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SINGLE STOCK FUTURE AND ITS IMPACT ON SPOT MARKET VOLATILITY IN INDIAN STOCK MARKET

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Abstract
The role of single stock futures in Indian stock market has been one of the major topics of research in financial econometrics. This paper examines the impact of the introduction of single stock futures on the spot market. The study analyses stocks which introduced stock futures during the period 2011 to 2016 and traded in National stock exchange. Variance is a measure of volatility, the study applies F test for preliminary investigation and GARCH model to capture the changes in conditional volatility. The paper analyses whether stock futures increase or decrease spot market volatility especially after a decade of introduction of stock futures in Indian stock market.

Keywords: Derivatives, GARCH Model, Single Stock Futures, Variance, Volatility.

Introduction

Financial markets are considered to have a keen role in economic conditions for countries worldwide. The Indian capital market has witnessed a tremendous change in the past decade especially with the introduction of derivative products. Financial derivatives have changed the world of finance through the creation of innovative ways to comprehend, measure and manage risks. The Securities Contracts (Regulation) Act 1956 (SCRA) defines, " derivative" as a security that is derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any other form of security, same as a contract which derives its value from the prices, or index of prices, of underlying securities. Derivatives are financial products which derive their value from some other assets called 'underlying. They are effective tools of risk management. Derivative products such as Forwards, Futures, Options, Swaps etc., have emerged as risk hedging products Risk-taking investors use these products as hedging tool for availing arbitrage and speculative opportunities. Sometimes the excessive speculative trading could increase the volatility of the market opportunites The derivative markets lead the price movements in cash segment. Low trading cost and leveraged trading are major attractions for speculators in derivative markets. Sub –Prime crisis is a good example of indiscriminate use of derivative products.

Stock futures are financial contracts where the underlying asset is an individual stock. Stock future contract is an agreement to buy or sell a specified quantity of underlying equity share for a future date at a price agreed upon between the buyer and seller. The contracts have standardized specifications like market lot expiry day, unit of price quotation, tick size and method of settlement. The price of a future contract is sum of the current spot price and cost of carry. Cost of carry is the interest cost of a similar position in cash market and carried to maturity of the futures contract less any dividend expected till the expiry of the contract. And is generally higher than the spot prices of the underlying stocks. Thus, Futures Price = Spot Price + Carrying Cost

Single Stock Futures (SSFs) is considered to be one of the most important financial innovations that have taken place in sphere of financial market. SSFs appeal to a wide audience- from the sophisticated retail investor to a wide range of professional traders, asset managers and short-term equity traders. They offer a wide variety of usages to the investors. Stock futures offer high leverage. They also offer arbitrage opportunity between stock futures and the underlying cash market. If used efficiently, single stock futures can be an effective risk management tool. Single Stock Futures are securities that share some of the features of equities and also some of traditional commodity futures contracts. They are traded in various financial markets, including those of the United states, United Kingdom, Spain, India and others.

Top 3 Exchanges by Number of Single Stock Futures Contracts Traded

Rank	Name of the Stock Exchanges				
	2013	**2014**	**2015**	**2016**	**2017**
1	Moscow Exchange	Moscow Exchange	Moscow Exchange	Moscow Exchange	Korea Exchange
2	Eurex	National Stock Exchange of India	National Stock Exchange of India	National Stock Exchange of India	National Stock Exchange of India
3	National Stock Exchange of India	Eurex	Korea Exchange	Korea Exchange	Moscow Exchange

Source: www.world-exchanges.org/files/file/IOMA(compiled)

The Security and Exchange Board of India (SEBI) permitted the trading on index futures on May 25, 2000. The trading of BSE Sensex futures commenced at Bombay Stock Exchange (BSE) on June 9, 2000 and on June 12, 2000 trading of Nifty-futures commenced at National Stock Exchange (NSE). In the June 2001 index options and in July 2001 stock options were introduced. Futures on individual stocks were introduced in November 2001.

Percentage of Participant Wise Trading Value In The NSE F&O Segment

Year	Institutional investors Percentage to Gross Turnover	Retail Percentage to Gross Turnover	Proprietary Percentage to Gross Turnover
2011-12	16.22	40.47	43.31
2012-13	16.63	38.85	44.52
2013-14	16.50	35.79	47.71
2014-15	12.82	36.12	51.06
2015-16	13.35	37.33	49.32

Source: NSE Website (compiled)

Review of Literature

Antoniou and Holmes (1995) examined the impact of trading in the FTSE-100 Stock index futures on the volatility of the underlying spot market. To examine the relationship between information and volatility the GARCH family of techniques was used. The results suggested that futures trading has led to increased volatility, but that the nature of volatility has not changed post-futures, implies that the introduction of futures had improved the speed and quality of information flowing to the spot market.

Maurice Peat and McCorry (1997) examined relation between SSFs listing and the volatility of the underlying shares in Sydney Futures Exchange and found that these SSFs had resulted in a significant increase in the volatility and trading volume for the underlying stocks.

Chun I.Leea & Hung CheongTongb(1998) addressed the issue of the effects of the introduction of stock futures—available only in Australia, Sweden and Hong Kong—on the underlying stock which had not been examined. and showed that the volatility of the underlying stocks does not increase in the post-futures period. The evidence suggested that stock futures trading in Australia offers significant benefits to all participants in the market.

Jae H. Min and Mohammad Najand (1999) investigated possible lead lag relationship in returns and volatilities between cash and futures markets in **Korea**. The Granger causality test is extensively undertaken using two methodologies(SEM and VAR). With regard to volatility interaction between spot and futures markets, a bidirectional causality is more prevalent between cash and futures markets and trading volume has significant explanatory power for volatility changes in both spot and futures markets.

Pilar and Rafel(2002) examined the effect of introduction of futures and options in the **Spanish** market. They found significant impact on variance: the evidence indicated that the conditional volatility of the underlying index declined after derivative markets were introduced.

P Shenbagaraman(2003) assessed the impact of introducing index futures and options contracts on the volatility of the underlying stock index in India and explored the impact of the introduction of derivative trading on cash market volatility using data on stock index futures and options contracts traded on the S & P CNX Nifty (India). The results suggested that futures and options trading had not led to a change in the volatility of the underlying stock index, but the nature of volatility have changed post-futures.

Wee Ching Pok &Sunil Poshakwale(2004) investigated the impact of futures trading on spot market volatility.. This paper provided evidence on the impact of the introduction of futures trading on spot market volatility using data from both the underlying and non-underlying stocks in the emerging **Malaysian** stock market. VAR results showed that the impact of the previous day's futures trading activity on volatility is positive but short (only a day). This was further confirmed by Granger's causality test.

Vipul (2006) investigated the changes in volatility in the Indian stock market after the introduction of derivatives. There was strong evidence of a reduction in the volatility of the underlying shares after the introduction of derivatives. This was largely attributable to a reduced persistence in the previous day's volatility. However, the interday unconditional volatility of the equity index increased.

P.K. Mishra(2010) examined the volatility of Indian capital market in the aftermath of global market slowdown. They investigated the nature and characteristics of the stock return volatility in the Indian capital market using GARCH class models. The results provided the evidence of time varying stock return volatility over the sample period spanning from January 1991 to August 2009. It was further found that the effect of bad news was relatively greater in causing market volatility in India.

G. Saravanan, Devi R. Gayathri , Malabika Deo (2011) studied in micro-level, how as to the volatility implications were there across the days of the week in post futures and options period in Indian stock market by isolating volatility related to market-wide factors as well as international-wide factors and also examined the nature of the volatility after the introduction of futures and options contracts. The results of the study showed that the presences of derivatives markets on S&P CNX Nifty have declined the volatility marginally and volatility implication in days of the week as a consequence of derivatives introduction revealed the presence of speculative activities in spot as well as derivatives market. And, further results showed that options market reduce volatility and stabilize underlying spot market marginally more than futures market.

Dana AL –Najjar (2016) examined the volatility characteristics on **Jordan**'s capital market. ARCH, GARCH AND EGARCH models were applied to investigate the behavior of stock return volatility for Amman Stock exchange. The findings suggested that the symmetric ARCH/GARCH models can capture characteristics of ASE, and provide more evidence for both volatility clustering and leptokurtic, whereas EGARCH output revealed no support for the existence of leverage effect in the stock returns at ASE.

Data and Methodology

The study is based on a sample of daily returns of fifteen stocks traded in NSE on which the derivative products are available for trading from 2011 - 2016. The stocks which were excluded or reintroduced during the period are not included. The present study is based on stock price returns. The daily return is based on closing price and is computed using the formula:

R_t = Log (p_t/p_{t-1})

Where p_t =log of price at time t, p_{t-1} = log of price at t-1

The volatility effect that is change in unconditional variance is determined by the ratio of pre-futures and post-futures variance is calculated and **F test** applied. This paper studies the impact of introduction of stock futures on spot market using **ARCH/GARCH** technique.

Table : Difference In Variance For Pre & Post Introduction Period

Company				F-test	
code	Pre	Post	Change	Cal Value	Cri Value
jub11	0.0010	0.0010	0.0000	0.9582	0.8122
gle13	0.0004	0.0004	0.0001	0.8423	0.8101
ubl13	0.0004	0.0004	0.0001	0.8745	0.8191
eic14	0.0005	0.0005	-0.0001	1.1472	0.8101
jus14	0.0018	0.0008	0.0010	0.4569	1.2344
mot14	0.0011	0.0012	-0.0001	1.0990	0.8087
aja15	0.0049	0.0004	0.0045	0.0824	0.8089
baf15	0.0005	0.0004	0.0001	0.8736	0.8087
bri15	0.0004	0.0003	0.0001	0.7772	0.8087
cas15	0.0004	0.0003	0.0001	0.8131	0.8087

ksc15	0.0007	0.0011	-0.0004	1.5691	1.2360
ncc15	0.0018	0.0006	0.0012	0.3337	0.8091
pid15	0.0003	0.0002	0.0001	0.7121	0.8091
gcp16	0.0006	0.0004	0.0002	0.6286	0.8010
pcj16	0.0011	0.0007	0.0004	0.6437	0.8010

Table 2. ARCH/GARCH Effect For The Pre And Post Period

Comp Code	Period	ω	α	β	Comp Code	Period	ω	α	β
jub11	Pre	0.000263	0.107812	0.639826	bri15	Pre	0.00015	0.251092	0.417648
		0.0384	0.0377	0			0.0231	0.0347	0.0466
	Post	0.000158	0.128296	0.710562		Post	0.000107	0.194159	0.456053
		0.0769	0.0424	0			0.0636	0.0439	0.0427
gle13	Pre	7.15E-05	0.114213	0.571323	cas15	Pre	4.59E-05	0.123168	0.752848
		0.3621	0.1929	0.1443			0.1164	0.0211	0
	Post	0.000178	0.08176	0.407282		Post	0.000149	0.182188	0.319463
		0.2053	0.2136	0.3166			0.0007	0.0039	0.0658
ubl13	Pre	0.000218	0.281234	0.250576	ksc15	Pre	0.000377	0.552473	0.040006
		0.001	0.0003	0.0989			0	0	0.7117
	Post	5.47E-05	0.105033	0.757505		Post	0.000211	0.23728	0.598223
		0.053	0.0255	0			0.0017	0.0005	0
eic14	Pre	0.000285	0.014048	0.417882	ncc15	Pre	0.000831	0.244846	0.312567
		0.8812	0.8627	0.9134			0.0088	0.0028	0.1282
	Post	0.000212	0.31439	0.253065		Post	0.000432	0.270409	0.046067
		0	0.0001	0.0386			0.0001	0.0045	0.8015
jus14	Pre	0.000402	0.764372	0.192139	Pid15	Pre	0.000184	0.34742	0.063856
		0	0	0.0052			0.0006	0.0055	0.736
	Post	0.000398	0.241518	0.27785		Post	5.63E-05	0.036873	0.693729
		0.0045	0.0106	0.1721			0.1051	0.393	0.0001
mot14	Pre	0.000162	0.898159	0.136504	gcp16	Pre	0.00044	0.218183	0.014895
		0	0	0.0058			0.0452	0.0497	0.969
	Post	7.86E-05	0.952579	0.256142		Post	0.000218	0.079758	0.310252
		0.0021	0	0.0067			0.4133	0.1467	0.6847
aja15	Pre	0.000162	0.898159	0.136504	pcj16	Pre	0.000694	0.248319	0.030924
		0	0	0.0058			0	0.0241	0.8685
	Post	2.77E-05	0.144185	0.720688		Post	0.00022	0.534929	0.177502
		0.1082	0.0849	0			0	0	0.0191
baf15	Pre	0.000167	0.109196	0.540839					
		0.3007	0.079	0.1647					
	Post	2.96E-05	0.038362	0.893539					
		0.1258	0.0797	0					

Conclusion

Volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. Volatility has become a very important concept in different areas in financial theory and practice such as risk management, portfolio selection, derivative pricing. The paper analyses whether stock futures increase or decrease spot market volatility especially after a decade of introduction of stock futures in Indian stock market.

Table 1 depicts the result of the F-test performed on the differences between variances. Seven companies do not display significant difference in Pre and Post period volatility. Five companies experienced a significant increase in volatility, while three companies showed a significant decrease in volatility.

Table 2 shows the results from an ARCH/GARCH variance regression for the Pre SSF period and Post-SSF period. The mean equation $y_t = \alpha + \beta\, y_{t-1} + \varepsilon_t$ generated the residuals for the variance equation, estimated by regressing the lognormal share returns on the one period lagged returns of each share. The variance equation $h_t = \omega + \alpha\, \varepsilon_{t-1}^2 + \beta\, h_{t-1}$ provided the ARCH and GARCH terms for the pre and post period. The summary of the analysis is that out of fifteen companies, three companies exhibit faster incorporation of news into share price with smaller contribution of old news to volatility, three companies exhibit faster incorporation of news into share price with larger contribution of old news to volatility, seven companies exhibit slower incorporation of news into share price with larger contribution of old news to volatility, two companies exhibit slower incorporation of news into share price with smaller contribution of old news to volatility.

Thus it could be concluded from F test and GARCH model that during the study period the stock futures introduction has little effect on the volatility of the spot market.

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