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Editorial Note

In the last issue of South Asian Journal of Management Research, in the editorial note I mentioned about humor. Humor can increase the happiness and reduce the stress.

Stress is most vulnerable condition in the organization because experts as well as non-experts are handling the stress situation of the employees. Some scientists still argue that they know little about stress whereas many people claim that they know everything about stress. And the result is handling the stress improperly.

Job stress has several impacts on individual employee and organization. Most of the employees in modern organization experience stress. It can have a damaging effect on employee, especially managers. It can affect the effectiveness of the organization as well as employees. The problem of stress is very much relevant of change that is spreading across the globe in all the fields. The employees are unable to cope of with changes. Organizations are doing little to handle the change process. For any organizational process the change must be helping the employees in improving the ability of organization to cope up with the change in its environment.

Lazarus's view on stress is that an individual perception of the psychological situation is the critical factors for stress. It includes potential harms, threats, and challenges on one hand, and on another an individuals ability to cope with them. The ability or inability to cope with stress is the perceived ability of an individual. Coping strategy differs from individual to individual in a different manner.

Less research is available on coping strategies of stress. Readers can contribute research articles on coping strategies of stress.

Dr. Babu Thomas
Editor

Effect of Future Trading on Spot Price Volatility for NSE Nifty using Time Series Regression and GARCH Model

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Abstract

Futures contracts detail the quality and quantity of the underlying asset; they are standardized to facilitate trading on a futures exchange. Some futures contracts may call for physical delivery of the asset, while others are settled in cash. The futures markets are characterized by the ability to use very high leverage relative to stock markets. Futures can be used either to hedge or to speculate on the price movement of the underlying asset.

The study investigated the effects of the Nifty futures on underlying the spot market volatility using GARCH (1,1) model. The research indicates that futures trading reduced stock market volatility and contributes to increase market efficiency. The study also examined futures trading changes structure of spot market volatility. There is a change in the structure of spot market volatility after introduction of futures trading. Specifically, there is evidence that the increased impact of recent news and reduced effect of the uncertainty originating from the old news. New information gets assimilated and the effect of old information on volatility gets reduced at the faster rate in the period following the onset of futures trading.

Keywords: Volatility, market efficiency, parameter, stock, garch.

1. Introduction

The stock index futures contracts were the most successful financial innovation of 1980's. The first contract was the Chicago mercantile exchange S&P 500 futures, which began trading in the US in April 1982. In India, L. C. Gupta committee on derivatives had recommended in 1998, the introduction of the index futures, followed by other instruments once the market matures. The preparation of the regulatory framework for the operation of the index futures took some time. In June 2000 futures on benchmark index were introduced and followed by options on indices, introduced in June 2001. This was again followed by options on individual stock in July 2001, and finally futures on individual stocks in November 2001.

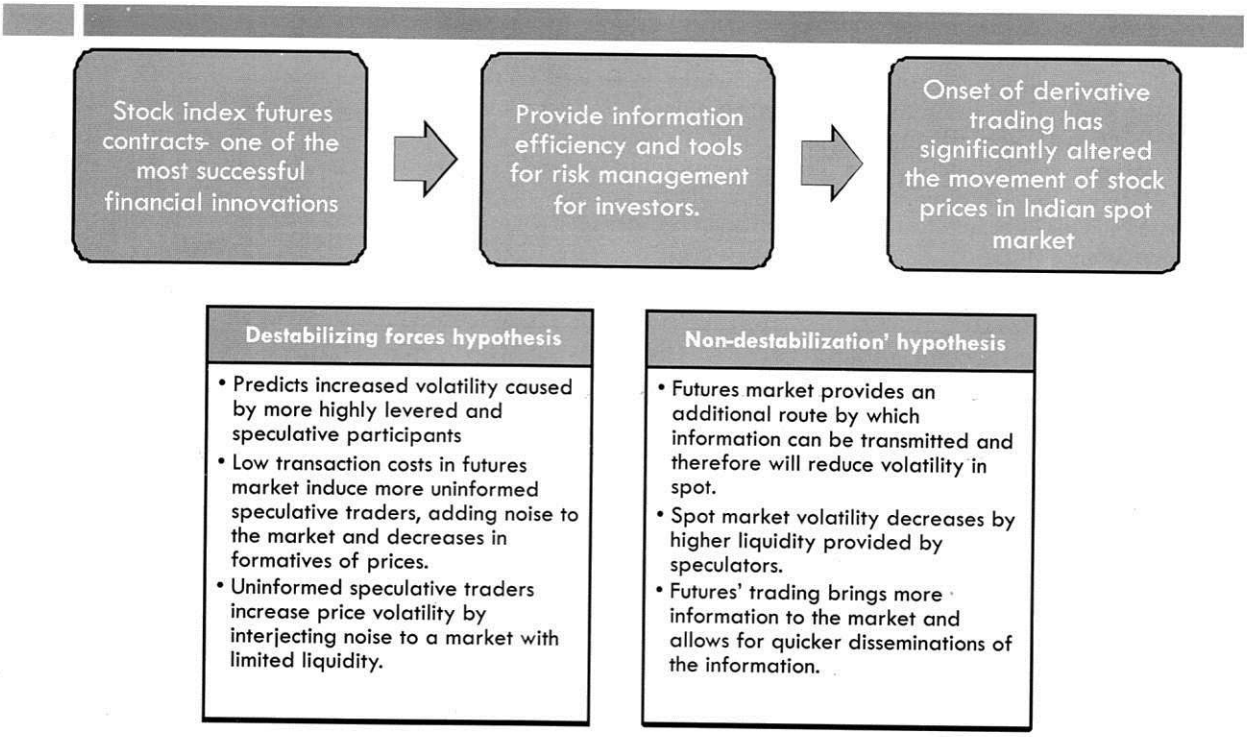
The main objectives of the introduction of the derivatives in Indian stock market is to fully integrate, the Indian financial markets with the global markets, to improve the information efficiency and to provide tools for risk management for investors.

In the late nineties, many emerging and transition economies have introduced derivative contracts, raising interesting issues unique to these markets. Emerging stock markets operate in very different economic, political, technological and social environments than markets in developed countries like the USA or the UK. The effect of the introduction of futures trading on the spot market volatility has been widely documented in the financial literature. The main objective of the study is to investigate the impact of the introduction of Futures trading on cash market volatility in an emerging capital market of India. The study uses data from a leading stock exchange in India, namely, NSE on which futures trade. The impact of futures introduction on the volatilities of the underlying stock index is examined during pre-futures and post-futures period. The Indian capital market had witnessed a major transformation and structural change from the past one decade as a result of ongoing financial sector reforms. Gupta (2002) had rightly pointed out that improving market efficiency, enhancing transparency, checking unfair trade practices and bringing the Indian capital market up to a certain international standard are some of the major objectives of these reforms.

In India, derivatives were mainly introduced with view to curb the increasing volatility of the

asset prices in financial markets and to introduce sophisticated risk management tools leading to higher returns by reducing risk and transaction costs as compared to individual financial assets. Though the onset of derivative trading has significantly altered the movement of stock prices in Indian spot market, it is yet to be proved whether the derivative products has served the purpose as claimed by the Indian regulators. Two main set of theories exist in literature about the relationship between derivatives market and underlying spot markets, with contradicting observations. These theories are: a) A 'Destabilizing forces" hypothesis that predicts increased volatility caused by more highly levered and speculative participants; and b) A 'Market completion' or 'Non-destabilization' hypothesis , that says futures market provides an additional route by which information can be transmitted and therefore will reduce volatility in spot.

Figure 1 : Explanation regarding destabilizing and Non Destabilizing



2. Literature Review

Various studies have been conducted to assess the impact of derivatives trading on the underlying market mostly related to US and other developed countries markets. Very few studies attempted to know the impact of introduction of derivatives trading in emerging market economies like India. The literature on futures markets, including financial futures, is very extensive. We review few of the important studies.

The results on the introduction of stock index futures are somewhat ambiguous. Many, authors find no significant volatility effect associated with stock index future listing. Others, including Maberly et al. (1989), Brorsen (1991), Lee and Ohk (1992), Antoniou and Holmes (1995) and Gulen and Stewart (2000) report a volatility increase in highly developed markets such as the USA, UK, and Japan. Those who argue that futures market increases stock market volatility, support this argument based on the observation that because of their high degree of leverage, futures markets are likely to attract uninformed traders. The lower level of information of futures traders with respect to cash market traders is likely to increase the asset volatility. Cox (1976), Figlewski (1984) and Stein (1987) found results supporting this in their studies. On the other hand, Antoniou et al.

(1998) and Gulen and Stewart (2000), find evidence that volatility decreased with future listings in many other countries. The opposite current of literature claims that futures markets play an important role of price discovery, and have a beneficial effect on the underlying cash markets.

According to Schwarz and Laatsch (1991), futures markets are an important means of price discovery in spot markets. Powers (1970) argued that futures markets increase the overall market depth and informativeness. Stoll and Whaley (1987) stated that futures markets enhance market efficiency. The model proposed by Danthine (1978) implies that futures trading increases market depth and reduces spot market volatility. Kyle (1985) presented alternative models asserting that futures trading lower the volatility of the underlying market. Cox (1976) and Figlewski (1984) found results that support that futures markets increase stock market volatility. The empirical evidence on the effects of futures trading on spot volatility is inconclusive. Edwards (1988b) compares estimated stock market volatility before and after the introduction of equity futures, and documents a small but statistically significant decline in volatility. By contrast, Figlewski (1984) documents a positive relation between the volatility of Government National Mortgage Association (GNMA) securities prices and open interest in GNMA futures contracts, leading him to conclude that "futures market activity increased the volatility of prices". In general, this literature provides mixed evidence as to the volatility impact of futures trading. Chang et al. (1999) analyze the effect of index future listing on the underlying stocks by decomposing portfolio volatility into the average volatility of component stocks and the cross sectional dispersion of returns. They find that when Nikkei225 futures were listed in Japan, the cross sectional dispersion of returns across stocks in the index decreased, and index volatility increased proportionally more than the average volatility of the individual stocks. No such result was found for stocks outside the index, nor was any effect found at the time of offshore listing of Nikkei225 futures in Singapore. Butterworth (2000) investigates the effect of futures trading in the FTSE Mid 250 index on the underlying spot market using symmetric and asymmetric GARCH methods. The results reported for the Mid250 index indicate that while the existence of future strading had made little impact on the underlying level of volatility, as measured by the standard deviation, it has altered significantly the structure of the spot market volatility. Pre- and post-futures sub-samples were modeled using Box-Jenkins techniques and significant parameter changes between the two periods were tested for. Results indicated that there had been no statistically significant parameter change, suggesting that spot volatility had not been influenced by the introduction of futures trading.

In the Indian scenario, we have the few related empirical works. Shenba garaman (2003) examined the impact of introduction of NSE Nifty index futures on Nifty index. Using an event study over the period from October 1995 to December 2002, she tested for change since the volatility before and after the introduction using GARCH techniques to model the time series. She concluded that futures trading has not lead to a change in the volatility of the underlying stock index but the structure of volatility seems to have changed in post-futures period. Nagraj and Kumar (2004) studied the impact of Index futures trading on spot market volatility using the data from June 12, 2000 to February 27, 2003 of S&P CNX NSE Nifty.

It also showed that domestic market factors represented by NSE 500 had a significant Spot-price effect in determining the volatility of the Nifty index but the other international factors are found to have insignificant effect. The present study covers the entire period since inception of index futures at NSE in June 2000. Pierluigi Bologna and Laura Cavallo (2002) study to analyse the effect of the introduction of stock index futures on the volatility of the Italian Stock Exchange. This study mainly addresses two issues: First, the study analyses whether the reduction of stock market volatility showed in the post-futures period, is effectively due to the introduction of futures contract. Second, whether the `futures effect', if confirmed, is immediate or delayed with respect to the moment of the futures trading onset is tested. The current study has tried to

incorporate cross sectional data and its impact on volatility post introduction of futures. But the study is limited to specific market i.e. Italy and doesn't take into account structural composition of Italian Markets.

P. Srinivasan and K. Sham Bhat (2008) try to examine the impact of futures trading on spot market volatility of selected commercial banks in India. The study considered the daily closing price returns of twenty-one selected commercial banking stocks in India. Out of 21 banking stocks, 13 belong to public sector while 8 belong to private sector. The empirical analysis of selected banking stocks was conducted for the different time periods from 1st January, 1996 through 29th May, 2008.

Sibani Prasad Sarangi & Uma Shankar Patnaik (2007) paper focuses on the volatile behaviour in the equity market in individual stocks after the introduction of futures trading on individual stocks. The paper examines the stock market volatility of individual stocks listed on the S&P CNX Nifty index after the introduction of futures trading. It uses the family of GARCH techniques to capture the time-varying nature of volatility and volatility clustering phenomenon in the data. The data consist of daily closing price returns of 28 individual stocks listed on S&P CNX Nifty, Nifty Junior index and S&P index. The study spanned from October 4, 1995 to March 31, 2007. The total number of observations is 2,878 for the stocks where futures trading were introduced from the inception. The largest possible dataset was used for the study.

Pretimaya Samanta & Pradeepta Kumar Samanta (2007) in their study assess the impact of introducing index futures and stock futures on the volatility of the underlying spot market in India. The research paper uses the standard univariate GARCH model to capture the time-varying nature of volatility and volatility clustering phenomenon in the data. The sample data consists of daily closing price returns of S&P CNX Nifty, Nifty Junior, and S&P 500 index from October 4, 1995 to December 31, 2006.

Satya Swarup Debashish(2008) emphasis that futures trading affects the volatility and operating efficiency of the underlying Indian stock market by taking a sample of 15 individual stocks. The study examines the effect of introduction of futures trading on the stability of BSE Sensex. It also aimed to measure the conditional volatilities of daily returns on BSE Sensex before and after futures trading. The study compared the conditional volatilities of monthly returns of BSE Sensex over pre-futures and post-futures periods, after adjusting macroeconomic factors. The study investigates whether futures trading have contributed to market crash in BSE Sensex (during May 2004 & May 2006) in the post-futures period. The useful point found in this study was the parametric and nonparametric tests conducted on the volatility of daily returns in the post futures period, was higher than in the pre futures period.

Antonios Antoniou & Andrew J. Foster (2004), empirically investigate the effects of the introduction of a futures contract for Brent Crude Oil in 1988 on the price volatility in the spot market for Brent Crude. The insignificance of the proxy variables raises questions as to the reliability of inferences made about the impact of derivative trading on volatility, since changes could be due to a number of other factors. Difficulties with filtering the effects of other determinants are, however, a common problem experienced by numerous other studies. This study, however, covers only one commodity for the UK. Further investigations using the GARCH technique to examine the experience of other commodities can be carried out.

Mr T Mallikarjunappa & Afsal E. M.(2008) attempted to analyse the impact of introduction of derivatives on spot market volatility by examining the behaviour of CNX bank Nifty Index using GRACH Models. The index comprises of 12 most actively traded stocks. The study was first subjected to stationary test. The Nifty Junior Index returns are taken as a proxy variable. This is done because it covers market wide volatility and thus serves as a perfect control factor. The GARCH (1,1) Model is run and results are analysed. The paper looks at only CNX bank ex returns. Although the bank ex contributes the most in derivative market it alone cannot be taken to study the effect on the market. The proxy to cover market wide risk is Nifty. This will introduce a bias in the process.

3. Research Methodology

3.1 Research Objectives

The primary research objective of this study is to determine the effect of future trading on spot price volatility. To achieve the said objective following secondary objectives are being studied

1. Developing models for market volatility.

2. To determine the effect of future trading on spot price volatility for NSE Nifty using time series regression and GARCH model

3. To investigate the impact of future trading on spot price volatility of individual stocks from diverse sectors of the economy.

3.2 Universe of Research

Volatility is the most common statistical measure for market movements. Volatility in prices/ markets mainly arises due to variations in demand and supply, which in turn is affected by various factors like information in the market, speculation and hedging. Hence to measure the impact of change in volatility due to futures introduction, the largest and most liquid sectors of Indian economy have been analysed. Sectoral analysis involves application of volatility models to the **most liquid** scrips of the sector. The sectors analysed are as follows:

- Banking
- Cement
- Oil and Gas
- Information Technology
- Pharma
- Infrastucture/ Real Estate

3.3 Sample of Research

A universe of 4 companies from each of the above mentioned sectors was considered for GARCH analysis. Top two companies in terms of liquidity(trading volume) and market capitalization have been taken as the sample of study. Volatility models (GARCH Models) have been applied to the sample selected. The volumes for each of the stocks chosen are as follows:

Table 1 : List of selected companies

S No	Symbol	No of Contracts	Notional Value (Rs.)
1	ICICIBANK	3663	1120425464
2	ACC	129	45257917
3	INFOSYSTCH	9471	5026661640
4	IOC	8	3155640
5	MRPL	69	26769198
6	RELIANCE	8110	2732738520
7	UNITECH	3313	1378650825
8	WIPRO	362	157150350
9	CIPLA	127	56841440

For the predictive models six sectors and 30 different companies from these sectors have been considered.

3.4 Scope of Research

The scope of the research includes the study of the stock markets prior to introduction of futures. The study also analyses the impact of futures introduction on the movements in the cash market. It aims to see the impact on cash market volatility of the futures market.

The data for the companies has been taken for the years 1995 till January 2010.

3.5 Models Used

The models used are as follows:

1. Time-series Regression
2. GARCH Models
3. Classification and Regression Trees

4. Analysis and Interpretation

This section analyses the change in volatility due to introduction of futures. This has been done for NIFTY and 9 other companies

1. Set of financial assets and datasets have time varying volatility and clustering of volatility.

4.1 Volatility clustering

- Volatility clustering is the property that there are periods of high and low (conditional or unconditional) variance. The volatility"clusters."

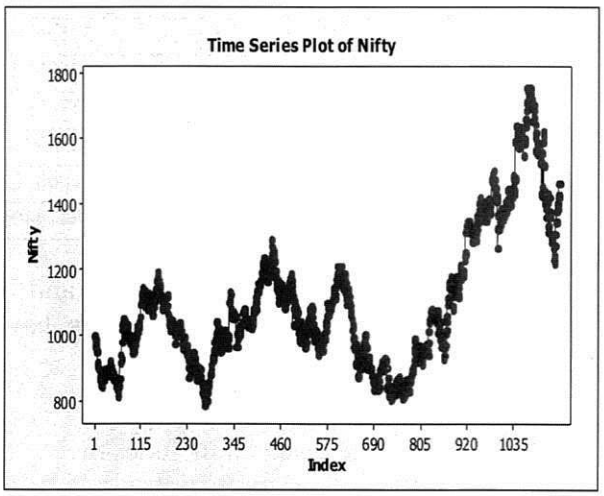
- The volatility "clusters" is a property of most heteroskedastic stochastic processes used in finance and economics.

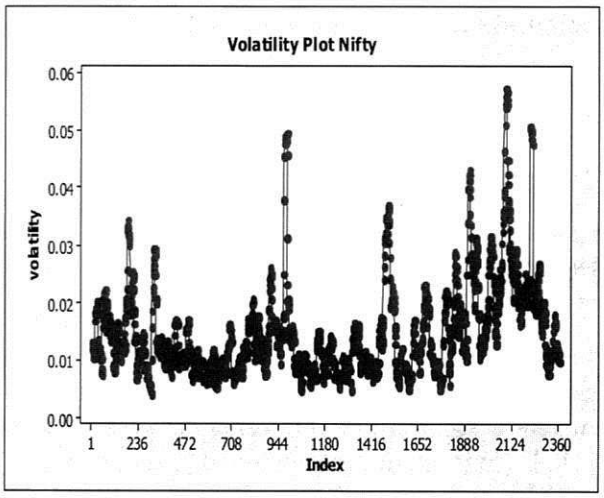
4.2 Conditional Heteroskedasticity

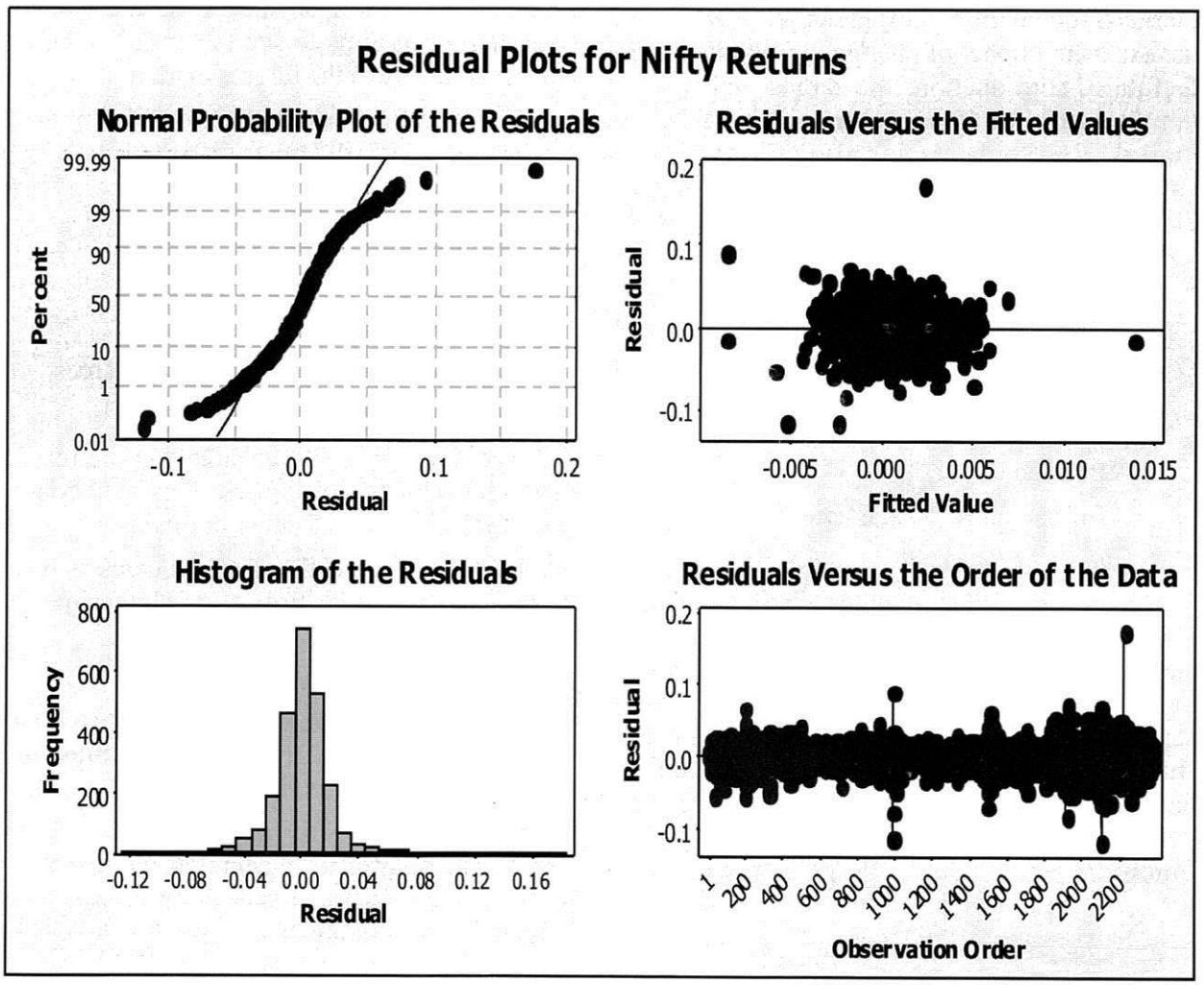
□ Variance of the current error term is a function of the actual sizes of the previous time periods' error terms.

Figure 2 (A, B, C) : Times Series and volatility Plot

NIFTY







The graph above shows volatility clustering. Also, the data is heteroscedastic. Hence GARCH model is the most appropriate for modelling the volatility of share prices. Time series regression has been carried out. The autoregressive model for the returns is as follows:

Autoregressive model for daily returns before the introduction of futures

$R(t) = 0.000491 + 0.036268 * R(t-1) + error$

Autoregressive model for daily returns before the introduction of futures

$R(t) = 0.000754 + 0.040893 * R(t-1) + error$

The model is significant at 78% confidence level. The GARCH model is applied before and after introduction of futures. The GARCH model is as follows:

GARCH Model before the introduction of futures

Standard Deviation(t) = 2.83794e-05+ 0.0727053*error(t-1) + 0.0.841998* Standard Deviation(t-1)

GARCH Model after the introduction of futures

Standard Deviation(t) = 8.65449e-06+ 0.157252*error(t-1) + 0.819833* Standard Deviation(t-1)

Hence it can be concluded that following the onset of futures trading, an increase in *alpha* suggests that news is impounded into prices more rapidly, and a decrease in *beta* would suggest that old news has a less persistent effect on prices changes. This shows that introduction of futures has led to a reduction in volatility. Similarly analysis is done for all the selected companies and the data is shown in figure 4

Table 2 : Volatility Analysis of all companies

Company	α – *Before*	α – *After*	β - Before	β – After	Volatility
Nifty	0.0727053	0.157252	0.0.841998	0.819833	Decrease
Reliance	0.12409	0.285635	0.87591	0.650168	Decrease
ICICI Bank	0.261695	0.267721	0.439776	0.692846	Increase
Unitech	0.171132	0.219205	0.719741	0.780795	Decrease
Infosys	0.235268	0.408698	0.764732	0.138205	Decrease
Cipla	0.340811	0.257166	0.659189	0.742834	Increase
Wipro	0.523105	0.593726	0.593726	0.178372	Decrease
ACC	0.125543	0.282058	0.84965	0.694559	Decrease
MRPL	0.367512	0.33650	0.656789	0.663496	No Change
IOC	0.383492	0.125435	0.448499	0.694996	Increase

Source: Primary data ; *alpha* is the coefficient of error term and *beta* is the coefficient of previous standard deviation in case of GARCH model.

4.3 PREDICTIVE MODEL:

4.3.1 Analysis Of Impact Of Various Parameters On Change In Volatility :

The diagram below shows data points used for creating a classification tree. Each data point represents a company, 30 in all from six different sectors. The six sectors are banking, IT, cement, refinery, real estate and pharma. The data has been classified into 9 sub-sections because the impact on volatility due to futures is different on different sub-sections.

The following parameters were used to determine these subsections:

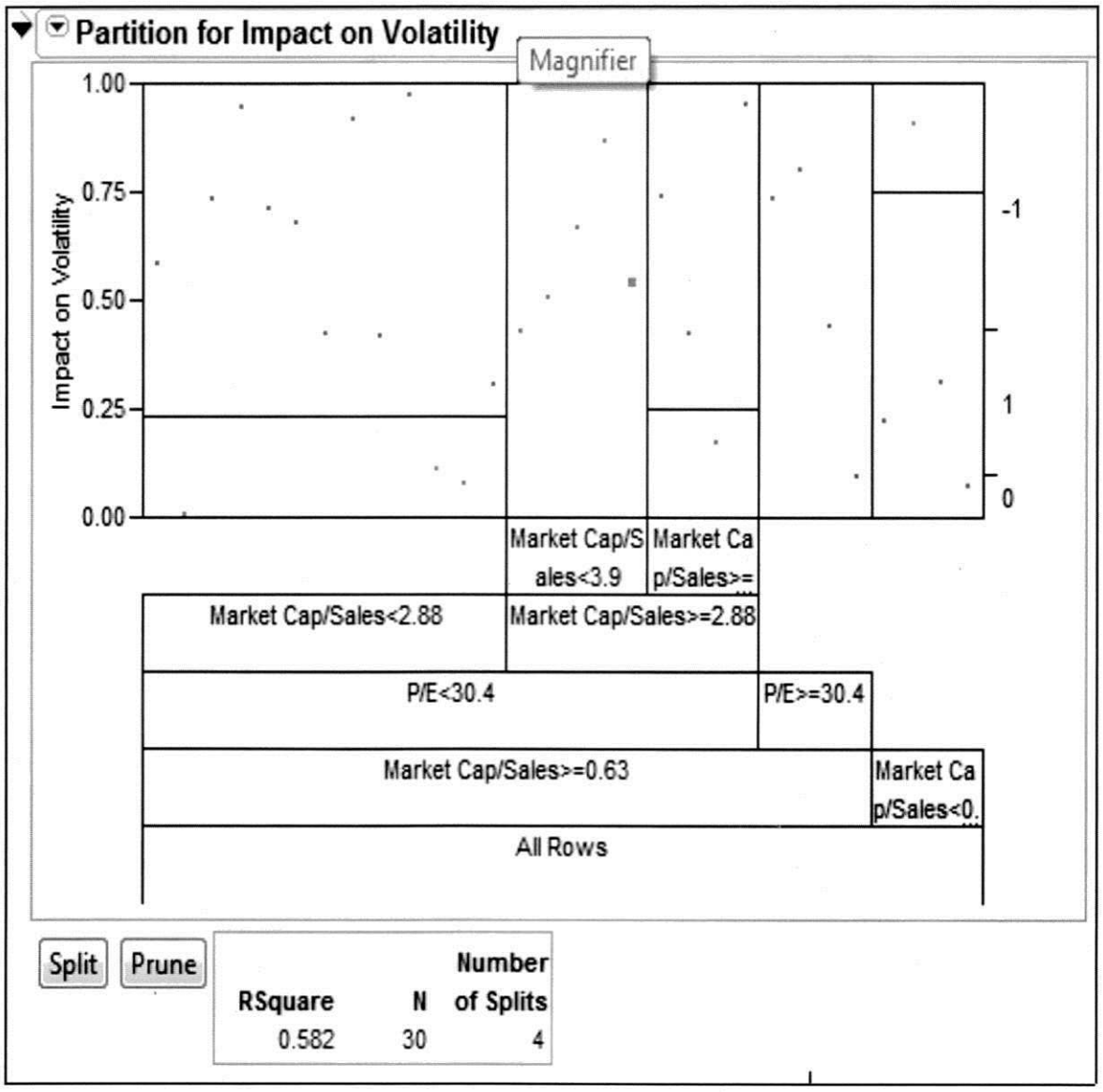
1. P/E of the company
2. Market cap to sales ratio
3. Sector of the company (Banking, IT, Cement,etc)

Methodology named CART is used to :

1. Understand the impact of significant variables
2. Create a predictive model

- CART: Classification and Regression Tree is used for discrete dependant variable, and combination of continuous and discrete independent variables

Figure: 3 Partition for Impact of Volatility

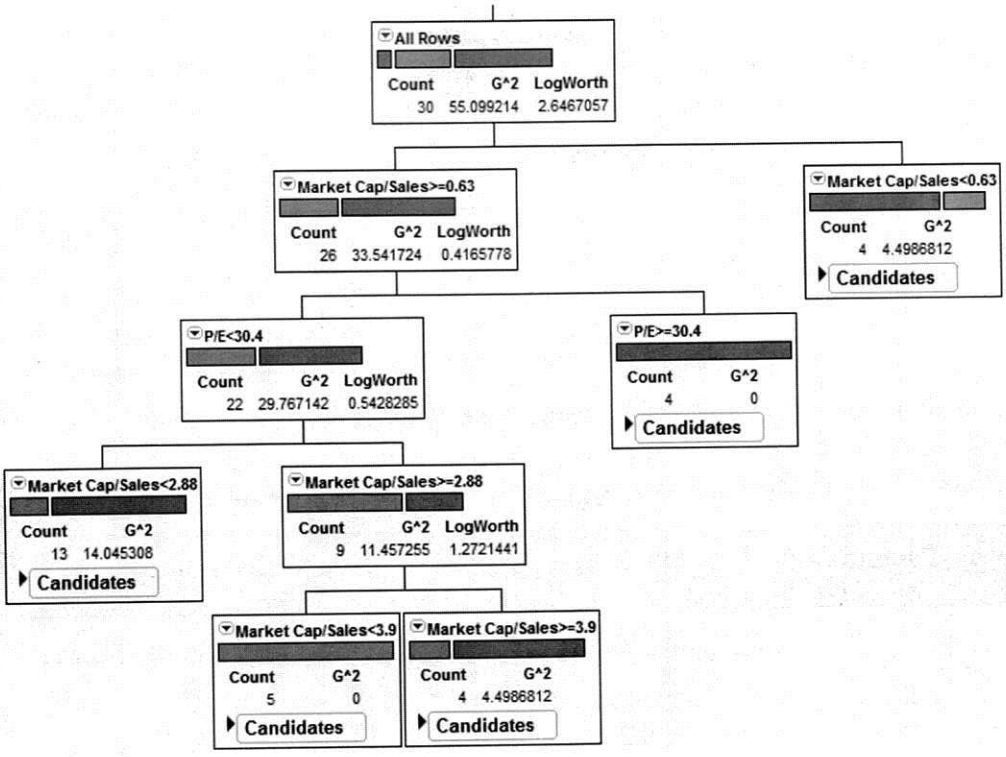


4.3.2 Classification Tree: A Predictive Model

The tree diagram below shows the criteria used to classify the companies into five sub-sections. It is observed that market cap to sales ratio and P/E are significant parameters which impact the direction and amount of change in volatility of a stock on introduction of futures.

Moreover, this classification tree acts as a predictive model that will be able to predict the impact of futures on volatility of a stock. For example, if market cap to sales ratio of a stock is less than 0.63, there is 75% probability that there will be no change in the volatility of the stock.

Figure: 4 Classification Tree : A Predictive Model



LEGEND

Red: No Change in Volatility, Green: Increase in Volatility, Blue: Decrease in Volatility.

4.4 Impact of Futures Trading on Volatility in Various Market Phases

To check impact of futures on volatility of spot stock prices and broader market, we consider one of integral part of markets i.e. different market phases. Generally it is believe that capital markets have two dominant phases viz. Bull phase and Bear phase, in between is normally efficient market.

We began our analysis by bringing forth general assumption that Bear Markets are more volatile than Bull Markets and based on this premise we divided our data into Bear and Bull phases. We did see strong signs of increase in bear market volatility post introduction of futures. The same was fairly visible in majority of the stock and the difference in pre and post future bear market beta coefficient of majority of stocks.

However there were some divergent trends where news discounting was such a big factor that volatility post introduction of futures have fallen for some stocks. Also impact on nifty is not that significant and we can not conclude that introduction of futures had led to increase in volatility during bear markets for this data set, sole reason could be higher news discounting.

4.5 Application of the model:

Classification Tree acts as a predictive model that will be able to predict the impact of futures on volatility of stock.

Example: If market cap-sales ratio of a stock is less than 0.63, there is 60% probability that volatility won't change.

Model can be extended and used by SEBI to determine whether futures should be launched for a stock or not.

4.5.1 Testing the hypothesis on different Market Phases

1. Generally it is observed that markets are more volatile during Bear Markets.

2. Our hypothesis, changes in volatility is different for market phases.

3. Bear Market – Phase of continuous negative daily cumulative returns.

4. Bull Market – Phase of continuous positive daily cumulative returns.

Nifty – Futures have resulted in lower volatility and better information discounting.

1. Nifty – Futures have resulted in lower volatility and better information discounting.

Company	Parameter	Bear		Bull	
		Before	After	Before	After
Nifty	Alpha	0.067	0.22	0.07	0.17
	Beta	0.834	0.67	0.82	0.77

On the contrary to general belief Bear markets have been less volatile

1. Reliance – Major change in Volatility post introduction of futures.

Company	Parameter	Bear		Bull	
		Before	After	Before	After
Reliance	Alpha	0.21	0.38	0.14	0.17
	Beta	0.62	0.38	0.74	0.4

Large fall in both Bear and Bull Market volatility is major reason for fall in Nifty volatility

1. ICICI – Old Index constituent have seen drastic increase in bear market volatility post introduction of futures.

Company	Parameter	Bear		Bull	
		Before	After	Before	After
ICICI	Alpha	0.36	0.11	0.248	0.37
	Beta	0.00	0.86	0.678	0.63

Increase in overall volatility can be attributed to more volatile in Bear Market

Based on the study we can make the following observations.

- Nifty volatility has been different for market phases.
- More volatile Bear Markets can be confirmed for 4 out of 7 major index constituents.
- Bear Markets are generally more volatile for majority of the stocks.
- Increased Bear Market volatility in Infosys and ACC calls for more research on impact of introduction of futures on spot market volatility.
- Increase in information discounting is fairly constant for different stocks.
- Different impact on index constituents

indicates presence of volatility levelers.

5. Conclusion and Suggestions

The study investigated the effects of the Nifty futures on underlying the spot market volatility using GARCH (1,1) model. The research indicates that futures trading reduced stock market volatility and contributes to increase market efficiency.

The study also examined futures trading changes structure spot market volatility. There is a change in the structure of spot market volatility after introduction of futures trading. Specifically, there is evidence that the increased impact of recent news and reduced effect of the uncertainty originating from the old news. New information gets assimilated and the effect of old information on volatility gets reduced at the faster rate in the period following the onset of futures trading.

The key points highlighted in the research were:

- The market capitalization and price earnings ratio are found to be significant parameters in predicting the changes in the volatility of the stocks.
- Stocks in a particular sector portray a significantly different behaviour with respect to volatility when compared to socks in other sectors.
- There is a structural difference in bear and bull market volatility. The study points to the fact that bear market volatility are higher on introduction of futures with respect to bull market.
- There is a superior discounting of information on introduction of futures.
- The dormant volatility of certain constituents has reached an average level.

6. Suggestions

- The model can be used for accurately predicting the impact of introducing futures for individual stocks. Future should be launched only if the model predicts reduced volatility.
- The model parameters need to be enhanced and additions done if required

References

Antoniou, A. and Holmes, P. (1995), "Futures trading, information and spot price volatility: evidence for the FTSE-100 stock index futures contract using GARCH", Journal of Banking & Finance, Vol. 19, pp. 117-29.

Antoniou, A., Holmes, P. and Priestly, R. (1998), "The effects of stock index futures trading on stock index volatility: an analysis of the asymmetric response of volatility to news?",The Journal of Futures Market, Vol. 18 No. 2, pp. 151-66. Annastiina Silvennoinen, Timo Ter¨asvirta (2008), "Multivariate GARCH models" SSE/EFI Working Paper Series in Economics and Finance, Jan 2008, Vol No 669

Amit Goyal (2000), "Predictability of Stock Return Volatility from GARCH Models", Anderson Graduate School of Management UCLA, May 2000, Pierluigi Bologna and Laura Cavallo(2002) , "Does the introduction of stock index futures effectively reduce stock market volatility? Is the `futures effect' immediate? Evidence from the Italian stock exchange using GARCH", Applied Financial Economics, 2002, Vol 12, 183 -192.

Baldaf, B. and Santoni, G.J. (1991), "Stock price volatility: some evidence from an ARCH model", Journal of Futures Mmarkets, Vol. 11 No. 2, pp. 191-200.

Baumol, W.J. (1957), "Speculation, profitability, and stability", Review of Economics and Statistics, August, pp. 263-71.

Bollerslev, T. (1986), "Generalized autoregressive conditional Heteroskedacticy", Journal of Econometrics, Vol. 33, pp. 307-27.

Bologna, P. and Cavallo, L. (2002), "Does the introduction of stock index futures effectively reduce stock market volatility? Evidence from the Italian stock exchange using GARCH", Applied Financial Economics, Vol. 12, pp. 183-92.

Brorsen, B.W. (1991), "Futures trading, transaction costs, and stock market volatility", Journal of Futures Markets, Vol. 11, pp. 153-63.

Butterworth, D. (2000), "The impact of futures trading on underlying stock index volatility: the case of the FTSE Mid 250 contract", Applied Economics Letters, Vol. 7, pp. 439-52.

Chang, E.C., Cheng, J.W. and Pinegar, J.M. (1999), "Does future trading increase stock market volatility? The case of the Nikkei stock index futures markets", Journal of Banking & Finance, Vol. 23, pp. 727-53.

Chiang, M. and Wang, C. (2002), "The impact of futures trading on spot index volatility: evidence for Taiwan index futures", Applied Economics Letters, Vol. 9, pp. 381-6.

Cox, C.C. (1976), "Futures trading and market information", Journal of Political Economy, Vol. 8, pp. 1215-37.

Danthine, J. (1978), "Information, futures prices, and stabilizing speculation", Journal of Economic Theory, Vol. 17, pp. 79-98.

Darrat, A. and Rahman, S. (1995), "Has futures trading activity caused stock price volatility?", Journal of Futures Markets, Vol. 15, pp. 537-57.

Decision, Y. P. Singh and Shalini Bhatia "Does Futures Trading Impact Spot Market Volatility? Evidence from Indian Financial Markets", July - December, 2006 Vol. 33, No.2,

Kotha Kiran Kumar & Chiranjit Mukhopadhyay (2007), " Impact of futures introduction on underlying index volatility evidence from India", Dept of Management Studies, Indian Institute of Science, Bangalore, Nov2007

Pretimaya Samanta and Pradeepta Kumar Samanta (2007) "Impact of Futures Trading on the Underlying Spot Market Volatility", ICFAI Journal of Applied Finance, Oct 2007, Vol. 13 Issue 10, p52-65

P. Srinivasan and K. Sham Bhat(2008) "The Impact of Futures Trading on the Spot Market Volatility of Selected Commercial Banks in India", European Journal of Economics, Finance and Administrative Sciences, 2008, ISSN 1450-2887 Issue 14

Panayiotis Alexakis (2007), "Effect of Index Futures Trading on Stock Market Volatility", International Research Journal of Finance and Economics,2007, Issue 11

Sathya Swaroop Debasish, Bhagaban Das (2008), "An Econometric Study on Impact of Futures Trading On the Stability of Stock Index in India", International journal of business and management, Dec 2008, Vol 3, No 12

Sibani Prasad Sarangi , Uma Shankar Patnaik (2007), "Futures Trading and Volatility: A Case of S&P CNX Nifty Stocks and Stock Futures", The Icfai Journal of Derivatives Markets, 2007, Vol. IV, No. 4

Satya Swarup Debashish (2008) , "Financial Engineering And The Impact Of Index Futures Trading On Spot Market In India", Pranjana: The Journal of Management Awareness, Jul-Dec2008, Vol. 11 Issue 2, p27-38, 12p

Satya Swarup Debashish (2008), An Econometric Study on Impact of Futures Trading On the Stability of Stock Index in India, International Journal of Business Management, Dec 2008, Vol. 3 No. 10

Antonios Antoniou And Andrew J. Foster (2008), "The Effect Of Futures Trading On Spot Price Volatility: Evidence For Brent Crude Oil Using GARCH", Journal of Bunness Finance & Accounting, June 2008, 19(4)

Dhananjay Sahu (2008), "Does the Index Futures Trading influence spot market volatility? Evidence from Indian Stock Market", International Journal of Business Insights & Transformation, 2008, Vol. 1 Issue 1

T Mallikarjunappa & Afsal E. M.(2008), "Effect of Futures Trading on spot market volatility: A study on CNX Bank Nifty Index", International Journal of Business Insights & Transformation, Jan 2008, Vol. 35 Issue 1