

ABSTRACT

STOCK MARKET VOLATILITY AND RETURNS: A STUDY OF SELECTED INDIAN INDUSTRIES

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1. Introduction:

Industrial development plays a crucial role in economic development. Industrial development depends on capital formation. A vibrant and competitive financial market plays a vital role in mobilization of saving and investment process. Stock market is an important part of financial market. Stock market acts as an engine of industrial development. Stock exchanges reflect the changing conditions of economic health of a country, as the shares prices are highly sensitive to changing economic, social and political conditions. During the periods of economic prosperity, the share prices in the stock market tend to rise. Conversely, share prices tend to fall when there is an economic stagnation and the business activities slow down as a result of depressions. Thus, the intensity of trading at stock exchanges and the corresponding rise or fall in the share prices of securities reflects the investors' assessment of the economic and business conditions in a country, and acts as the barometer which indicates the general conditions of the atmosphere of business. As a result of stock market transactions, funds flow from the less profitable to more profitable enterprises and they avail of the greater potential for growth. Financial resources of the economy are thus better allocated. Stock prices are highly volatile; it is changed in every moment in the stock market. Share prices change because of supply and demand for share of the companies in the share market. If more people want to buy a particular share then price moves up. Conversely, if more people want to sell their shares, then price would start to fall. Volatility in the stock market price is an integral part of stock market with the alternating bull and bear phases. In the bullish

market, the share prices soar high and in the bearish market share prices fall down and these ups and downs determine the return and volatility of the stock market.

A common problem plaguing the emerging economies is the shallowness of their financial sector. Financial sector play an important role in the process of economic growth and development by facilitating savings and channeling funds from savers to investors. While there have been numerous attempts to develop the financial sector, developing economies are facing the problem of high volatility in numerous fronts including volatility of financial sector. Volatility, which has a dominant influence, impairs the smooth functioning of the financial system and adversely affects economic performance. Similarly, stock market volatility also has a number of negative implications. One of the ways in which it affects the economy is through its effect on consumer spending (Campbell et al. 1994 and Poterba et al. 1986). The impact of stock market volatility on consumer spending is related via the wealth effect. Increased wealth will drive up consumer spending. However, a fall in stock market will weaken consumer confidence and thus drive down consumer spending. Stock market volatility may also affect business investment and economic growth directly.

A rise in stock market volatility can be interpreted as a rise in risk of equity investment and thus a shift of funds to less risky assets. This move could lead to a rise in cost of funds to firms and thus new firms might bear this effect as investors will turn to purchase of blue-chip or growth stocks. While there is a general consensus on what constitutes stock market volatility and, to a lesser extent, on how to measure it, there is far less agreement on the causes of stock market volatility. Some economists determine the causes of volatility in the arrival of new, unanticipated information that alters

expected returns on a stock (Engle and Ng, 1993). Thus, changes in market volatility would merely reflect changes in the local or global economic environment. Others claim that volatility is caused mainly by changes in trading volume, practices or patterns, which in turn are driven by factors such as modifications in macroeconomic policies, shifts in investor tolerance of risk and increased uncertainty. The degree of stock market volatility can help forecasters predict the path of an economy's growth and the structure of volatility can imply that "investors now need to hold more stocks in their portfolio to achieve diversification" (Krainer 2002).

Indian stock market has seen many microstructure changes such as global capital flow in the form of FII, private equity during last one decade or so. This has helped the market to grow and attract substantial foreign investment. Last decade has seen a few market debacles when an illegal trade practices manipulated the market to earn abnormal return. However, few settlement problems have occurred. The market has crashed few times, specifically on May 17, 2004, but settlement has passed off without any hitch. This has been possible due to sound and alert risk management practices (systemic and non-systemic) followed by the leading exchanges in the country. Wide price fluctuations are a daily occurrence on the world's stock markets as investors react to economic, business, and political events. Of late, the markets have been showing extremely erratic movements, which are in no way in tandem with the information that is fed to the markets. Thus, chaos prevails in the markets with investor optimism at unexpected levels. Irrational exuberance has substituted financial prudence.

Volatility analysis is important to investigate the behaviour of stock market because issues of volatility and risk have become increasingly important in recent times to financial practitioners, market participants, regulators and researchers.

As a concept, volatility is simple and intuitive. It measures variability or dispersion about a central tendency. To be more meaningful, it is a measure of how far the current price of an asset deviates from its average past prices. Greater this deviation, greater is the volatility. At a more fundamental level, volatility can indicate the strength or conviction behind a price move. Despite the clear mental image of it, and the quasi-standardized status it holds in the field of finance, there are some subtleties that make volatility challenging to analyze. Since volatility is a standard measure of financial vulnerability, it plays a key role in assessing the risk / return trade-offs and forms an important input in asset allocation decisions. In segmented capital markets, a country's volatility is a critical input in the cost of capital. Peters (1994) has noted that stock prices and returns are cyclical, imperfectly predictable in the short run, and unpredictable in the long run and that they exhibit nonlinear, and possibly chaotic, behavior related to time-varying positive feedback.

2. Necessity of the Study:

Economic growth is essential for improving the quality of life. Standard classical and neo-classical theories emphasize the role of investment in enhancing economic growth. Monetary and financial sectors play a key role in mobilizing resources. Financial stability is crucial for promoting investment. In a situation of financial stability, financial institutions and markets are able to efficiently mobilize savings, provide liquidity and allocate investment. The growing role of the financial sector in the efficient allocation of

resources at appropriate prices could significantly enhance the efficiency with which our economy functions. If financial markets work well, they will direct resources to their most productive uses. Risks will be more accurately priced and will be borne by those who have appetite for absorbing risks. Real economic activity with higher investments, in both quantity as well as quality, would result in growth with macroeconomic stability and fewer financial uncertainties. A stable financial system facilitates efficient transmission of monetary policy initiatives.

There are several reasons to take up this study. Volatility represents risk and is a matter of concern for anyone who is dealing with money or investing in the stock market or any other financial instruments. Hence, the issue of volatility has become increasingly significant in recent times for the financial practitioners, market participants, retail investors, regulators and researchers.

Volatility is a matter of great concern for market participants for the simple reason that as an investor one would like to know how much volatility or risk, he or she is exposed to, as more volatile a stock is, the more risky it is. Knowing the volatility of a stock provides some idea about what possible range of values it will take on some future date and can make informed decisions on his investments. Nonetheless, it is hard to predict with any certainty the price of a volatile stock. In general, people dislike risk and would like to have less risk or no risk while investing.

Secondly, organizations entrusted with the job of regulating the market also need a clear idea regarding the pattern of volatility for framing policies to protect the interests of investors. Hence, an understanding of the market volatility is, thus, important from the

regulatory policy perspective as well. Lastly, it is perceived as an indicator of market inefficiency and potential threat to the very integrity of market mechanism.

Stock return volatility hinders economic performance through consumer spending (Garner, 1988). For example, immediately after a persistent drop in stock prices, economic forecasts generally predict sharply weaker economic growth. They believe that the fall in stock prices would reduce consumer spending. The sizeable fall in consumer wealth as a result of fall in stock prices is expected to directly lower consumer spending. In addition, a weakening in consumer confidence could contribute to a further spending reduction.

Stock return volatility may also affect business investment spending (Gertler and Hubbard, 1989). Investors may perceive a rise in stock market volatility as an increase in the risk in equity investments. If so, investors may shift their funds to less risky assets. This reaction would tend to raise the cost of funds to firms issuing stock. Moreover, small firms and new firms might gravitate towards the purchase of stock in larger well-known firms.

Further, extreme stock return volatility could disrupt the smooth functioning of the financial system and lead to structural or regulatory changes. Systems that work well with normal return volatility may be unable to cope with the extreme price changes. Changes in the market rules of regulations may be necessary to increase the resiliency of the market in the face of greater volatility.

Although the issue of stock market volatility is of vital importance, yet limited very rare efforts have been made in India to examine it empirically and adequately. A plethora of research has been done on this subject in developed markets such as USA,

Australia, UK and other European markets, and some emerging markets of Southeast Asia and Latin America. However, only one or two studies have been done on the magnitude and pattern of volatility in the Indian stock market. The present study is an attempt to fill this gap and aims to empirically investigate stock market volatility in India.

Hence, the empirical findings of the present study can be considered useful would be useful for financial practitioners, market participants, regulators and researchers, especially investors as these provide evidence of stock market volatility and its pattern prevailing in India. Investors aim at making more profitable and less risky investments. Therefore, they need to have a deep knowledge about stock market volatility before making their investment decisions.

However, from an investor's perspective, it would be immensely useful if the future stock return volatility could be predicted from the past data. Such forecasting capability is useful for the pricing of sophisticated financial instruments such as futures and options. An attempt is made to model the stock market volatility process from the past stock return data. It is generally said stock market volatility is predictable. This observation has important implications for asset pricing and portfolio management. Investors seeking to avoid risk, for example, may choose to adjust their portfolios by reducing their commitments to assets whose volatilities are predicted to increase or by using more sophisticated dynamic diversification approaches to hedge predicted volatility increases. In a market in which such strategies operate, equilibrium asset prices should respond to forecasts of volatility, as well as to the risk aversion of investors. This is particularly true of the markets for derivative assets such as options and swaps, where the volatility of the underlying asset has a profound effect on the value of the derivative.

3. Objectives of the study:

The study is based on the following objectives:

- To measure the stock market volatility and check its pattern in Indian stock market with special reference to National Stock Exchange (NSE).
- To examine the relationship between the expected returns and the volatility in Indian stock market with special reference to National Stock Exchange.
- To examine the relationship between the expected returns and the size of firms of the selected Indian industries.
- To identify the responsible factors for stock market volatility.
- To examine the relationship between volatility and profitability of the selected Indian industries.

4. Hypotheses of the study:

On the basis of above mentioned objectives the following hypotheses can be framed:

- There is a high volatility in the share prices and the volatility clustering in Indian stock market is not persistent.
- Expected return depends on the share market volatility.
- There is no association between expected return and firm's size.
- There is a significant relationship between stock market volatility and industrial profitability.

5. Data and Data Sources:

There are two prominent stock exchanges in India, viz. National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). The National Stock Exchange captures 83

per cent transactions of the cash segment and 79 per cent of the derivatives segment. Therefore, National Stock Exchange is selected for the study. The present study is based on secondary data. The present study is a sectoral and firm level study. Therefore, we consider NSE listed sectoral indices. There are eleven sectoral indices in National Stock Exchange in India, are CNX AUTO, CNX BANK, CNX ENERGY, CNX FINANCE, CNX FMCG, CNX IT, CNX MEDIA, CNX PHARMA, CNX PSU BANKS, CNX REALTY, CNX METAL. From these 11 sectoral indices, six sectoral indices are selected based on percentage of traded value and percentage of market representation. These are CNX AUTO, CNX BANK, CNX ENERGY, CNX FINANCE, CNX FMCG and CNX IT. From each sectoral index top 15 stocks (companies or firms) are selected based on market capitalization. The study is based on daily closing index value and daily closing prices of selected sectoral indices and firms. The period of the study is from April 1, 2005 to April 1, 2014. These sectoral indices and firm level data are collected from NSE website www.nseindia.com. The study here also considers several macroeconomic and firm specific variables. These are Wholesale Price Index (WPI), Exchange Rate (ER), Index of Industrial Production (IIP), Net Foreign Institutional Investment (Net FII), Trade Balance (TB) and Call Money Rate (CMR). The monthly data of these macroeconomic variable's are collected from Handbook of Indian Statistics, website www.rbi.org.in. The firm specific factors such as Price Earnings Ratio (P/E), Price to Book Value (P/B) and Dividend Yields (DY) data are collected from NSE website www.nseindia.com. The quarterly data of profit, net sales and market capitalisation are collected from the website www.equimaster.com. The data of all the concerned variables are collected for a period of April 1, 2005 to April 1, 2014.

Basis for Sector Selection:

There are 11 sectoral indices in the National Stock Exchange of India. For selection of the sectors a composite index has been constructed by considering three crucial variables percentage of traded value, percentage of market representation and percentage of sectoral representation with assigning equal weights. Finally, a ranking has been done on the basis of composite value of the sectoral indices. Based on percentage of traded value 60 per cent of the total sectoral indices are selected. The selected sectors are Banking sector, IT sector, Financial sector, Automobile sector, FMCG sector and Energy sector which are in top six ranks as per the composite index value.

Sector-wise Selected Companies:

There are more than 1600 companies listed in National Stock Exchange in India. In each sector there are a large number of firms. Based on market capitalization top 15 companies or firms are selected from each sector. Finally from the above six sectors 90 companies are selected. However, data of some selected companies for some periods of the total study period are not available and finally these companies are dropped.

6. Methodology of the Study:

- The study here apply GARCH-M model to examine the nature of volatility and the relationship between return and volatility.
- To examine the leverage effect E-GARCH model is used.
- To examine the relationship between firm size volatility and returns the study here used panel regression.

- To empirically analyse the long run relationship and short term dynamic interaction among the variables of interest the study here employs the OLS based auto regressive distributer lag co-integration technique (ARDL).
- To investigate the relationship between volatility and industrial profitability panel regression is used.

7. Outline of the Chapters:

To fulfill the above-mentioned objectives the study comprises with seven chapters which are briefly mentioned in the following:

Chapter 1 gives introduction of the study. In this chapter necessity of the study, objectives, hypotheses, data description and plan of chapters has been discussed.

Chapter 2 deals with review of literature which is combined by both theoretical and empirical literature. These literatures mainly focus on the various aspects of stock market volatility and return, determination of volatility, volatility and firm size.

Chapter 3 shows the theoretical and conceptual frameworks and methodology of the study. The present study is based on secondary data. The present study is a sectoral and firm level study. There are eleven sectoral indices in National Stock Exchange in India. The detailed analytical methodology is explained in the chapter. For the study GARCH-M model is used to examine the nature of volatility and the relationship between return and volatility. To examine the leverage effect E-GARCH model is used. To examine the relationship between firm size volatility and returns the study here used panel regression. To analyze the long run relationship and short term dynamic interaction among the variables of interest the study here employs the OLS based auto regressive

distributer lag co-integration technique (ARDL). To investigate the relationship between volatility and industrial profitability panel regression is used.

Chapter 4 deals with the measurement of stock market volatility and its pattern. The relationship between stock market volatility and return is also examined in this chapter. The study here also make a comparative analysis among six different sectoral indices viz; Automobile, Banking, Energy, Financial, FMCG, IT sector in the Indian stock market.

Chapter 5 investigates the relationship between expected return and firm size. Firm size is classified into three categories, viz; small size firm, medium size firm and large size firm based on a composite index constructed by using market capitalization, net sales and profit after tax. The chapter shows the relationship between firm size and expected return. The chapter also explains the effect of change in volatility on expected return for each category of firm size. This chapter further makes a comparative analysis among different sectors.

Chapter 6 shows the relationship between stock market volatility and profitability of the selected sectors. This chapter also makes a comparative analysis among different sectors. The study here tries to examine whether change in profitability has any impact on stock market volatility. This chapter also deals with identification of the determinants of stock market volatility.

Chapter 7 depicts the summary, conclusion, policy suggestion and limitation of the study and scope for further research.

8. Findings:

- The study reveals that the daily mean return of FMCG sector is relatively higher than that of other sectors followed by Automobile sector and financial sector respectively. The daily mean return of FMCG sector is 0.00083 (0.083 per cent). The lowest mean return is shown in energy sector, that is, 0.00038 (0.038 per cent). Among the selected sectors, the return is fluctuated between 0.17 to -0.15.
- The highest standard deviation or volatility is shown in financial sector (0.021) where as the lowest is shown in banking sector (0.003). From this, it can be said that higher return is associated with relatively lower risk.
- A positively skewed return series indicates that it has higher possibility to generate positive returns while negatively skewed implies higher probability to generate negative returns. Except banking and financial sectors all other sectors have negative skewness.
- It is observed that for all the return series of the selected sectors viz; automobile, banking, energy, financial, FMCG and IT the ARCH and GARCH coefficients statistically significant, which indicates that previous period shocks as well as previous period volatility influences the current period volatility.
- It is further seen that the GARCH coefficient is relatively large in almost all the return series of the selected sectors indicating that the volatility clustering is persistent.
- The study shows that expected return depends on stock market volatility for the return series of Escorts Limited (EL), Hindustan Machine Tools Ltd. (HMT), Hindustan Motors Limited (HNM), Mahindra & Mahindra Limited (M&M), Maharashtra

Scooters Limited (MS), Sml Isuzu Limited (SI), and Tata Motors Limited (TM) of automobile sector, the return series of Canara Bank Limited (CBL), ICICI Bank, Ing Vysya Bank Limited (INGV), Jammu & Kashmir Bank Limited (J&K) and Kotak Mahindra Bank Limited (KMB) of banking sector, the return series of CESC Ltd., National Hydroelectric Power Corporation (NHPC), National Thermal Power Corporation Limited (NTPC), Reliance Infrastructure Limited (RIL) and Torrent Power Limited (TPL) of energy sector, the return series of Bajaj Finanserv Limited (BFSL), Industrial Financial Corporation of India (IFCI) and Relience Capital Limited (RCL) of financial sector, the return series of Britannia Industry Ltd. (BIL), Marico Limited (ML), Nestle India Limited (NIL) and Zydus Wellness Limited (ZWL) of FMCG sector and the return series of Hcl Technologies Limited (HCL), Hexaware Technologies Limited (HTL), Kpit Technologies Limited (KPIT), Oracle Financial Service Limited (OFSL), Persistent System Limited (PSL), Tata Consultancy Service Limited (TCS), and CNX IT of IT sector.

- The asymmetric term (λ_1) is negative and statistically significant for the return series of AL, EL, MS and CNX Auto of Automobile sector, the return series of Axis Bank Limited (ABL), Bank Of India (BOI), Canara Bank Limited (CBL), IDBI, Indusind Bank Limited (ILB), Punjab National Bank (PNB), SBI, Yes Bank Limited (YSB) and CNX Bank of banking sector, the return series of CESC, Jaiprakash Power Ventures Limited (JPV), Ksk Energy Ventures Limited (KSK), Neyveli Lignite Corporation Limited (NLC), and CNX Energy of energy sector, the return series of Bajaj Finance Limited (BFL), IFCI, RCL, Sriram Trans (SRT) and CNX Finance of

financial sector, the return series of BCL, BIL, CPI, GCP, ML and CNX FMCG of FMCG sector and, the return series of NTL and CNX IT.

- The asymmetric term (λ_1) is positive and statistically significant for HM, HNM, TM and VST companies of automobile sector, the return series of ILB of banking sector, the return series of NPHC, Power Grid Corporation of India Limited (PGC) and RIL of energy sector, the return series of BHI and IDFC of financial sector, the return series of Glaxosmithkline Consumer Healthcare Limited (GSCH) of FMCG sector and, the return series of for HCL, KPIT, Mphasis Limited (MPL) and TCL.
- The effect of small size firms on expected returns is negative for all the sectors but statistically significant for FMCG, energy and automobile sectors.
- The effect of medium size firms on expected returns is also negative but statistically significant for FMCG sector.
- The effect of large size firms on expected returns is positive for all sectors and it is also statistically significant for all sectors except energy sector.
- The relationship between expected return and volatility of small size firm is positive and statistically significant for banking, energy and FMCG sector but it is negative and statistically significant for the financial sector.
- The study identifies that wholesale price index, call money rate; trading volume and trade balance have significant impact on stock market volatility in the long run. However, in the short run all the selected variables have affected stock market volatility.

- The relationship between profitability and volatility is negative and statistically significant for automobile, financial and IT sectors. However, the coefficient of profitability is statistically insignificant for banking, energy and FMCG sectors.
- The impact of profitability on volatility is relatively higher in the automobile sector as compared to other sectors. The impact of profitability on volatility is almost same for automobile and IT sectors
- The existence of volatility is relatively higher in IT sector followed by automobile sector and it is relatively lower for energy sector. However, banking and FMCG sector have no statistically significant existence of volatility in the market.

9. Conclusion:

The study is focused on mainly six industries or sectors viz; automobile, banking, energy, financial, FMCG and IT industry of Indian industries. Already there are five objectives in this study which is mentioned in the Chapter 1. The conclusion can be analyzed according to the formation of hypotheses taken in this study.

The first hypothesis of the study is that there is a high volatility in the share prices and the volatility clustering in Indian stock market is not persistent. From the findings it is observed that for all the return series of the selected sectors viz; automobile, banking, energy, financial, FMCG and IT the ARCH and GARCH coefficients statistically significant, which indicates that previous period shocks as well as previous period volatility influences the current period volatility. It also represents the existence of volatility in all the return series of selected sectors. From this it can be concluded that the null hypothesis that there is high volatility in share prices is accepted. A significant GARCH coefficient indicates the presence of volatility clustering, i.e. a positive value of

the coefficient implies that a positive stock price changes are associated with further positive changes and vice versa. A relatively large value of GARCH coefficients indicates that shocks to the conditional variance take a long time to die out. From the above analysis it is seen that the GARCH coefficient is relatively large in almost all the return series of the selected sectors indicating that the volatility clustering is persistent. From this it can be said that the null hypothesis that the volatility clustering is not persistent is rejected.

Once it is conformed that there exist high volatility and the volatility clustering is persistent then it is important to know the relationship between expected returns and stock market volatility. From the findings it is observed that expected return depends on stock market volatility for the return series of Escorts Limited (EL), Hindustan Machine Tools (HMT), Hindustan Motors Limited (HNM), Mahindra & Mahindra Limited (MM), Maharashtra Scooters Limited (MS), SML Isuzu Limited (SI), and Tata Motors Limited (TM) of automobile sector, the return series of Canara Bank Limited (CBL), Industrial Credit and Investment Corporation Of India Limited (ICICI), Ing Vysya Bank Limited (INGV), Jammu & Kashmir Bank Limited (J&K) and Kotak Mahindra Bank Limited (KMB) of banking sector, the return series of Calcutta Electric Supply Corporation (CESC), National Hydroelectric Power Corporation (NHPC), National Thermal Power Corporation Limited (NTPC), Reliance Infrastructure Limited (RIL) and Torrent Power Limited (TPL) of energy sector, the return series of Bajaj Finanserv Limited (BFSL), Industrial Financial Corporation of India (IFCI) and Reliance Capital Limited (RCL) of financial sector, the return series of Britannia Inds. Limited (BIL), Marico Limited (ML), Nestle India Limited (NIL) and Zydus Wellness Limited (ZWL) of (FMCG) sector and

the return series of Hindustan Computers Limited (HCL), Hexaware Technologies Limited (HTL), KPIT Technologies Limited (KPIT), Oracle Financial Service Limited (OFSC), Persistent System Limited (PSL), TCL and CNX IT of IT sector. From this it can be concluded that for the above mentioned companies the null hypothesis that the expected return depends on volatility is accepted.

After knowing that for some companies of selected sectors expected return depends on stock market volatility it is essential to know the relationship between expected return and firm size. To examine the relationship between expected return and firm size the study here test the hypothesis that there is no association between expected return and firm's size. Firm size is classified into three categories, viz; small size firm, medium size firm and large size firm based on a composite index constructed by using market capitalization, net sales and profit after tax (details given in appendix). The effect of small size firms on expected returns is negative for all the sectors but statistically significant for FMCG, energy and automobile sectors. The effect of medium size firms on expected returns is also negative but statistically significant for FMCG sector. However, the effect of large size firms on expected returns is positive for all sectors and it is also statistically significant for all sectors except energy sector. By considering different firm size it is concluded that there is association between expected return and firm size. That means the null hypothesis of no association between expected return and firm size is rejected. The study further examines the relationship between expected return and volatility according to firm size. It is observed that the relationship between expected return and volatility of small size firm is positive and statistically significant for banking,

energy and FMCG sector but it is negative and statistically significant for the financial sector.

The study further identifies the factors which are responsible for stock market volatility and to empirically analyze the long run relationship and short run dynamic interaction among the variables of interest. From the study it is observed that wholesale price index, call money rate, trading volume and trade balance have significant impact on stock market volatility in the long run. However, in the short run all the selected variables have affected stock market volatility.

As the study is on selected Indian industries therefore it is essential to know whether there is any relationship between industrial profitability and volatility. For this the study here framed the hypothesis that there is a significant relationship between stock market volatility and industrial profitability. From the findings of the study it is observed that the relationship between profitability and volatility is negative and statistically significant for automobile, financial and IT sectors. However, the coefficient of profitability is statistically insignificant for banking, energy and FMCG sectors. The impact of profitability on volatility is relatively higher in the automobile sector as compared to other sectors. The impact of profitability on volatility is almost same for automobile and IT sector. From the study, it is observed that the existence of volatility is relatively higher in IT sector followed by automobile sector and it is relatively lower for energy sector. However, banking and FMCG sector have no statistically significant existence of volatility in the market.

10. Suggestive Policy Measures:

Some policy suggestions can be framed in the following on the basis of findings and conclusions of this study.

- The present study would be useful for investor because it provides the empirical evidence on volatility of different sectors and firms. Before taking investment decision it is essential to analyze volatility of the different sectors as well as firms. Investor should have systematic investment plan as systematic investment plan is one of the most efficient ways to benefit from the volatility. The markets move up and down over a period of time. By investing through systematic investment plan, one has the opportunity to enter at every stage of the market and can earn good return. There should be diversification in the investment such as rather than investing the whole money in single sector or firm investor should invest in two or more than two sectors or firms as this study found each sector and firm is having different risk-return level and different pattern of volatility.
- It is suggested that before investment the investor should consider the size of the firm. Because return is significantly depends on size of firms. Return may vary with size of firm.
- A more liberalized regime in the emerging market economies should be accompanied by the further improvements in the regulatory system of the financial sector. Because a little increases in the volatility in the equity market may result in sudden massive withdrawals of FII, which may result in quite disturbing consequence on the country's economy.

- The government of the emerging countries should have a stable economic policy because frequent changes in the economic policy may cause excessive volatility in the market which loses the investor confidence in the equity market.

11. Limitations of the Study and Scope for further Research:

There are some limitations of the study which will help the further researcher to work in this area. These limitations are due to time constant and non-availability of data. These limitations are discussed in the following:

- The present study here used only symmetric and asymmetric GARCH model to measure conditional volatility. So, future researchers can study the stochastic volatility model to measure volatility.
- The present study is restricted to six sectoral indices and ninety companies of National Stock Exchange in India. More markets, sectors and companies may consider for further research.
- This study is based on daily closing price; further research work can be done on the high frequency data.
- The present study shows the relationship between return and volatility or risk. One may undertake further research on relationship between returns and volume change by considering the seasonality effect.

References:

1. Anderson, D. A. and Hamori, N. (2002), "Stock Returns and Real Activity: New Evidence from the United States and Japan", *Quarterly Journal of Business and Economics*, University of Nebraska-Lincoln College of Business Administration, Vol. 41, No. ¾, pp. 95-114.
2. Apergis, N.,Christou, C. and Miller, S. M. (2011), "Convergence Pattern in Financial Development: Evidence from Club Convergence", Working Paper 1104, University of Nevada, Las Vegas, Department of Economics.
3. Banz, R.W. (1981), "The Relationship Between Return and Market Value of Common Stocks", *Journal of Financial Economics*, Elsevier Science, North-Holland, Vol. 9, Issue 1, pp. 3-18.
4. Basu, S. (1977), "Investment Performance and Common Stocks in Relation to their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis", *The Journal of Finance*, Blackwell Publishing, American Finance Association, Vol. 32, Issue 3, pp. 663-682.
5. Black, F. (1976), "Studies of Stock Price Volatility Changes," Proceedings of the 1976 Meetings of the American Statistical Association, Business and Economics Statistics Section, Washington, DC, American Statistical Association, pp. 177-181.
6. Black, F. (1986), "Presidential Address: Noise", *Journal of Finance*, Blackwell Publishing, American Finance Association, Vol. 41, No. 3, pp. 529-543.
7. Bollerslev, T. (1986), "Generalized Autoregressive Conditional

- Heteroscedasticity”, *Journal of Econometrics*, Elsevier, Vol. 31 pp. 307-327.
8. Campbell, J. Y., Sangjoon, K. and Martain, L. (1994), “Dispersion and Volatility in Stock Returns: An Empirical Investigation”, Working paper, Princeton University.
 9. Chandra, P. (2007), “Investment Analysis and Portfolio Management”, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
 10. Das, N. and Pattanayak, J. K. (2007), “Factors Affecting Market Price of Sensex Shares”, *ICFAI Journal of Applied Finance*, Hyderabad: ICFAI University, Vol. 13, No. 8, pp. 33-51.
 11. Deena, R. (2013), “Stock Market and Economic Development”, Ph. D. Thesis, Kerala University Library, Thiruvananthapuram.
 12. Enders, W. (2005), “Applied Econometrics Time Series”, First Edition, John Willey & Sons Pvt. Ltd., New York.
 13. Engle, R. F. (1982), “Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation”, *Econometrica*, The Econometric Society, Vol. 50, No. 4, pp. 987-1007.
 14. Engle, R. F. (1993), “Statistical Models for Financial Volatility”, *Financial Analysts Journal*, CFA Institute Publishing, Vol. 49, No. 1, pp. 72-78.
 15. Engle, R.F. and Ng, V.K. (1993), “Measuring and Testing the Impact of News on Volatility”, *The Journal of Finance*, Blackwell Publishing for the American Finance Association, Vol. 48, Issue 17, pp. 49-78.
 16. Garner, A.C. (1988), “Has the Stock Market Crash Reduced Consumer Spending?” *Economic Review*, pp. 3-16,

<https://www.kansascityfed.org>>1988.

17. Gertler, M. L. and Hubbard, R. G. (1988), “Financial Factors in Business Fluctuations”, NBER Working Paper No. 2758, pp. 33-78.
18. Gertler, M. L. and Hubbard, R. G. (1989), “Taxation, Corporate Capital Structure And Financial Distress”, NBER Working Paper No. 3202.
19. Glosten, L., Jagannathan, R. and Runkle, D. (1993), “On the Relation between the Expected Value and the Volatility of the Nominal Excess Returns on Stocks”, *Journal of Finance*, American Finance Association, Vol. 48, No. 5, pp. 1779-1801.
20. Goyal, A. (2014), “No Size Anomalies in US Bank Stock Returns”, <http://ssrn.com/abstract=2410542>
21. Greene, W. H. (2008), “Econometric Analysis”, Sixth Edition, Prentice-Hall, Upper Saddle River, New Jersey.
22. Grewal, S. S. (2000), “Making Money on the Stock Market”, Vision Books Publisher, New Delhi.
23. Gujarati, D. N. (2003), “Basic Econometrics”, Fourth Edition. McGraw-Hill, New York.
24. Guner, N. and Onder, Z. (2002), “Information and Volatility: Evidence from an Emerging Market”, *Emerging Markets Finance & Trade*, M.E. Sharpe Inc., Vol. 38, No. 6, pp. 26-46.
25. Gupta, A. (2006), “Impact of Earning Announcements on Stock Prices: Some Empirical Evidences from India”, *The ICFAI Journal of Applied Finance*, Hyderabad: ICFAI University, Vol.12, Issue. 3, pp. 5-17.

26. Haq, I. U. and Rashid, K. (2014), "Stock Market Efficiency and Size of the Firms: Empirical evidence from Pakistan", *Oeconomics of Knowledge*, Saphira Publishing House, Vol. 6, Issue 1, pp. 10-31.
27. Kothari, C. R. (1985), "Research Methodology, Methods and Techniques", Second Edition, Wishwa Prakashan Publisher, Delhi, pp. 6-17.
28. Maddala, G. S. (1983), "Limited-Dependent and Quantitative Variables in Econometrics", Cambridge University Press, Cambridge, UK.
29. Nelson, D. B. (1991), "Conditional Heteroskedasticity in Asset Returns: A New Approach", *Econometrica*, The Econometric Society, Vol. 59, pp. 347-370.
30. Nicholas, A. and Nicholas, P. (2011), "Stock Returns Volatility: The European Big Three Before And During Crisis", *International Journal of Economic Research*, Serial Publication, Vol.8, No.2, pp.153-177.
31. Pandey, A. (2005), "Volatility Model and their Performance in Indian Capital Markets", *Vikalpa*, Sage Publisher, Indian Institute of Management, Ahmadabad, Vol. 30, Issue. 2, pp. 26-46.
32. Pesaran, M. H. and Pesaran, B. (1997), "Working with Microfit 4.0: Interactive Econometric Analysis", Oxford University Press, London, England.
33. Pesaran, M. H., Shin, Y. and Smith, R. J. (2001), "Bounds Testing Approaches To The Analysis of Level Relationship", *Journal of Applied Econometrics*, Wiley Publishing, Vol. 16, pp. 289-326.
34. Peter, E. E. (1994), "Fractal Market Analysis: Applying Chous Theory to

- Investment and Economics”, John Wiley & Sons Publisher, New York, US.
35. Poterba, J. and Lawrence, S. (1986), “The Persistence of Volatility and Stock Market Fluctuation”, *American Economic Review*, Vol. 76, pp. 1142-1151.
 36. Singh, S. K., “Stock Market Volatility: A Case Study of BSE and NSE”, Ph. D. Thesis, School Of Management Studies Punjabi University, Patiala.
 37. Song, H., Liu, X. and Romilly, P. (1998), “Stock Returns and Volatility: An Empirical Study of Chinese Stock Market”, *International Review of Applied Economics*, Taylor and Francis, Vol. 12, No.1 pp. 129-139.
 38. Tripathi, V. (2008), “Size Effect in Indian Stock Market”, First Edition, Serials Publications, New Delhi.
 39. Tripathy, N. (2007), “Dynamic Relationship between Stock Market, Market Capitalization and Net FII Investments in India”, *The ICFAI Journal of Applied Finance*, Hyderabad: ICFAI University, Vol. 13, No. 8, pp. 60-68.
 40. Tsay, R. S. (2005), “Analysis of Financial Time Series”, Second Edition, John Wiley & Sons, U. K.