE SENSEX and FTSE 100 can be accepted. The Eigen value test result is an additional evidence to strongly prove that there is no co integration between the indices.

3. To find out the co-integration between SSE composite index and NYSE composite index, the Johansen-Juselius co-integration test has been applied. The trace test and
Maximum Eigen value test have produced similar results. Both tests show that there is one co-integrating equation at 5% level of significance. Because, the trace statistics 16.42652 is lower than the critical value of 15.49471. It depicts that there is significant long run equilibrium relationship between the SSE Composite Index and NYSE composite index at 5% significance level. Therefore, the null hypothesis of no co-integration between China’s stock market index represented by SSE composite index and NYSE composite index can be rejected. The Eigen value test result is an additional evidence to strongly prove that there is co-integration between the indices. The calculated value at none is 14.714 and its critical value is 14.26. It depicts that there is long run equilibrium relationship between two indices. It reveals that the null hypothesis of no co-integration between the variables is rejected at 5% level of significance.

4. The Johansen co-integration test applied on SSE Composite index and FTSE 100 indices displays that there is long- run equilibrium relationship exists between the indices at 5% significance level. Therefore, the null hypothesis of no co-integration between SSE Composite index and FTSE 100 is rejected. The Eigen value test result is an additional evidence to strongly prove the existence of co-integration between the indices. The calculated value at none is 12.50765 its critical value is 14.26. It reveals that there is long- run equilibrium relationship between the two indices. Therefore, the null hypothesis of no co-integration between the variables is rejected at 5% level of significance

7.3 EMPIRICAL SUGGESTIONS

The role of stock market is to raise capital and also to ensure that the funds raised are used in the profitable opportunities. This analysis becomes an empirical contribution to the ongoing debate on the effect of macroeconomic variables on stock market returns. Analyzing the relationship between stock market returns and macroeconomic variables is called fundamental analysis which facilitates investors to find out the value of a security comparing with the current price with the aim of figuring out the future price of a security. The effect of macroeconomic variables on stock market returns has attracted much attention in developed and emerging economies due to their implications in the financial markets.
7.3.1 SUGGESTIONS TO THE INVESTORS

Suggestion for the investors is that they must closely analyze the macroeconomic variables patterns and forecast the future stock market returns using the appropriate model before investing in any of the stock market and they can maximize their profits.

1. Based on the findings, it is observed that macroeconomic variables and stock market returns have long run equilibrium relationship over the sample period. Therefore, Investors may use this as a guide in forecasting the stock market viability and to decide whether it is worthwhile to invest in it.

2. It is evidently seen that increasing inflation increases the cost of living and shifts resources from investment to disposable income. This leads to fall in demand for stock market investment and consequently reduces the volume of stock market. High inflation creates impact on the performance of the companies and in turn causes dividends to diminish. It is important for investors to follow the CPI because periods of high inflation worsen the market conditions.

3. Higher industrial production results in higher earnings for companies. With the expectation of higher earnings, investors tend to invest more in the stock market and it pushes up the stock returns. Therefore, investors can carefully watch the total amount of production of a country before making investment into stock market.

4. The domestic stock market is highly integrated with the world stock market since the relationship between domestic stock market returns and the world stock market returns is positive. In the period of 1990s, deregulation in many developing countries synchronizes the world financial market and it has become a challenge for investors to know the impact of world market on the price movements of domestic market. Therefore, investors should understand the price movement of world stock market before investing in the domestic stock market. Moreover, investors can use world stock market as a platform to find out the movement of the domestic stock market movement

5. The response of stock market returns to shock in macroeconomic variables is varied in terms of impact and level of significance in each market and results may prove
useful for portfolio diversification strategies and also to achieve better risk-return tradeoffs.

6. Investors in the USA and India can use GARCH (1, 1) model to forecast the future stock market returns using the key macroeconomic variables. Whereas, the investors in UK and China can use E-GARCH model and Regression model respectively to predict the future stock market returns. Investors in UK should be more cautious because bad news creates more impact on the stock market than the positive news.

7. The results suggest that investors may improve their portfolio performance in individual markets by focusing on the varying significance of the economic risk factors.

8. Investors may consider the past volatility of the stock prices along with the economic news prior to the financial investment in the stock market.

9. The co-integration test reveals that India is isolated from the other developed markets such as USA and UK. So, Investors in Indian stock market cannot use USA and UK stock price movement as the base price to forecast the Indian stock market price movements.

7.3.2 SUGGESTIONS TO THE POLICY MAKERS/ GOVERNMENT

Generally, governments do not interfere directly to regulate the securities market; however, there are methods and policies such as fiscal policy, monetary policy that have indirect influence on the market. Fiscal policies that affect the taxation of capital gains, dividends and interest gains may eventually have an effect on market activity. Tax cuts could motivate the investors to buy and sell securities whereas, unfavorable policies might cause individuals to move to fixed income securities or alternative investment. Moreover, through monetary policies, government can indirectly influence the stock market by adjusting the interest rates. In general, Cutting rates will discourage investors to invest money in fixed income securities and encourage borrowing for investment purposes. Furthermore the rules and regulations related to securities market have indirect effect on the securities market. The findings provide useful insights for the formulation and implementation of policies to achieve financial market stability.

1. It is noticed that increasing inflation increases the cost of living and shifts resources from investment to disposable income and in turn reduces the stock market returns.
Therefore, in order to improve the stock market performance, the government can take some effective measures to control the inflation and keep control the rising prices. Thus, maintaining price stability will ultimately be the best policy recommendations for stable and continued growth of any economy.

2. The second main factor that influences the stock market returns is interest rate. The interest rate has a negative causality on UK, China and India’s stock market returns. It denotes that when interest rate increases, the stock market returns will be decreased. The hidden fact is that when interest rate is high, rational investors tend to invest their money into less risky investment with the expectation of high returns. Hence, money market becomes an alternative investment opportunity to stock market investment in the long run. But, In USA the Increasing Treasury bill rate motivates the investor to invest more amount of money in the financial market with the expectation of dividend hike. On the other hand, a drop in interest rates could be the result of increased risk in stock market and moves away the investment from risky assets. Therefore, policy makers and government should use monetary policy as a tool and maintain the interest rate according to the changes in stock market.

3. The Money supply used as a proxy for broad money index (M3) influence the stock market returns positively. Increasing the money supply increases the flow of money and investors tend to invest more in stock market returns by creating demand for the shares. It will be resulted as hike in stock market returns. The nominal rate of returns could be increased because of increasing money supply. USA is an exception. An increase in money supply increases liquidity of the money could also result in increased inflation, which in turn may dampen the stock market prices. In USA, the Increasing inflation reduces the stock market returns. The government of USA can take effective measures to control the supply of money and increase the standard of living of the people by providing essential infrastructural facilities and social amenities in order to enhance the ability of the people to save and invest in the stock market.

4. It is noticed from the findings of UK, India and China that increase in exchange rate causes decrease in stock returns. The decrease in the stock returns occur when foreign investors invest their money in the stocks and their income decreases with an
increase in the exchange rate. The foreign investors will get less amount of money in the domestic currency because of increase in the exchange rates. This increase in exchange rate is not in favor of the foreign investors. Therefore, it is necessary to control the exchange rate to attract more capital from foreigners and to improve the stock market performance.

5. Index of industrial production is used as a proxy to represent the real sector. It is used as a measure of domestic macroeconomic activity in the economy and it affects stock prices through its influence on expected future cash flows. It is the measurement of real output of the industrial sector of the economy. Higher industrial production results in higher earnings for companies. With the expectation of higher earnings, investors tend to invest more in the stock market and it pushes up the stock returns. Therefore, a positive relationship prevails between the stock market returns and industrial production. The result is contrary to what is expected. Typically, increase in production would increase the corporate profit and cash flows. The government and policy makers can motivate the companies to increase the industrial production and give some incentives ultimately to increase the industrial production.

6. The global stock prices as measured by MSCI index have significant positive impact on the stock market returns. This leads to the conclusion that stock market returns are driven by global factors along with the domestic macroeconomic factors. The significant and consistent impact of the world stock market returns on the domestic stock market returns highlights the importance of external shocks. Investors in this market may look beyond the shocks of domestic economic environment to determine their full risks exposure. The positive and significant relationship with the world stock market returns shows that the stock market is highly integrated with the world stock market. The increasing integration with the world market may increase their exposure to external shocks such as capital reversals, performance of international capital markets. Though the government cannot directly control the world stock market, it can safeguard the domestic investors by taking prudent measures.

7. The global commodity prices have negative impact on the stock market returns. It is not a surprising fact that increasing price level decreases the stock market returns. But in China increasing commodity prices increases the stock market returns. It
shows that investors in China do not consider about the rising price level in the world. It is globally accepted fact that the inflation is always harmful for development of any economy. It is true for the economy of USA, UK, and India as well.

8. The relationship between crude oil prices and stock market returns is positive in USA and in India. The reason could be the companies in energy, industrial and material sectors raise the value of the shares to rising oil prices. Rising prices is a positive signal to the investors in USA and India to raise the amount of investment. So far, the empirical works carried out in the context of oil importing countries show that oil price variations have strong and negative impact on stock market returns. Whereas, in UK and China the stock market returns have negative relationship with the stock market returns. Increasing crude oil price is negative signal to the investors in UK and China. Hence, the government should promote the right political climate by improving macroeconomic stability, professionalization of asset management business.

7.3.3 SUGGESTIONS TO THE COMPANIES
1. High inflation creates impact on the performance of the companies and in turn causes dividends to diminish. The listed firms should strive to make their stocks attractive to investors as the firms stocks seem to be a good hedge against inflation over a long period for investors. This means that the firms should undertake projects that are viable to boost the performance of the company, as investors are motivated to invest in companies with good financial performance. Once the investors realized that the listed firms have a superior performance coupled with the fact that the returns on the shares increases as inflation goes up. The shares will become an asset to hedge against the risk of inflation.

2. Companies can take prudent measures that will bring about constant minimization and increase productivity so that, the returns on equity given to the share holds can go up.

3. The negative sign shows that the companies in USA are not strong enough to motivate the investors to invest in stock markets. The firms should undertake projects that are viable to boost their performance over time, as investors are
motivated to invest in companies with good financial performance. Once it is realized by investors that listed firms have a superior performance coupled with the fact that returns on their shares increases as inflation goes up, the shares may be preferred assets when investors have to hedge against the risk of inflation.

7.4 CONCLUSION

The growth of capital markets in the last two decades has become a major event in the international financial environment. Despite many financial crisis, the portfolio flows has kept increasing to emerging stock markets since the early 1990s as quoted by the International Finance Corporation. It is evidently seen from the analysis that stock market returns are highly sensitive to macroeconomic news and financial market participants are closely tied up with the release of economic data, fiscal and monetary policy changes. Based on the findings, the study has yield a number of specific conclusions. First, the impact of stock market returns to on macroeconomic variables varies across countries except the inflation rate and the world stock market returns. Second, the global variables are consistently more important along with the domestic variables in explaining the stock market returns across the countries. The stock markets are closely linked to some of the domestic and global economic variables. The shocks in the macroeconomic environment and poor policy making may transmit the shocks to stock market and volatile the capital markets. The results indicate that well planned economic policies helps to maintain a stable financial market of these countries. The global shocks that cannot be controlled by the domestic government highlight the importance of external shocks influencing the domestic stock market. Despite the external shocks that are arising out of the domestic governance, the policy makers with prudent policy formulation and effective implementation can protect the investors from the external shocks. Therefore it is concluded from the study that in order to maintain a stable financial market, the policy makers should manage the driving forces effectively by implementing and formulating well planned policies according to the present financial environment. The stronger structure of economic fundamentals determines the stability of the capital market.
7.5 SCOPE FOR FURTHER RESEARCH

Besides, macroeconomic conditions, there are many other factors that affect the prices of stocks and price movements. The idea is that the performance of particular companies and their results matter in determining the price of a stock. There is ample scope for doing further research in the stock markets. The topics that can be selected and used for further analysis are listed below.

1. Impact of microeconomic variables on stock market returns
2. Volatility of Frontier stock markets
3. Comparative study of developed and frontier stock market volatility
4. Impact of micro and macroeconomic variables on stock market returns