# Indian Derivatives Market: A Study of Impact on Volatility and Investor Perception

by

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#### Abstract

Derivatives Market has an important role to play in the economic development of a country. The objective of the study is to examine the impact of financial derivatives (futures and options) on the underlying market volatility. The paper also analyses derivatives awareness level of Indian investor and perception of investor about future of derivatives market in India. Data has been collected for a period of 18 years from January 1, 1997 to February 5, 2015. Data has been collected for various indexes like CNX S&P Nifty index daily closing prices (from January 1, 1997 to February 5, 2015), Nifty Junior Index (from January 1, 1997 to February 5, 2015), Index Futures near month contracts daily closing prices from (June 12, 2001 to February 5, 2015) and S&P 500 Index (from January 1, 1997 to February 5, 2015). The questionnaire was distributed to 1000 respondents but 522 filled questionnaires were received and have been analyzed in this study. The questionnaire was subjected to reliability and expert validity. The final AR (1)-GARCH (1,1) model show that overall volatility has reduced in the spot market after the introduction of derivatives. In the model all variables are highly significant. Awareness about financial markets, experience in derivatives trading, workplace activity and return expectation are significantly associated with derivative awareness level (DAL) of respondents at 5 percent level of significance. The results of Structural Equation Modeling reveals perception of investors about future of derivatives market in India include having an investor grievance redressal mechanism which is approachable under trading hours, steps to be taken by regulators to increase investments, conducting investor training and awareness programs, global integration will happen, derivatives market will affect growth of the economy and consolidation of exchanges is required.

Keywords: Derivatives Market, Volatility, Investor Perception

# 1. Introduction

Derivatives Market has an important role to play in the economic development of a country. Derivatives were introduced to for various benefits it offers including impact of the introduction of derivatives trading on the cash price volatility, market depth, information assimilation, price discovery and risk transfer, and so on. After global financial crisis, it has now become important to understand the effectiveness of derivatives market.

Two hypotheses exist on the impact of derivatives on spot market volatility. Proponents of 'destabilizing forces' hypothesis argue that derivatives trading increases stock market volatility because of high degree of leverage, likely presence of uninformed traders due to low transactions cost involved to take position in the futures market. So, volatility will increase after introduction of

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derivatives. Proponents of 'market completion' hypothesis argue that derivatives trading helps in price discovery, improve the overall market depth, enhance market efficiency, augment market liquidity, reduce asymmetric information and thereby reduce volatility of the cash market (Kumar et al, 1995; Antoniou et al, 1998).

Apart from that it is also important to know derivatives awareness level of Indian investor and their perception about future of derivatives in India. For this purpose a structured questionnaire was designed and responses were collected from 522 respondents. The present study examines the impact of financial derivatives (futures and options) on the underlying market volatility. It also studies perception of investors about Indian derivatives market. The rest of the paper covers the following sections: review of literature is explained in section two, section three explains the methodology of the study, section four presents the empirical results and finally, conclusions are presented in section five.

### 2. Review of Related Research

The review of related research covers studies on impact of volatility and studies on perception of Investors. Kabir and Ikram (2012), Sahu, D. (2012), Girish, G.P. (2012), Singla, R. (2012), Otswal, Priyanka (2011), Kaur, Gurpreet (2011), Sakhtivel, P. and Kamaiah, B. (2011), Ray, K. and Panda, A.K. (2011), Singh, G. and Kansal, S. (2010), Gahlot, R., Datta, K. and Kapil, S. (2010), Pati, P.C. and Rajib, P. (2010) studied the impact of futures and options on underlying spot market volatility in India.

Various studies have been undertaken on studying the impact on volatility after introduction of derivatives. Kalantzis, G.F. and Milonas, N.T. (2013), Gahlot, Ruchika and Dutta, Saroj Kumar (2012), Sahu, D. (2012), Singla, R. (2012), Kaur, Gurpreet (2011), Sakhtivel, P. and Kamaiah, B. (2011), Singh, G. and Kansal, S. (2010), Saravanan, G. and Malabika, Deo (2010), Pati, P.C. and Rajib, P. (2010), Gupta, K. and Singh, B. (2009), Kasman, A. and Kasman, S. (2008), Bhaumik, Karanasos and Kartsaklas (2008), Drimbetas, E. (2007), Raju, M.T. and Karande, Kiran (2003), Ghosh, G. and Bandivadekar, S. (2003), Bologna, P. and Cavallo, L. (2002), Thenmozhi, M. (2002), Pilar, C. and Rafeal, S. (2002), Gulen, M and Stewart, M (2000), Jhang, J. et.al, Stein (1987), Dentine (1978), Bessembinder and Seguin (1992) found that volatility has reduced after introduction of futures trading. Kabir and Ikram (2012) could find significant impact of futures trading on stock market volatility. Rajoub and Azzam (2012) found high volatility and negative correlation with returns at the time of market crisis. Girish, G.P. (2012), Gahlot, R., Datta, K. and Kapil, S. (2010), Manier, M. (2009), Mallikarjunappa, T. and Afsal, E.M. (2008), Debasish, S.S. (2008), Sah, A.N. and Omkarnath, G. (2005), Shenbagaraman, P. (2003), Yu, Shang-Wu. (2001), Hong Choi et al. (1994) did not find significant change in the volatility. Butterworth, D. (1998) found an increase in market efficiency, affected by futures trading. Otswal, Priyanka (2011) reported that as expiration day come closest, the volatility of the market increased. Gaurishankar S. Hiremath, (2009), Yu, Shang-Wu. (2001), Gulen, M and Stewart, M (2000), Smit, E. and Nienaber, H. (1997), Cox (1976), Figlewski (1981) and Chatrathet al. (1995), Harris (1989), Ross (1989) found that volatility has increased. Jegadeesh and Subrahmanyam (1993) found that average spread has increased after introduction of futures trading. Al-Zoubi and Kh.Al-Zu'bi (2011) found positive risk-return relationship. Ray, K. and Panda, A.K. (2011) found stronger volatility structure in post derivatives period. Rao, Ananth (2008) indicates that volatility persistence and spillover exist in all these markets. Siopis and Lyroudi (2007) found a negative impact of introduction of futures trading on underlying volatility. Katsikas (2007) found negative relationship between volatility and returns. Saatcioglu, K. and Starks, L. (1998) found no relationship between weekly prices and volume and

positive relationship between monthly prices and volume. Chan, K. (1992) found that futures market leads cash market. Xie S. and Huang J. (2014) did not found any decrease in the volatility, no leverage effect and a decrease in sensitivity to new information after introducing the CSI 300 index futures.

Stulec,I., et al., (2013) studied on USA, Canada, United Kingdom, Belgium, Sweden, Taiwan, Pakistan and Croatia to analyze the purpose of using derivatives and also investigated the scope of developing the financial derivatives in Croatia. They have conducted a survey among large firms of Croatia, to check their awareness about derivatives concept. They found that they perceived derivatives as a risky instrument and only high class can invest in this. And they do not have sufficient knowledge about derivatives. Some of the companies are using derivatives, are taking it as a hedging tool only. Brahmabhatt, Raghu Kumari, P.S, Malekar, Shamira, (2012) investigated the investor behavior on various investment avenues in Mumbai. They have primarily investigated the effect of volatility on investor behavior, using gold, currency and bonds. By using questionnaire survey technique they found that the awareness of investment knowledge, investment opportunities is very high in Mumbai.

Thomas, T. C. and Rajendran, G., (2012) assessed the impact of the use of BB&K Five-way Model on investment behavior of individual investors. They used Delphi technique and found all five dimensions of the BB&K model associated with the preferences of investments of individual investors. Kumar, R.T.Nirmal Balaji.K And Prabu.K (2011) studied on trader's perception on options trading with the products traded in the national stock exchange. The results indicate that 77 percent of traders in options market are trading based on market movements. Experience of the trader affects the trading in options. No significant relationship is found between the experience and risk taking capacity of the trader and also, effect of gender and income, could not find by the author on returns and volume of trading of options. Daniel EkerumehAduodeh, (2010) studied requisites to develop a derivative securities market in Ghana and to make it a successful market. He studied about the availability of participants and the existence of regulatory framework of securities market in the country. The objective of this study was to reduce the risk through hedging, allow price discovery and to increase the global resources into Ghana. He has worked on quantitative data to analyze the level of awareness of derivative instruments, and to analyse the involvement of organisations in any form of derivative trading and number of derivative contracts traded and used SPSS 16.0 software for windows. He has collected qualitative data through interview and used content analysis. The study found that Ghana is ready to develop a derivatives market but legal and regulatory framework for derivatives trading is needed. Martin, A., et al. (2009) studied on the non-financial firms of Peru whether they use financial derivatives or not. They obtained that the possibility of development of financial derivatives market in Peru is less due to less market regulations and less training.

D. MilošSprčić, (2007) examined the use of financial derivatives as hedging instruments in the Croatian and Slovenian non-financial companies. The results indicate that non-financial firms of Croatian and Slovenian were weak in taking decision about derivatives and it was also found that they are using standardised derivatives and structured derivatives as risk management tools but exchange-traded and OTC options are not being used as a financial risk management tool in both countries. The reasons of not using derivatives in both the countries were high costs of establishing and maintaining risk management programs. Ahmed A. El-Masry, (2006) investigated the way of using of financial derivatives by nonfinancial firms in UK by using questionnaire which was filled by 401 UK nonfinancial companies. Results of the study reveal that the number of larger firms using derivative instruments due to non-significant exposures, necessary activity of disclosures of derivatives under FASB rules, and costs of establishing and maintaining derivatives is high. The

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study also revealed the reasons of using derivatives with hedging is managing the volatility in cash flows. Guay W & Kothari, S. P. (2003) investigated that how much non-financial firms use derivatives as a hedging tool. They have applied standard deviation and median over 234 nonfinancial firms and found that non-financial firms use corporate derivatives very often. They use other benchmarks to reduce the risk. ANZ Banking Group, (2003) examined adult financial literacy in Australia by ANZ telephonic survey on 3548 adults conducted by Roy Morgan Research and overseen by a Steering Committee and solved 145 finance and 25 demographic questions. They have also conducted interview session on 202 people of 1-1.5 hours each. They found low financial literacy level among the Australian respondents. Berkmana, Henk, et al., (2002) examined the relation between derivatives use and financial characteristics of Australian industrial and mining firms. The firm characteristics were taken as proxy for financial distress, tax losses, managerial ownership, growth opportunities, the ability to generate operating cash flows and liquidity. They also tried to control the firm size, dividends and exposure to foreign exchange risk. The results show that firm size and leverage are the main explanatory variables for derivative use for both industrial and mining firms. Prevost, Andrew K. et al. (2000) studied derivatives usage and financial risk management in large and small economies. The study found that the risk management patterns and objectives of firms in the small, open market of New Zealand are similar in many respects to those of firms in the much larger, more developed US, UK, and German markets. Grant, K. and Marshall, A. P. (1997) conducted a survey of derivatives use by large UK firms and found that swaps, forwards, and options are commonly used to manage foreign exchange and interest rate risks. They reported that the firms in their survey very often speculate with derivatives, and main focus is on the reporting and control of derivative contracts. Grant and Marshall also found that companies are somewhat reluctant to disclose their information like use of derivatives. In general, they conclude that the use of derivatives in the UK is well developed and that risk management objectives are similar to those of firms in other countries.

# 3. Methodology of the Study

The objective of the study is to examine the impact of financial derivatives (futures and options) on the underlying market volatility. The paper also analyses the investor behavior and perception of investor about future of derivatives market in India. The investor behavior has been studied in terms of their investment pattern and derivatives awareness level.

Data has been collected for a period of 18 years from January 1, 1997 to February 5, 2015. Data has been collected for various indexes like CNX S&P Nifty index daily closing prices (from January 1, 1997 to February 5, 2015), Nifty Junior Index (from January 1, 1997 to February 5, 2015), Index Futures near month contracts daily closing prices from (June 12, 2001 to February 5, 2015) and S&P 500 Index (from January 1, 1997 to February 5, 2015). The data was collected from NSE website and Yahoo finance. The closing price data was converted to daily compound returns by taking the first log difference.

To understand that whether introduction of derivatives (futures) has altered the volatility of spot market? For this dummy variable has introduced for identifying pre-derivatives period (0) and post-derivatives period (1). Augumented Dickey-Fuller test was applied on all time series to check for stationarity of the price series and return series. Since volatility of prices is affected by many factors and introduction of derivatives is one of them so, we tried to control these market wide factors by regressing spot market returns against a proxy variable for which no related futures contracts are available (Nifty Junior Index). In order to isolate the unique impact of introduction of derivatives on spot market volatility we have to remove any predictability associated with world

returns. So, lagged return of S&P 500 index has been introduced. Lagrange Multiplier test was used to check whether the data is suitable for applying GARCH iterative process. GARCH model is separately fitted for each period. The study has used GARCH (1,1) process (Mallikarjunappa and Afsal 2008).

The questionnaire was distributed to 1000 respondents but 522 filled questionnaires were received and have been analyzed in this study. The questionnaire was subjected to reliability and expert validity.

# 4. Results and Discussion

This section is divided into two parts. Part one cover results on impact of derivatives on underlying market volatility and part two covers investor's perception on Indian derivatives market.

After fourteen years of introduction of derivatives in Indian capital markets, it's time to relook on the impact of derivatives on the underlying market. Indian derivatives market has come a long way from 41,96,873 (contracts traded) and 1,01,926 (turnover in crores) in 2001-02 to 404,244,278 (contracts) and 11,897,301.33 (turnover in crores) in 2013-14. Also we need to evaluate that has derivatives been able to achieve its real purpose for which they were established i.e. has derivatives been able to reduce spot market volatility.

# Impact on Volatility

The results of the analysis as shown in table 1 depicts that mean returns is positive for all series for the total period (01-01-1997 to 05-02-2015). The Nifty Index has a mean return of 0.0435 percent and standard deviation of 1.6844. The returns are negatively skewed and kurtosis is higher than three. These results are similar to those of Mallikarjunappa and Afsal (2008). The results of Jarque-Bera test indicate a rejection of the null hypothesis of a normal distribution of daily Nifty log returns (at 1 percent level of significance) for all series.

	Nifty	Nifty Junior	S&P 500 Index	Nifty Futures
Mean Returns	0.0435	0.0557	0.0238	0.0432
Maximum	16.3343	13.8254	10.9572	16.1947
Minimum	-15.9810	-19.4901	-9.4695	-17.5194
Std. Dev.	1.6844	1.8911	1.2901	1.7123
Skewness	-0.4123	-0.6968	-0.1778	-0.8867
Kurtosis	12.0504	9.8224	11.0783	16.3048
Jarque-Bera	15024.4800	8820.7240	11894.7800	24779.9000
Probability	0.0000	0.0000	0.0000	0.0000
Sum	190.0424	243.2152	103.7412	142.6426
Sum Sq. Dev.	12384.8600	15610.5300	7264.4680	9675.5480
Observations	4366	4366	4366	3301

 Table 1 Descriptive Statistics of Sample Period (01-01-1997 to 05-02-2015)

Table 2 shows results of Augmented Dickey-Fuller test for which lag length is chosen on the Schwarz Information Criterion (SIC) and it is applied with intercept and trend. All the returns series are stationary at its level and they are significant at 1 percent level. These results are also confirmed with Sahu, D. (2012), Girish, G.P. (2012) and Gahlot, R., Datta,K. and Kapil, S.(2010).

	<b>Return Series</b>	t-Statistic	Prob.*	Lag Length	
Full Period	Nifty	-47.4904	0	1	
	Nifty Junior	-57.69079	0	0	
	S&P 500	-50.99196	0	1	
	Index				
	Nifty Futures	-56.86959	0	0	
*MacKinnon (1996) one-sided p-values.					
Exogenous: Constant, Linear Trend					
SC: Schwarz informa	tion criterion				

 Table 2 Augmented Dickey-Fuller Test Statistic

Table 3 reports the results of ARCH-LM test. We start with the residual term in the mean equation for five lag using the following model.

Table 3 Heteroskedasticity Test: Arch

F-statistic	63.9516	Prob. I	F(5,4344)	0.0000		
Obs*R-squared	298.2459	Prob. Chi- Square(5)		0.0000		
		Std.	t-			
Variable	Coefficient	Error	Statistic	Prob.		
С	1.5777	0.1402	11.2540	0.0000		
RESID^2(-1)	0.1559	0.0151	10.3085	0.0000		
RESID^2(-2)	0.0927	0.0153	6.0757	0.0000		
RESID^2(-3)	0.0286	0.0153	1.8660	0.0621		
RESID^2(-4)	0.0832	0.0153	5.4539	0.0000		
RESID^2(-5)	0.0783	0.0151	5.1785	0.0000		
Dependent Variable: RESID^2						
Method: Least Squar	es					
Included observation	s: 4350 after a	djustments				

<b>R-squared</b>	0.0686	Mean dependent var	2.8111
Adjusted R-			
squared	0.0675	S.D. dependent var	8.2066
S.E. of regression	7.9248	Akaike info criterion	6.9793
Sum squared			
residual	272817.2	Schwarz criterion	6.9881
Log likelihood		Hannan-Quinn	
	-15173.89	criter.	6.9824
F-statistic	63.9516	<b>Durbin-Watson stat</b>	2.0061
Prob(F-statistic)	0		

The F statistics value F (5,4344) is 63.9516 which is highly significant. The R-square value is 0.0686 and adjusted R-squared value is 0.0675. Thus the null hypothesis is rejected and we can conclude that there are sufficient ARCH effects (Pati, P.C. and Rajib, P.(2010).

Table 4 depicts AR (1) - GARCH(1,1) model for the pre-derivatives period (from 1-1-1997 to 4-6-2001). The results reveal that constant, ARCH (1) lagged residual returns coefficient  $\alpha_1$  and GARCH (1) (lagged Nifty returns) and Nifty Junior returns are highly significant in the model. The high value of  $\beta_1$  is 0.7884 shows that old news has a lasting impact on Nifty prices in the pre-derivatives period. The significant coefficient value of 0.0760 shows that recent news also has an immediate effect on Nifty prices. But Nifty Junior returns have a negative relationship with Nifty returns which means when returns of Nifty Junior Index increased then return of Nifty decreased in the pre-derivatives period.

	Variance I	Equation			
			Std.	Z-	
	Variable	Coefficient	Error	Statistic	Prob.
$\alpha_0$	Constant	0.5276	0.1365	3.8643	0.0001
$\alpha_1$	ARCH (1)	0.0653	0.0161	4.0509	0.0001
$\beta_1$	GARCH(1) (R <sub>t-1</sub> )	0.7884	0.0472	16.7086	0.0000
$\delta_1$	Lagged Nifty Junior Returns (R <sub>t-1,Nifty Junior</sub> )	-0.0987	0.0350	-2.8236	0.0047
$\delta_2$	S&P 500 Index Returns(R <sub>t, S&amp;P500</sub> )	-0.2443	0.0575	-4.2499	0.0000
			Mean d	lependent	
	R-squared	-0.0006	var		0.0464
			S.D. dependent		
	Adjusted R-squared	0.0003	var		1.8542
			Akaik	e info	
	S.E. of regression	1.8539	crite	rion	4.0268
			Sch	warz	
	Sum squared residual	3653.4390	criterion		4.0502
			Hannan-Quinn		
	Log likelihood	-2135.2680	criter.		4.0357
	Durbin-Watson stat	1.9001			
	Method: ML - ARCH (Marquardt) - Normal dis	stribution			
	Convergence achieved after 16 iterations				
	Included observations: 1063 after adjustments				

Table 4 Garch (1,1) Estimates for Pre Derivatives Period

Presample variance: backcast (parameter = 0.7)  $GARCH = C(1) + C(2)*RESID(-1)^{2} + C(3)*GARCH(-1) + C(4)*JRETURNS(-1) + C(5)*SRETURNS$ 

Table 5 reveals AR (1) - GARCH(1,1) estimates for post derivatives period (5-6-2001 to 3-2-2015). The results depicts that the coefficient of futures dummy is -0.0518 which is highly significant at 1 percent level significance and coefficient of options dummy is -0.5469 which is highly significant have inverse relationship with Nifty returns.

			Std.	Z-	
	Variable	Coefficient	Error	Statistic	Prob.
	Constant	0.1308	0.0253	5.1804	0.0000
	AR(1)	0.1161	0.0185	6.2666	0.0000
	Variance l	Equation			
$\alpha_0$	Constant	1.0561	0.0665	15.8867	0.0000
$\alpha_1$	ARCH (1)	0.2315	0.0155	14.8850	0.0000
$\beta_1$	GARCH(1) (R <sub>t-1</sub> )	0.5848	0.0188	31.1128	0.0000
$\delta_1$	Lagged Nifty Junior Returns (R <sub>t-2,Nifty Junior</sub> )	-0.1020	0.0126	-8.0669	0.0000
	Lagged S&P 500 Index Returns (R <sub>t-2,</sub>				
$\delta_2$	<u>s&amp;P500)</u>	-0.2926	0.0091	-32.1248	0.0000
γ	Futures_Dummy (D <sub>f</sub> )	-0.0518	0.0039	-13.2528	0.0000
λ	Options Dummy (D <sub>0</sub> )	-0.5469	0.0498	-10.9877	0.0000
					-
			Mean d	lependent	
	R-squared	-0.0040	var S.D. dependent		0.0438
			S.D. dependent		
	Adjusted R-squared	-0.0043	Vá	ar	1.6848
		1 (000	Akaik	e info	
	S.E. of regression	1.6883	crite	erion	3.6771
	a	10.400.0000	Sch	iwarz	<b>a</b> (00 <b>a</b>
	Sum squared resid	12433.9200	crite	rion	3.6902
		9014 2500	Hannar	I-Quinn	2 (017
		-8014.3500	cri	ter.	3.0817
	Durbin-Watson stat	2.1192			
	Inverted AR Roots	0.12			
	Method: ML - ARCH (Marquardt) - Normal dis	stribution			
	Convergence achieved after 8 iterations				
	Included observations: 4364 after adjustments				
	Presample variance: backcast (parameter $= 0.7$ )				

 Table 5 Garch (1,1) Estimates for Post Derivatives Period

 $GARCH = \alpha_0 + \alpha_1 * \varepsilon_{t-1}^2 + \beta_1 * (R_{t-1}) + \delta_1 * R_{t-2,Nifty Junior} + \delta_2 * R_{t-2, S\&P500} + \gamma * D_f + \lambda * D_o$ NIFTYRETURNS = 0.1308 + [AR(1)=0.1161]  $GARCH = 1.0561 + 0.2315 * \varepsilon_{t-1}^2 + 0.5848 * R_{t-1} - 0.1020 * R_{t-2,Nifty Junior} - 0.2926 * R_{t-2, S\&P500} - 0.000 = 0.0000 * R_{t-2,Nifty Junior} + 0.0000 * R_{t-2,Nifty Junior}$ 

# $GARCH = 1.0561 + 0.2315 * \varepsilon_{t-1} + 0.5848 * R_{t-1} - 0.1020 * R_{t-2,Nifty Junior} - 0.2926 * R_{t-2, S\&P500} - 0.0518 * D_f - 0.5469 * D_o$

This clearly shows that after introduction of derivatives volatility of spot or cash market has reduced. These results are similar to those of Sahu, D.(2012), Singla, R. (2012), Sakhtivel, P. and Kamaiah, B.(2011), Singh, G. and Kansal, S. (2010), Pati, P.C. and Rajib, P.(2010) and Gupta, K. and Singh, B.(2009). The contribution of  $\beta_1$  (GARCH(1)) coefficient is highest 0.5848 in the model. This shows that news at t-1 day has a major impact on prices of Nifty on 't' day.



Figure 1 Forecasted Volatility of AR (1)-GARCH (1,1) Model Predicted by Equation

Product	No. of contracts	Traded Value (Rs. Crores)
Index Futures	5,11,077	17,072.52
Stock Futures	8,27,089	26,634.60
Index Options	15,94,125	54,748.41
Stock Options	2,31,914	7,766.72
F&O Total	31,64,532	1,06,293.62

Table 6 Traded Value of NSE Futures and Options Segment as on Apr 30, 2014

As per data from NSE as on April, 2014 Index options had trading value of Rs. 54,748.41 crores (table 6). Stock futures had trading value of Rs. 26,634.60 crores. Table 7 showsnumber of trades in the futures &options segment. In the crisis period, highest number of trades was achieved in 2008-09 like index futures (58,898,232 trades) and stock futures (153,256,283 trades). Index options were highly traded in 2011-12 and stock options are continually growing as 7,767,865 trades were in 2007-08 and 47,114,197 trades were in 2012-13.

Year	Index Futures	Stock Futures	Index Options	Stock Options	Total
2007-08	30,897,058	153,187,768	10,370,483	7,767,865	202,223,174
2008-09	58,898,232	153,256,283	43,740,142	9,331,300	265,225,957
2009-10	57,564,449	120,163,033	76,949,992	11,494,712	266,172,186
2010-11	54,099,706	143,556,091	147,150,524	25,923,625	370,729,946
2011-12	57,713,350	122,687,746	217,338,496	27,365,782	425,105,374
2012-13	38,006,692	116,343,124	186,345,210	47,114,197	387,809,223

<b>TADIC</b> / INUMBER OF FRANCES IN THE FULLIES AND OPTIONS SEGMENT
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Source:NSEWebsite

# **Investor's Perception about Indian Derivatives Market**

The second part of the analysis is to study about investment pattern of Indian investor, factors influencing derivative awareness level, perception about future of derivatives market in India. The data was collected for 522 respondents on their perception about Indian derivatives market.

Table 8 shows ranking of various derivative instruments in India based on popularity. Futures contracts on stocks are the most popular instrument used by Indian investor. Stock options are used by 38.46 percent respondents making it second most popular instrument. Commodity derivatives are used by 23.85 percent respondents and it is third most popular instrument used in India. Currency derivatives are used by 14.23 percent respondents.

 Table 8 Investment in Derivatives Instruments

Derivatives Instrument	Frequency	Per cent	Rank
Stock Futures	416	80.00	1
Forward Contracts	46	8.85	6
Swaps	31	5.96	9
Index Futures	43	8.27	7
Stock Options	200	38.46	2
Index Options	54	10.38	5
Currency Derivatives	74	14.23	4
Interest rate futures	34	6.54	8
Commodity derivatives	124	23.85	3

Figure 2 shows proportion of investment in various instruments by an average investor in India. The mean total investment of sample respondents is 50 percent with standard deviation of 15.33. The average investment in saving bank account is 23 percent with standard deviation of 16.33 and maximum investment in saving bank is 50 percent. Average investment in fixed deposit is 10 percent. Investment in government securities is 8 percent with standard deviation of 5.41 percent. 6 percent of funds are dedicated to insurance policies by an average investor. Gold as an investment

asset is used by 6 percent investors and highest level is 10 percent. Indian investors are basically conservative and this can be judged the investment portfolio they have. 6 percent of the funds are invested in mutual funds by the investor. 9 percent funds are invested in real estate by an average investor. An average investor invests 7 percent of funds in bonds/debenture available in the market. Under the high risk category, equity share has an average investment rate of 8 percent with standard deviation of 5.06. In the derivatives market only 6 percent of funds are invested by average investor with standard deviation of 3.17 and highest level of 10 percent.



Figure 2 Average Investment Portfolio of Indian Investor

In the further analysis hypothesis testing has been done. Table 9 depicts ANOVA results on differences between investment patterns of males and females. The investment pattern in equity shows no difference for males and females as it has F value of 0.031 with 0.861 level of significance, which is not significant. The investment pattern in saving bank account, government securities, pension funds, mutual fund, ETFs and derivative investments is also not significantly different for males and females. The investment pattern of males and females was significantly different for fixed deposit. ANOVA results show F value of 5.062 with 0.025 level of significance (which is highly significant).

Table 9 ANOVA Results of Differences between Investment Pattern and Gender Respondents

		Sum of		Mean		
		Squares	Df	Square	F	Sig.
	Between					
	Groups	7.398	1	7.398	0.031	0.861
	Within					
	Groups	61264.461	254	241.199		
<b>Equity Shares</b>	Total	61271.859	255			
	Between					
	Groups	133.419	1	133.419	0.233	0.629
	Within					
Saving Bank	Groups	218404.539	382	571.74		
Account	Total	218537.958	383			
<b>Fixed Deposit</b>	Between	1223.965	1	1223.965	5.062	0.025

	Groups					
	Within					
	Groups	74711.971	309	241.786		
	Total	75935.936	310			
	Between					
	Groups	41.815	1	41.815	0.572	0.451
	Within					
Government	Groups	10675.179	146	73.118		
Securities	Total	10716.993	147			
	Between					
	Groups	68.439	1	68.439	0.316	0.575
	Within					
	Groups	34181.084	158	216.336		
Pension Fund	Total	34249.523	159			
	Between					
	Groups	1189.244	1	1189.244	7.352	0.007
	Within				1	
	Groups	39631.655	245	161.762		
<b>Insurance Plans</b>	Total	40820.899	246			
	Between					
	Groups	567.472	1	567.472	3.931	0.048
	Within					
	Groups	40565.991	281	144.363		
Gold	Total	41133.463	282			
	Between					
	Groups	23.205	1	23.205	0.321	0.572
	Within					
	Groups	10839.473	150	72.263		
Mutual Fund	Total	10862.678	151			
	Between					
	Groups	9.605	1	9.605	0.044	0.835
	Within					
	Groups	11872.109	54	219.854		
ETF	Total	11881.714	55			
	Between	(04.150		604150		0.1.50
	Groups	604.158	I	604.158	2	0.159
	Within	51242.06	170	202.022		
DestEntert	Groups	51343.80	170	302.023		
Real Estate	1 otal	51948.017	1/1			
	Between	1572 10	1	1572 10	7.07	0.000
	Groups Within	13/3.19	1	13/3.19	7.07	0.009
	Croups	17801 7	80	222 521		
Bonds/Debentures	Total	1037/ 80	81	222.321		
Donus/Debentures	Retween	17577.07	01		<u> </u>	
	Grouns	8 106	1	8 106	0.043	0.836
	Within	0.100	1	0.100	0.045	0.050
Derivative	Groups	27889 787	148	188 445		
Instruments	Total	27897.893	149		1	

	Between					
	Groups	1016.309	1	1016.309	2.933	0.088
	Within					
Percentage of	Groups	142390.907	411	346.45		
<b>Total Investment</b>	Total	143407.215	412			

The investment pattern of males and females was significantly different for fixed deposit. ANOVA results show F value of 5.062 with 0.025 level of significance (which is highly significant). The investment in insurance plan is also significantly different for males and females as the ANOVA results are highly significant. There is significant difference in investment of males and females for Gold assets as ANOVA results are highly significant (F=3.931) at 5 percent level of significance (0.048). Again significant difference is seen in the investment of bonds/debentures by males and females with F value of 7.07 which is highly significant. Total investments significantly differ for males and females with F value of 2.933 at 10 percent level of significance.

The respondents were further asked twenty five statements about the basics of derivatives and trading and this scale was termed as Derivatives Awareness Level (DAL). The purpose was to come up with a value of DAL which depicts level of awareness of investors in Indian market. The highest score in this category was 125. Table 10 shows results of multiple regression on derivation awareness level and various demographic variables. All potentially important variables were included in the regression analysis. By using enter method, it was found that seven independent variables constituted the optimum regression model. The evaluated regression model is highly significant the F rate 8.913 at 0 percent level significance. But the degree of explanation of the model is not very high as the adjusted  $R^2$  isonly 14.8 percent. Auto correlation of residuals is tested with the use of Durbin Watson test. Because of the calculated value of 1.876 and the table of critical values it appears that in the evaluated model there is no problem in auto correlation of residuals.

	Unstandardized Coefficients		Standardized Coefficients		
	В	Std. Error	Beta	Т	Sig.
(Constant)	52.114	7.868		6.623	0
Gender of the Respondent	-4.968	2.729	-0.09	-1.82	0.07
Nature of your Employment	1.586	0.931	0.084	1.704	0.089
Workplace Activity	-7.141	2.42	-0.146	-2.951	0.003
Educational Background	2.554	1.541	0.082	1.658	0.098
Experience in Derivatives Trading	5.019	1.525	0.166	3.291	0.001
Awareness about Financial Market	7.157	1.711	0.208	4.182	0
<b>Return Expectation</b>	3.106	1.595	0.096	1.948	0.052
Explanation of the	Model		Significance of the Model		odel
R	0.385		F	8.913	
R Square	0.148		Sig.	0	
Adjusted R Square	0.131				
Std. Error of the Estimate	21.271				
Durbin-Watson	1.876				

 Table 10 Regression Results of Derivative Awareness Level and Demographic Variables

# DAL = 52.114 - 4.968 (Gender) + 1.586 (Nature of employment) - 7.141 (workplace activity) + 2.554 (Education) +5.019 (Experience in derivation trading) + 7.157 (Awareness of financial market) + 3.106 (Return expectation)

Awareness about financial markets, experience in derivatives trading, workplace activity and return expectation are significantly associated with derivative awareness level (DAL) of respondents at 5 percent level of significance. Work place activity is inversely associated with DAL which means that the investors who work in finance related profiles have more DAL as compared to non-finance profile respondents. Gender of the respondent also has inverse association with DAL which indicates that men have higher DAL as compared to women. Gender, nature of employment and educational background also are significantly associated with derivatives awareness level of investor at 10 percent level of significance.

Table 11 shows results of SEM on statements related to perception of investors about future of derivatives market in India. The table shows factor loading of significant statements of the model. These include having an investor grievance redressal mechanism which is approachable under trading hours, steps to be taken by regulators to increase investments, conducting investor training and awareness programmes, global integration will happen, derivatives market will affect growth of the economy and consolidation of exchanges is required.

Consolidation of exchanges is required to enjoy the economies of scale			
To improve derivative market awareness, stock exchange or regulators should conduct investor training and awareness programmes.	0.236		
The Derivatives Exchange/Segment should have investor grievances redressal mechanism which could be approachable by every individual investor during trading hours.	0.444		
Regulators should take steps to increase investment in Indian derivatives market.	0.326		
With global integration of markets derivatives market is going to increase	0.234		
In future, growth of the economy will depend on the growth of derivatives market.	0.175		

Table 11 Construct Future of Derivatives Market by Structural Equation Modeling

Table 12 shows ANOVA results on demographic profile wise differences in perception about future of derivatives market in India. The results show that age-wise there is significant difference in the perception of investors about derivatives market in India (F=4.9400 at 1 percent level of significance). The results of DUNCAN post hoc test show that there is significant difference in age group of 35-50 years and 60 years and above respondents.

ANOVA results show significant difference in perception based on nature of employment. The F value 4.2120 is highly significant at 1 percent level of significance and DUNCAN Post hoc test shows differences in the perception of self-employed and government employee and unemployed category.

		Sum of	df	Mean	F	Sig.
		Squares		Square		
Gender	Between Groups	0.027065	1	0.027065	0.1336	0.7149
	Within	103.7151	512	0.202569		
	Groups					
	Total	103.7422	513			
	Between					
	Groups	2.938	3	0.979	4.9400	0.0020
Age	Within					
	Groups	100.92	509	0.198		
	Total	103.858	512			
	Between					
Natura of	Groups	3.342	4	0.835	4.2120	0.0020
Fmnloymont	Within					
Employment	Groups	100.359	506	0.198		
	Total	103.701	510			
	Between					
Westerless	Groups	0.013	1	0.013	0.0640	0.8000
workplace	Within					
Activity	Groups	101.825	502	0.203		
	Total	101.838	503			
Work Experience	Between					
	Groups	0.716	3	0.239	1.1810	0.3160
	Within					
	Groups	102.268	506	0.202		
	Total	102.984	509			
	Between					
Annual Family	Groups	1.231	2	0.615	3.0480	0.0480
	Within					
Income	Groups	101.148	501	0.202		
	Total	102.379	503			
	Between					
	Groups	1.309	3	0.436	2.1650	0.0910
Educational Background	Within					
	Groups	102.326	508	0.201		
	Total	103.635	511			
	Between					
Derivatives	Groups	16.448	91	0.181	0.8720	0.7850
Awareness	Within					
Level	Groups	86.457	417	0.207		
	Total	102.905	508			

 Table 12 Anova Results of Demographic Variables Differences in Perception of Investors about

 Future of Derivatives Market

There is significant difference in annual family income wise perception of respondents about future of derivatives market. The ANOVA results are significant at 5 percent level. The DUNCAN

test shows that investors in the category of 0-10 lakhs income have high opinion about future of derivatives market as compared to investors in 10-20 lakhs income category.

Rest all variables including gender, workplace activity, work experience, educational background and derivatives awareness level have non-significant difference about perception on future of derivatives market in India.

# 5. Conclusion

The study suggests that after the introduction of derivatives in the Indian financial markets, volatility of spot market has reduced. The final AR (1)-GARCH (1,1) model show that overall volatility has reduced in the spot market after the introduction of derivatives. In the model all variables are highly significant. Nifty Junior Returns have inverse relationship withNifty Returns and returns are lagged by two days. S&P 500 returns are also lagged by two days and have inverse relationship with Nifty returns. Both after introduction of futures and options volatility has reduced. But Options have greater impact on Nifty returns as its coefficient is higher than futures contract in the GARCH model. The above analysis shows that overall derivatives market has been able to achieve the purpose for which it was established. It has been able to reduce the volatility of the stock market over a period of more than a decade of its establishment.

The investment pattern in saving bank account government securities, pension funds, mutual fund, ETFs and derivative investments is also not significantly different for males and females. The investment pattern of males and females was significantly different for fixed deposit.Awareness about financial markets, experience in derivatives trading, workplace activity and return expectation are significantly associated with derivative awareness level (DAL) of respondents at 5 percent level of significance. Work place activity is inversely associated with DAL which means that the investors who work in finance related profiles have more DAL as compared to non-finance profile respondents. Gender of the respondent also has inverse association with DAL which indicates that men have higher DAL as compared to women. Gender, nature of employment and educational background also are significantly associated with derivatives awareness level of investor at 10 percent level of significance. Age of the respondents and the objective of investment in derivative market were found to be significantly related. Perception of investors about future of derivatives market in Indiainclude having an investor grievance redressal mechanism which is approachable under trading hours, steps to be taken by regulators to increase investments, conducting investor training and awareness programmes, global integration will happen, derivatives market will affect growth of the economy and consolidation of exchanges is required.

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