GROWTH OF NSE DERIVATIVE MARKET: AN EVIDENCE FROM INDIA

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Abstract

A derivative is a financial contract type whose value is based on an underlying asset, group of assets, or benchmark. The present study analyses the growth of exchange traded derivative market traded on the National Stock Exchange of India Limited (NSE). It has been found that all the sampled derivative instruments have grown significantly over the period of 16 year ranging from 2000 to 2017 Further, the comparative analysis of four exchange traded derivatives instruments, namely indexed futures, stock futures, indexed options and stock options with the help of various descriptive statistical tools. Ith has been observed taht volume of index futures have grown at the highest rate with CAGR of 59.94 percent during the sample period, followed by index options (45.22 percent), stock futures (43.10%) and stock options (33.14 percent). Stock options have least but most variant average turnover, however, stock futures have highest and the second least variant average turnover. The volume of Indexed futures grow at highest rate of percentage with CAGR 59.54%, followed by indexes options (45.22), stock futures (43.10%) and stock options (33.14%). The findings are quite useful for investors as well as policymakers.

Keywords: Derivatives, index futures, stock futures, index options, stock options, CAGR

1.   Introduction

A derivative is a financial contract type whose value is based on an underlying asset, group of assets, or benchmark. A derivative is an agreement made between two or more parties who can trade over-the-counter (OTC) or on an exchange. There are various types of derivative instruments. The derivatives that are not traded on any exchange are known as over the counter derivative contracts such as forwards and swaps. On the hand, the derivatives contracts that are traded on an exchange are known as exchange traded contracts such as futures and options. These contracts have their own risks and can be used to trade a wide range of assets. Derivative prices are based on changes in the underlying asset. These financial instruments can be traded to reduce risk and are frequently used to get access to specific markets. Derivatives can be used to either accept risk with the intention of receiving a similar reward or to mitigate risk (hedging) (speculation). The risk-averse can transfer risk (and the associated profits) to the risk-takers using derivatives.

According to section 2(ac) of Securities Contracts (Regulation) Act, 1956 (SCRA), as modified by the Finance Act, 2015, "Derivative" includes:-

a)   A security derived from a debt instrument, share, loan, whether secured or unsecured, risk instrument or contract for differences or any other form of security;

b)   A contract which derives its value from the prices, or index of prices, of underlying securities;

c)   Commodity derivatives; (inserted later by chapter VIII (Part II) of the Finance Act, 2015).

Such other instruments as may be declared by the Central Government to be derivatives (inserted later by chapter VIII (Part II) of the Finance Act, 2015).

The Indian derivatives market has existed since 1875. This year saw the launch of futures trading by the Bombay Cotton Trading Association. According to history, India's futures trading market grew considerably by 1900. However, the Indian government formally outlawed cash settlement and option trading in 1952, the year the country attained independence. The year 2000 saw an increase in the trading prohibition on commodities futures. It was made possible by the establishment of the National Electronics Commodity Exchange. The National Stock Exchange, an Indian trading exchange based on electronics, was founded in 1993. The Bombay Stock Exchange had been operating effectively for more than a century at that point. Forward trading was available on the BSE in the form of Badla trading, but officially derivatives trading began in its current form after 2001 only. The first derivative instrument launched by NSE was CNX Nifty index futures on 12th June 2000, based on underlying asset CNX Nifty 50 index. Later, BSE launched indexed futures derivative instrument on June 2000, base on BSE-30 index. After this yeat, both the started launching other variants of derivatives such as option index in June 2001 followed by stock options in July, 2001 and stock futures in November, 2001.

This paper analyses the growth of exchange traded derivative market traded on the National Stock Exchange of India Limited. Further, the comparative analysis of four exchange traded derivatives instruments, namely indexed futures, stock futures, indexed options and stock options with the help of various descriptive statistical tools

2.   Literature Review

Remolona (1992) Exchange traded derivatives' expansion was primarily driven by a demand for innovations that would increase liquidity, whereas OTC derivatives' rise was driven by a need for innovations that would transfer risk.

Bose (2006) analysed the exchange, commodity and equity derivatives market and found a significant increase in all volume of turnover, market participants and type of instruments.

Mihaljek and Packer (2010) Derivatives turnover has increased more quickly in emerging markets than in established nations. Of all risk categories, foreign exchange futures are the most frequently traded due to high currency movement in emerging market currencies and an increasing share of cross-border transactions. The offshore trading of several emerging market currency derivatives has increased along with the global reach of emerging Asia's financial centres. Trade, financial activity, and per capita income are all positively correlated with growth in derivatives turnover.

Masood and Chary (2016) found that that Indian commodity market has grown compounded at rate of 29 percent for value and 15 percent for volume. SEBI (2017) found that turnover in equity derivatives market in India has grown significantly at rate of 35.10 %.

SEBI (2017) has observed higher compounded annual growth rate (CAGR) for turnover in equity derivatives (35.10%) as compared to CAGR in turnover of equity cash segment (11.39 %)..

There is hardly any study that studied the growth and comparative analysis of Indian exchange traded derivatives instruments, namely index futures, stock futures, index options and stock options.

3. Research Methodology

3.1 Data Sources

In order to examine the growth of derivatives market in India, data related to various derivatives products has been retrieved from the official website of the National Stock Exchange of India Limited. The data for Index futures, Stock Futures, Index options and Stock options have been collected from 1st April 2001 to 31st March 2017. Since, derivatives market in India began in 2001, therefore, for the purpose of analysis data collected from year 2001.

3.2 Methodology: For the purpose of analysis, the following statistical tools have been used in the present study

a)   **Average**

The average is one of the measurements of central tendency. Average is nothing but mean of the values in the given set. It indicates that values in a particular data set are distributed equally. It is calculated by dividing the sum of all observations with the total number of observations.
Average = Sum of all the observations/Total number of observations

b)   **Standard Deviation**

The standard deviation is a metric that reveals how much variance from the mean there is, including spread or dispersion. In other words, it determines how much the values deviate from the mean. The most popular way to assess dispersion is standard deviation, which is based on all values.

$$\textbf{S.D}= \sqrt{\frac{1}{n-1}} \sum_{i=1}^{n} \quad (x_i - x)^2$$

Here,
n= Number of observations in the sample
x_i = ith observations in the sample
x= Sample Average

c)   **Coefficient of variation**

The relative measure for comparing the variation of two or more than two series is known as the coefficient of variation (C.V.). It is the ratio of standard deviation to the average of the series. It is usually expressed in percentage. The higher the coefficient of variation indicates the greater level of dispersion around the average or mean and vice-versa.

C.V= (Standard Deviation/Average)*100

d)   **Compound Annual Growth Rate**

The annualised average rate of revenue growth between two specified years is known as the compound annual growth rate (CAGR), assuming that growth occurs at an exponential compounding rate. The following formula is used to determine the CAGR

CAGR= [(value in X year/value in Y year) ^ (1/N)-1]
Here,
X year = End Year of the sample period
Y year = beginning year of the sample period
N = the number of years between X and Y years:

4. Results
Table 4.1 shows the percentage change and growth of Index Futures traded on NSE in terms of two bases, namely number of contracts and turnover. The important things observed from the table are the following. Firstly, number of contracts of index futures witnessed a significant increase from 90580 in 2000-01 to 66535070 in 2016-17, showing the compound annual growth rate of 51.05%.On the other hand, the turnover of index futures showed a significant increase from 2365 crore to 4335940 crore during the sample period, showing the CAGR of 59.94%. Secondly, the number of contacts as well as volume of index futures contracts remains positive throughout the sample period with some exception.

Table 4.1: Growth and Percentage Change in Index Futures

Year	Index Futures			
	No. of contracts	**Percentage Change**	**Turnover (Rs Crore)**	**Percentage Change**
2000-01	90580	-	2365	-
2001-02	1025588	1032.245529	21483	808.372093
2002-03	2126763	107.3701135	43952	104.5896756
2003-04	17191668	708.3490262	554446	1161.480706
2004-05	21635449	25.84845752	772147	39.26459926
2005-06	58537886	170.5646922	1513755	96.04492409
2006-07	81487424	39.20458966	2539574	67.7665144
2007-08	156598579	92.17514963	3820667.27	50.44520341
2008-09	210428103	34.37420974	3570111.4	-6.557908666
2009-10	178306889	-15.2646978	3934388.67	10.2035267
2010-11	165023653	-7.44964823	4356754.53	10.73523476
2011-12	146188740	-11.41346265	3577998.41	-17.87468435
2012-13	96100385	-34.26279958	2527130.76	-29.37026599
2013-14	105252983	9.523997224	3083103.23	22.00014652
2014-15	129303044	22.84976664	4107215.2	33.21692119

2015-16	140538674	8.6893778	4557113.64	10.95385603
2016-17	66535070	-52.65710989	4335940.78	-4.853354063
Total	1576371478		43318145.89	
Mean	92727734		2548126.229	
S.D.	68499063.16		1699293.911	
C.V	73.87%		66.69%	
CAGR	51.05%		59.94%	

Source: National Stock Exchange India Limited

Table 4.2 shows the percentage change and growth of Stock Futures traded on NSE in terms of two bases, namely number of contracts and turnover. The important things observed from the table are the following. Firstly, number of contracts of stock futures witnessed a significant increase from 1957856 in 2001-02 to 173860130 in 2016-17, showing the compound annual growth rate of 34.86%.On the other hand, the turnover of stock futures showed a significant increase from 51515 crore to 11129587 crore during the sample period, showing the CAGR of 43.10%. Secondly, the number of contacts as well as volume of stock futures contracts remains positive throughout the sample period with some exception.

Table 4.2: Growth and Percentage Change in Stock Futures

	Stock Futures			
Year	No. of contracts	Percentage Change	Turnover (Rs Crore)	Percentage Change
2000-01	-	-	-	-
2001-02	1957856	-	51515	-
2002-03	10676843	445.333416	286533	456.212754
2003-04	32368842	203.168661	1305939	355.772634
2004-05	47043066	45.3344114	1484056	13.6389985
2005-06	80905493	71.9817603	2791697	88.1126453
2006-07	104955401	29.7259273	3830967	37.2271776
2007-08	203587952	93.9756793	7548563.23	97.0406748
2008-09	221577980	8.8364895	3479642.12	-53.903253
2009-10	145591240	-34.293453	5195246.64	49.3040508
2010-11	186041459	27.7834154	5495756.7	5.78432711
2011-12	158344617	-14.887457	4074670.73	-25.857876
2012-13	147711691	-6.7150537	4223872.02	3.66167722
2013-14	170414186	15.3694639	4949281.72	17.1740454
2014-15	237604741	39.4277945	8291766.27	67.5347402
2015-16	234243967	-1.4144389	7828606	-5.5857854
2016-17	173860130	-25.778182	11129587.1	42.1656313
Total	2156885464		71967699.6	
Mean	134805342		4497981.22	
S.D.	79170580.7		3075531.54	

C.V	58.73%		68.38%	
CAGR	34.86%		43.10%	

Source: National Stock Exchange India Limited

Table 4.3 shows the percentage change and growth of Index Options Futures traded on NSE in terms of two bases, namely number of contracts and turnover. The important things observed from the table are the following. Firstly, number of contracts of index options witnessed a significant increase from 175900 in 2001-02 to 1067244916 in 2016-17, showing the compound annual growth rate of 78.73%.On the other hand, the turnover of index options showed a significant increase from 1299 crore to 350021crore during the sample period, showing the CAGR of 45.22%. Secondly, the number of contacts as well as volume of index options contracts remains positive throughout the sample period with some exception.

Table 4.3: Growth and Percentage Change in Index Options

Year	Index Options			
	No. of contracts	Percentage Change	Premium Turnover (Rs Crore)	Percentage Change
2000-01	-	-	-	-
2001-02	175900	-	1299	-
2002-03	442241	151.4161455	112.7	-91.324095
2003-04	1732414	291.7352756	991.48	779.751553
2004-05	3293558	90.11379497	2356.98	137.723403
2005-06	12935116	292.739888	5770.52	144.826855
2006-07	25157438	94.48946573	17650.87	205.880059
2007-08	55366038	120.0782051	29286.09	65.9186771
2008-09	212088444	283.0659582	91715.58	213.171133
2009-10	341379523	60.96092581	124416.58	35.6547928
2010-11	650638557	90.59097373	192637.87	54.8329572
2011-12	864017736	32.795348	253068.22	31.3699222
2012-13	820877149	-4.993021	184383.24	-27.140895
2013-14	928565175	13.11865315	244090.71	32.3822653
2014-15	1378642863	48.47023129	265315.63	8.69550504
2015-16	1623528486	17.76280352	351221.01	32.3785598
2016-17	1067244916	-34.2638626	350021.53	-0.3415172
Total	7986085554		2114338.01	
Mean	499130347.1		132146.1256	
S.D.	551407041.2		130816.5132	
C.V	110.47%		98.99%	
CAGR	78.73%		45.22%	

Source: National Stock Exchange India Limited

Table 4.4 shows the percentage change and growth of Stock Options traded on NSE in terms of two bases, namely number of contracts and turnover. The important things observed from the table are the following. Firstly, number of contracts of stock options witnessed a significant increase from 1037529 in 2001-02 to 92106012 in 2016-17, showing the compound annual growth rate of 34.86%.On the other hand, the turnover of stock options showed a significant increase from 1305 crore to 404473 crore during the sample period, showing the CAGR of 33.14%. Secondly, the number of contacts as well as volume of stock options contracts remains positive throughout the sample period with some exception.

Table 4.4: Growth and Percentage Change in Stock Options

Year	Stock Options			
	No. of contracts	Percentage Change	Premium Turnover**	Percentage Change
2000-01	-	-	-	-
2001-02	1037529	-	1305.23	-
2002-03	3523062	239.5627496	3033.97	132.4471549
2003-04	5583071	58.47211886	8054.86	165.4891116
2004-05	5045112	-9.635539294	4948.95	-38.55945355
2005-06	5240776	3.87828853	4895.23	-1.085482779
2006-07	5283310	0.811597366	5904.31	20.61353603
2007-08	9460631	79.06636181	13581.77	130.0314516
2008-09	13295970	40.53999147	8250.53	-39.25291033
2009-10	14016270	5.417430996	15272.89	85.11404722
2010-11	32508393	131.9332676	20474.97	34.06087518
2011-12	36494371	12.26138124	19612.93	-4.210213739
2012-13	66778193	82.98217278	34288.56	74.82630081
2013-14	80174431	20.06079739	46428.41	35.40495722
2014-15	91479209	14.10022854	61732.59	32.96296384
2015-16	100299174	9.641496791	61118.39	-0.994936386
2016-17	92106012	-8.168723304	95570.09	56.36879505
Total	562325514		404473.68	
Mean	35145344.63		25279.605	
S.D.	37428062.71		27368.07635	
C.V	106.50%		108.26%	
CAGR	34.86%		33.14%	

Source: National Stock Exchange India Limited

Table 4.5 Comparative Analysis of Equity Derivative Instruments

Tools	Index Futures	Stock Futures	Index Options	Stock Options
Number of Contracts				
Mean	92727734	134805341.5	499130347.1	35145344.63
S.D.	68499063.16	79170580.68	551407041.2	37428062.71
C.V	73.87%	58.73%	110.47%	106.50%
CAGR	51.05%	34.86%	78.73%	34.86%
Volumes (Rs. Crore)				
Mean	2548126.229	4497981.223	132146.1256	25279.605
S.D.	1699293.911	3075531.541	130816.5132	27368.07635
C.V	66.69%	68.38%	98.99%	108.26%
CAGR	59.94%	43.10%	45.22%	33.14%

The Table 4.5 shows the descriptive statistics of various equity derivative instruments. Among all the four instruments, volume of index futures have grown at the highest rate with CAGR of 59.94 percent during the sample period, followed by index options (45.22 percent), stock futures (43.10%) and stock options (33.14 percent). Stock options have least but most variant average turnover, however, stock futures have highest and the second least variant average turnover. The volume of Indexed futures grow at highest rate of percentage with CAGR 59.54%, followed by indexes options (45.22), stock futures (43.10%) and stock options (33.14%) Just like turnovers, the aforementioned instruments concluded the same results when compared in terms of mean, coefficient of variation and CAGR of the number of contracts of selected derivative instruments.

5. Conclusion

A derivative is a financial contract type whose value is based on an underlying asset, group of assets, or benchmark. The present study analyses the growth of exchange traded derivative market traded on the National Stock Exchange of India Limited (NSE). It has been found that all the sampled derivative instruments have grown significantly over the period of 16 year ranging from 2000 to 2017 Further, the comparative analysis of four exchange traded derivatives instruments, namely indexed futures, stock futures, indexed options and stock options with the help of various descriptive statistical tools. Ith has been observed that volume of index futures have grown at the highest rate with CAGR of 59.94 percent during the sample period, followed by index options (45.22 percent), stock futures (43.10%) and stock options (33.14 percent). Stock options have least but most variant average turnover, however, stock futures have highest and the second least variant average turnover. The volumes of Indexed futures grow at highest rate of percentage with CAGR 59.54%, followed by indexes options (45.22), stock futures (43.10%) and stock options (33.14%). The findings are quite useful for investors as well as policymakers.

References

1.	Bose, S. (2006). The Indian derivatives market revisited. *Money & Finance, 2,* 24-25.
2.	Masood, S. & Chary,T. (2016). Performance of commodity derivatives market in India. *Amity Journal of Finance. 1(1),* 131-148.
3.	Mihaljek, D., & Packer, F. (2010). Derivatives in emerging markets. *BIS Quarterly Review, December*.
4.	Remolona, E. M. (1992). The recent growth of financial derivative markets. *QUARTERLY REVIEW-FEDERAL RESERVE BANK OF NEW YORK*, *17*, 28-28.
5.	SEBI. (2017). *Discussion paper on growth and development of equity derivatives market in India.https://www.sebi.gov.in/reports/reports/jul-2017/discussion-paper-on-growth-and-development-of-equity-derivative-market-in-india_35295.html*

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