INDIA: THE NEXT FOREX DERIVATIVES DESTINATION?

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ABSTRACT

India has grown as a deep and liquid FOREX market over the years. The Indian financial system has evolved impressively in the recent past, especially after liberalization. India is relatively less susceptible to global crises than most other countries. This can be attributed to the robust banking system in India. The Reserve Bank of India (RBI) is the apex body in India which regulates the financial system in India. The RBI, in conjunction with the Securities and Exchange Board of India (SEBI), regulates the financial markets in India. The financial markets have a number of segments and one such segment is the Derivatives segment. The present work focuses on the Derivatives market in India with special focus on Foreign Exchange (FOREX) Derivatives, its evolution in India, current scenario and future outlook.

DERIVATIVES IN INDIA

BACKGROUND

Derivatives in India are not new. Farmers used to enter into Forward contracts to hedge risk against their crops since long. However, there was always a risk of the counter-party defaulting on the contract (which remains even today in case of OTC markets). India is a conservative country and Indians are very careful and cautious when it comes to matters related to money. It has been traditionally observed that Indians tend to resort to safe ways of making money. For ex: keeping money in bank deposits, PPF, NSC etc. However, that outlook is slowly changing now. With the knowledge base of the people increasing by the day and owing to higher return on the money in the capital markets, people have started investing money in it. Derivatives market is no different. Derivatives are primarily used for hedging. With the commencement of options, it is now possible to limit one's losses to a certain amount. Given below is a snapshot of the evolution of derivatives market in India.

Date	Progress
14 December 1995	NSE asked SEBI for permission to trade index futures
18 November 1996	SEBI sets up L. C. Gupta Committee to draft a policy framework for index futures
11 May 1998	L. C. Gupta Committee submitted report
7 July 1999	RBI gave permission for OTC forward rate agreements (FRAs) and interest rate swaps
24 May 2000	SIMEX hose Nifty for trading futures and options on an Indian index
25 May 2000	SEBI gave permission to NSE and BSE to do index futures trading
9 June 2000	Trading of BSE Sensex futures commenced at BSE
12 June 2000	Trading of Nifty futures commenced at NSE
31 August 2000	Trading of futures and options on Nifty to commence at SIMEX
June 2001	Trading of Equity index options at NSE
July 2001	Trading of stock options at NSE
9 November 2002	Trading of single stock futures at BSE

June 2003	Trading of Interest Rate futures at NSE
13 September 2004	Weekly options at BSE
1 January 2008	Trading of chhota(Mini) Sensex at BSE
1 January 2008	Trading of Mini Index futures & options at NSE
29 August 2008	Trading of currency futures at NSE
2 October 2008	Trading of currency futures at BSE
7 August 2009	BSE-USE form alliance to develop currency and interest rate derivatives markets
February 2010	Launch of Currency futures on additional currency pairs
29 October 2010	Introduction of Currency options on USD INR

Source:Compiled from BSE and NSE website

As seen from the above snapshot, deliberations for trading in derivatives have been going on for quite long and that the derivative products have been introduced in India in a phased manner. However, derivative market in India is still at its nascent stage and has a lot of potential to expand. BSE and NSE are two main exchanges on which derivatives are traded (USE is the recent exchange which has formed alliance with BSE to develop currency and interest rates derivatives markets) but NSE has more than 96% of the volumes of the derivatives which are traded in India. Let us now have a look at the products traded in the derivatives segment in BSE and NSE separately.

Products traded in Derivatives segment of BSE

S. No.	Product Traded with underlying asset	Introduction Date
1	Index Futures – Sensex	June 9 2000
2	Index Options – Sensex	June 1 2000
3	Stock Options on 109 Stocks	July 9 2001
4	Stock futures on 109 Stocks	November 9 2002
5	Weekly Option on 4 Stocks	September 13 2004
6	Chhota (mini) Sensex	January 1 2008
7	Futures & Options on sectoral indices namely BSE TECK, BSE FMCG, BSE Metal, BSE Bankex and BSE Oil & Gas	N.A.
8	Currency Futures on US Dollar Rupee	October 1 2008
9	Currency Options on US Dollar Rupee (launched on USE)	October 29 2010

Source: Compiled from BSE website

Products traded in Derivatives (F&O) segment of NSE

S. No.	Product Traded with underlying asset	Introduction Date
1	Index Futures – S&P CNX Nifty	June 12 2000
2	Index Options – S&P CNX Nifty	June 4 2001
3	Stock Options on 233 Stocks	July 2 2001
4	Stock futures on 233 Stocks	November 9 2001
5	Interest Rate Futures – T- Bills and 10 Years Bond	June 23 2003
6	CNX IT Futures & Options	August 29 2003
7	Bank Nifty Futures & Options	June 13 2005
8	CNX Nifty Junior Futures & Options	June 1 2007
9	CNX 100 Futures & Options	June 1 2007

10	Nifty Midcap 50 Futures & Options	October 5 2007
11	Mini index Futures & Options – S&P CNX Nifty index	January 1 2008
12	Long term Option contracts on S&P CNX Nifty index	March 3 2008
13	Currency Futures on US Dollar Rupee	August 29 2008
14	S&P CNX Defty Futures & Options	December 10 2008
15	Currency Options on US Dollar Rupee	October 29 2010

Source: Compiled from NSE website

NSE has been very active in the derivatives segment and number of products traded on NSE is more than that traded on BSE. A number of derivative products have been introduced in India as can be seen from the above tables. Index and stock futures and options were the first products to be traded and recently the RBI allowed the trading of currency derivatives in India.

Business growth of Derivatives

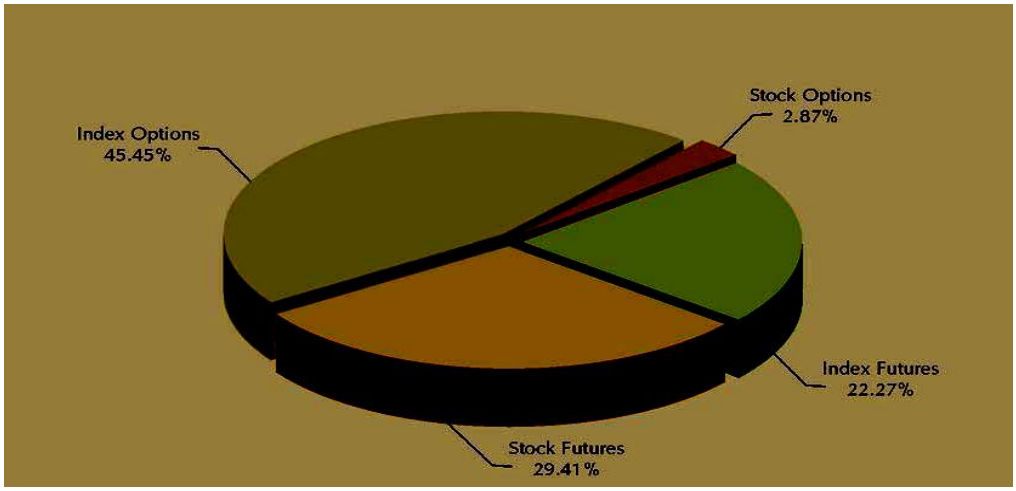
Year	Index Futures		Stock Futures		Index Options		Stock Options		Total		Average Daily Turnover (₹ cr.)
	No. of contracts	Turnover (₹ cr.)	No. of contracts	Turnover (₹ cr.)	No. of contracts	Notional Turnover (₹ cr.)	No. of contracts	Notional Turnover (₹ cr.)	No. of contracts	Turnover (₹ cr.)	
2011-12	28335422	745169.96	33363538	862171.65	160090747	4531302.96	6653288	180998.38	228442995	6319642.87	114902.60
2010-11	165023653	4356754.53	186041459	5495756.70	650638557	18365365.76	32508393	1030344.21	1034212062	29248221.09	115150.48
2009-10	178306889	3934388.67	145591240	5195246.64	341379523	8027964.20	14016270	506065.18	679293922	17663664.57	72392.07
2008-09	210428103	3570111.40	221577980	3479642.12	212088444	3731501.84	13295970	229226.81	657390497	11010482.20	45310.63
2007-08	156598579	3820667.27	203587952	7548563.23	55366038	1362110.88	9460631	359136.55	425013200	13090477.75	52153.30
2006-07	81487424	2539574	10495501	3830967	25157438	791906	5283310	193795	216883573	7356242	29543
2005-06	58537886	1513755	80905493	2791697	12935116	338469	5240776	180253	157619271	4824174	19220
2004-05	21635449	772147	47043066	1484056	3293558	121943	5045112	168836	77017185	2546982	10107
2003-04	17191668	554446	32368842	1305939	1732414	52816	5583071	217207	56886776	2130610	8388
2002-03	2126763	43952	10676843	286533	442241	9246	3523062	100131	16768909	439862	1752
2001-02	1025588	21483	1957856	51515	175900	3765	1037529	25163	4196873	101926	410
2000-01	90580	2365	-	-	-	-	-	-	90580	2365	11

Source: Compiled from NSE & BSE websites

The derivative market has grown quite substantially during the last decade. The table above shows the turnover of the derivatives segment of the market since its inception. The growth is almost exponential and the market has grown leaps and bounds from 2000 to 2012(an increase of 2, 67, 115 % in the total turnover over the specified period). The average daily turnover has

increased by 10, 44, 469 %. Both the total and average daily turnovers have shown a slight dip from 2007-08 to 2008-09 when the sub-prime crisis had hit the US markets and consequently all the markets world over. A chapter on 'Analysis of Derivatives turnover' towards the end has been devoted to carry out the mathematical analysis of the derivatives market.

Product wise turnover of F&O at NSE



Most of the derivatives market in F&O is dominated by Index options. This is followed up by stock futures, index futures and stock options. Index options are the clear leader in the product-wise turnover of futures and options segment in NSE during 2009-10. The turnover in the index options category was 45.45% of the total turnover in the F&O segmentof NSE, followed by stock futures and index futures which saw a y-o-y growth of 29.41% and 22.27% respectively (in 2009-10 compared to the previous year). This trend continued in the first-half of 2010-11 with Index options constituting around 58% of the total turnoverin this segment. The turnover of index options zoomed by 111% during the first-half of 2010-11 compared to thecorresponding period in the previous fiscal.

NSE Cash & Derivatives Segment Turnover
(In Rs. Cr)

Year	Cash Segment	Derivatives Segment
2009-10	41, 38, 023	1, 76, 63, 666
2008-09	27, 52, 023	1, 10, 10, 483
2007-08	35, 51, 038	1, 30, 90, 477.75
2006-07	19, 45, 285	73, 56, 242
2005-06	15, 69, 556	48, 24, 174
2004-05	11, 40, 071	25, 46, 982
2003-04	10, 99, 535	21, 30, 610
2002-03	6, 17, 989	4, 39, 862
2001-02	5, 13, 167	1, 01, 926
2000-01	13, 39, 510	2, 365

Source: Compiled from NSE website

From the above table, it is pretty clear that derivatives segment has grown at a much faster pace than the cash segment. While the increase in the derivatives segment from 2000-01 to 2009-10 is an astonishing 7, 46, 778 % (Yes, it is seven lakh forty six thousand seven hundred and seventy

eight percent!!) it is only 209 % for the cash segment. This is a clear indication of the dominance of the derivatives segment over the cash segment.

Product wise Derivatives Turnover at NSE and BSE
(In Rs. Cr)

Year	Index Future		Index Option		Stock Option		Stock Future	
	NSE	BSE	NSE	BSE	NSE	BSE	NSE	BSE
2009-10	39, 34, 389	96	80, 27, 964	138	1, 40, 16, 270	0	51, 95, 247	0
2008-09	35, 70, 111	11, 257	37, 31, 502	9	1, 32, 95, 970	0	34, 79, 642	9
2007-08	38, 20, 667	2, 34, 660	13, 62, 111	39	94, 60, 631	15	75, 48, 563	7, 609
2006-07	25, 39, 575	55, 491	7, 91, 913	0.06	52, 83, 310	6	38, 30, 972	3, 516

Source: Compiled from SEBI Annual reports

The product wise Derivatives turnover shown above re-iterates the fact that turnover of Derivatives at BSE is far less than the turnover of Derivatives at NSE. A closer examination of the table reveals that Index option has grown the most over the given years: be it on NSE or on BSE. Also, BSE is becoming less and less inactive in the derivatives segment.

Number of Contracts traded at NSE & BSE Derivatives Segment

Year	Number of Contracts	
	NSE	BSE
2009-10	67, 92, 93, 922	9, 028
2008-09	65, 73, 90, 497	5, 15, 588
2007-08	42, 50, 13, 200	74, 53, 371
2006-07	21, 68, 83, 573	15, 45, 169
2005-06	15, 76, 19, 271	103
2004-05	77, 017, 185	5, 31, 719
2003-04	5, 68, 86, 776	3, 82, 258

Source: Compiled from SEBI Annual reports

BSE Cash & Derivatives Segment Turnover
(In Rs. Cr)

Year	Cash Segment	Derivatives Segment
2009-10	1, 37, 881	234.13
2008-09	1, 10, 008	12, 266
2007-08	15, 78, 857	2, 42, 309
2006-07	9, 56, 185	59, 006
2005-06	8, 16, 074	9
2004-05	5, 18, 715	16, 112
2003-04	5, 03, 053	12, 452
2002-03	3, 14, 073	2, 478
2001-02	3, 07, 292	1, 922
2000-01	10, 00, 032	1, 673

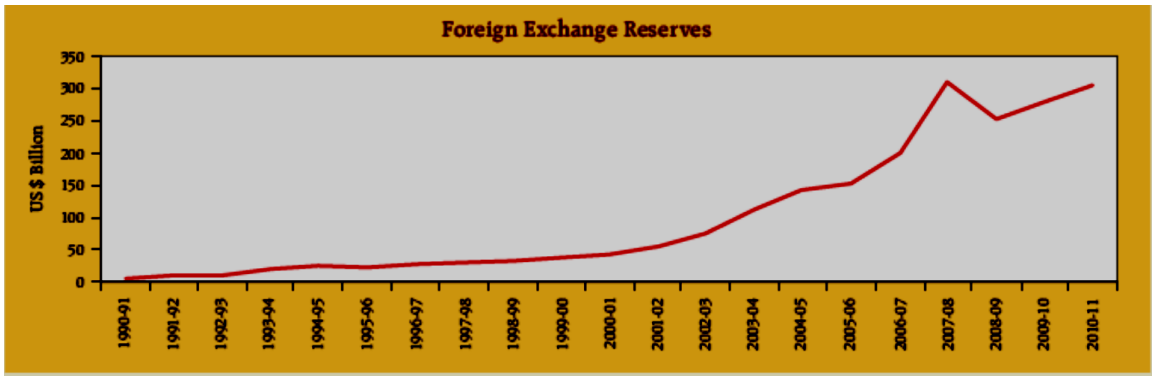
Source: Compiled from SEBI Annual reports

As is mentioned earlier, the Derivatives segment is more pronounced on the NSE than on BSE. From the tables above, it is seen that the Derivatives segment of BSE has grown by 14, 383 % (till 2007-08) whereas it is in lakhs of percentage increase for the Derivatives segment on the NSE. In fact, from 2007-08 onward, the Derivatives segment on BSE has actually declined in value terms. However, it is very clear that the Derivatives market has a huge potential in India.

FOREX DERIVATIVES IN INDIA

FOREX RESERVES IN INDIA

Now that we have seen the status of the overall Derivatives market in India, let us look at the development of FOREX Derivatives in India. With the advent of liberalization, money from other countries started flowing in India. The diagram below shows the FOREX Reserves in India since 1991. The FOREX Reserves have increased over the years and at present amount to around US $ 300 bn.



Source: RBI monthly bulletin May 2011 issue

FOREX Derivatives in India have been growing at a steady pace. The percentage share of India in the world FOREX Derivatives is very low. The table below gives the share of India in percentage terms.

India's share in the global FOREX Derivatives Market

Year	Percentage share of India
1998	0.1
2001	0.2
2004	0.3
2007	0.7
2010	0.9

Source: BIS Triennial Survey, 2010

The table clearly indicates that share of India in the global derivatives market is very low (almost negligible). However, it may be noted that the percentage share of India is nevertheless, increasing. The FOREX derivatives products that are traded in India are: Forwards, Options, Swaps, Currency futures and Currency Options.

Given below is the table showing business growth in Currency Futures in India

Month/ Year	USDINR		EURINR		JPYINR		GBPINR		USDINR	EURINR	JPYINR	GBPINR
	No. of Contracts	Traded Value (Notional) in ₹ mn	No. of Contracts	Traded Value (Notional) in ₹ mn	No. of Contracts	Traded Value (Notional) in ₹ mn	No. of Contracts	Traded Value (Notional) in ₹ mn	Currency Futures Open Interest (No. of contracts) as on last trading day of the respective month			
Apr-09	7,851,502	393,857							206,620			
May-09	13,682,468	664,315							318,203			
Jun-09	15,724,507	753,627							267,400			
Jul-09	19,888,011	965,229							318,298			
Aug-09	18,672,623	903,957							394,756			
Sep-09	22,251,896	1,077,888							360,603			
Oct-09	32,267,958	1,508,430							447,812			
Nov-09	33,794,926	1,575,541							493,018			
Dec-09	41,004,341	1,914,147							406,200			
Jan-10	60,223,714	2,767,419							615,612			
Feb-10	49,093,914	2,276,337	2,888,980	184,164	53,026	2718	76,265	5533	622,656	9,930	968	3,911
Mar-10	58,039,720	2,642,413	2,820,999	174,620	146,393	7273	125,740	8613	407,390	11,980	1,810	6,693
2009-10	**372,495,580**	**17,443,161**	**5,709,979**	**358,783**	**199,419**	**9,991**	**202,005**	**14,146**	**4,858,568**	**21,910**	**2,778**	**10,604**
Apr-10	75,411,437	3,359,080	1,608,481	95,989	9,786	467	55,463	3786	563,226	21,834	538	5,655
May-10	75,021,152	3,438,519	2,591,211	149,680	17,842	903	114,665	7696	762,391	20,192	1,542	4,029
Jun-10	68,341,107	3,187,766	1,371,201	78,212	46,094	2383	79,131	5465	944,121	19,395	6,281	7,341
Jul-10	43,199,013	2,028,844	1,538,240	92,370	62,361	3343	125,240	8977	826,468	22,412	3,535	5,765
Aug-10	41,273,073	1,929,224	1,190,935	71,785	79,854	4379	95,776	7003	908,783	20,866	10,667	4,106
Sep-10	60,535,055	2,783,444	748,696	45,116	191,847	10522	110,876	7959	800,905	23,760	14,099	4,146
April-September 2010	**363,780,837**	**16,726,876**	**9,048,764**	**533,152**	**407,784**	**21,998**	**581,151**	**40,886**	**4,805,894**	**128,459**	**36,662**	**31,042**

Source: NSE
Note:
Currency Futures on Additional Currency Pairs were introduced w.e.f February 01, 2010. (New currency pairs EUR-INR, GBP-INR and JPY-INR futures contracts)

After an impressive start in the latter half of 2008, the Currency futures on the NSE witnessed exponential growthduring 2009-10 and continued to flourish in the first-half of 2010-11. Table above presents the growth in the currencyfutures volumes and open interest on the NSE. The number of traded contracts and the trading value in this segment hasincreased by more than ten-times each in 2009-10, compared to that of 2008-09. Similarly, the trading volumes in thecurrency futures segment grew by around 260% in the first-half of 2010-11 compared to the corresponding period in2009-10. The average daily trading volume zoomed to INR1, 55,

805crores in 2009-10 compared to INR 1, 167 croresin 2008-09. During April-September 2010-11, the average daily trading volume whizzed to INR13, 533crores.

During 2009-10, total turnover was the highest at MCX-SX (INR 19,44, 654 crore) followed by NSE (INR 17,82,609 crore) and BSE (Rs.0.04 crore) At NSE, the share of top ten members in volumes of currency derivatives segment increased to 72.1 percent at the end of March 2010 from 56.8 percent at the end of March 2009. Their share in open interest of currency derivatives segment was 35.3 percent at the end of March 2010 as compared to 34.3 percent at the end of March 2009. The share of top ten members in volumes and open interest at MCX-SX were 60.5 percent and 35.9 percent, respectively at the end of March 2010. In BSE, the share of top ten members in volume and open interest fell to zero after being 100 percent in May 2009. For details, please refer to the tables given on the next page:

Table : Trends in the Currency Futures Segment

Month/ Year	MCX-SX			NSE			BSE		
	No. of Contracts Traded	Turnover (Rs.crore)	Open interest at the end of Month	No. of Contracts Traded	Turnover (Rs.crore)	Open interest at the end of Month	No. of Contracts Traded	Turnover (Rs.crore)	Open interest at the end of Month
1	2	3	4	5	6	7	8	9	10
2008-09	2,98,47,569	1,48,826	990	3,27,38,566	1,62,563	1,313	1,82,469	869	0
2009-10	40,81,66,278	19,44,654	1,951	37,86,06,983	17,82,609	1,964	8	0.04	0
Apr-09	75,47,128	37,858	532	78,51,502	39,386	1,039	2	0.01	0
May-09	1,20,53,551	58,469	987	1,36,82,468	66,431	1,504	6	0.03	0
Jun-09	1,41,98,087	67,985	931	1,57,24,507	75,363	1,285	0	0	0
Jul-09	1,81,88,940	88,290	1,665	1,98,88,011	96,523	1,531	0	0	0
Aug-09	1,86,48,790	90,292	2,363	1,86,72,623	90,396	1,933	0	0	0
Sep-09	2,26,36,371	1,09,666	1,992	2,22,51,896	1,07,789	1,739	0	0	0
Oct-09	3,28,49,655	1,53,630	2,235	3,22,67,958	1,50,843	2,109	0	0	0
Nov-09	3,46,66,197	1,61,641	2,340	3,37,94,926	1,57,554	2,297	0	0	0
Dec-09	4,25,13,360	1,98,498	1,985	4,10,04,341	1,91,415	1,896	0	0	0
Jan-10	6,35,91,431	2,92,345	2,758	6,02,23,714	2,76,742	2,852	0	0	0
Feb-10	6,47,73,311	3,22,635	2,531	5,21,12,185	2,46,875	2,976	0	0	0
Mar-10	7,64,99,457	3,63,345	1,951	6,11,32,852	2,83,292	1,964	0	0	0

Source: NSE, BSE, MCX-SX.

Table : Share of Top 10 members in Currency Derivatives Segment of NSE, BSE and MCX-SX

(Percent)

Year/Month	Share of top 10 members in percentage					
	NSE		BSE		MCX-SX	
	Open Interest	Volume	Open Interest	Volume	Open Interest	Volume
1	2	3	4	5	6	7
2008-09	**36.59**	**50.62**	**99.80**	**99.79**	**53.77**	**59.75**
2009-10	**36.52**	**69.38**	**100.00**	**100.00**	**35.87**	**53.19**
Apr-09	39.23	57.53	100.00	100.00	43.57	68.32
May-09	41.41	57.34	100.00	100.00	60.51	70.28
Jun-09	44.53	60.20	0.00	0.00	56.20	67.19
Jul-09	40.68	62.72	0.00	0.00	55.50	62.35
Aug-09	45.26	65.48	0.00	0.00	51.17	54.12
Sep-09	42.91	69.37	0.00	0.00	48.69	55.19
Oct-09	42.09	74.92	0.00	0.00	50.77	53.27
Nov-09	42.79	74.47	0.00	0.00	47.46	54.03
Dec-09	43.43	77.14	0.00	0.00	45.95	63.02
Jan-10	39.64	77.49	0.00	0.00	41.46	63.30
Feb-10	40.92	69.40	0.00	0.00	46.17	60.10
Mar-10	35.28	72.04	0.00	0.00	35.87	60.53

Source: NSE, BSE, MCX-SX.

Comparison between OTC Currency Forward Market and Futures on USD/INR

We have already dealt with OTC and exchange traded markets. Let us now have a look at the size of FOREX derivatives in these markets. As stated earlier, Forwards contracts are traded on OTC market and Futures on the Exchange traded market. Here we will look at the comparison between OTC Currency Forward Market and Futures on USD/INR. Currency Futures trading (USD/INR) started in India on August 29, 2008. However, trading takes place mainly on NSE and MCX-SX. Let us first have o look at the turnover in USD/INR Futures in comparison to turnover in OTC Forward market. Have a look at the table below:

Month	**Forward turnover INR/ other currency ($ billion)**	**Exchange (NSE + MCX-SX) turnover ($ billion)**	**Exchange (NSE + MCX-SX) turnover as a percentage of OTC Forward turnover**
November 2008	87.77	6.30	7.19
December 2008	89.60	9.38	10.50
January 2009	65.66	9.89	15.09
February 2009	61.29	12.92	21.10
March 2009	92.04	19.40	21.13
April 2009	73.24	15.40	21.07
May 2009	75.10	25.74	34.31
June 2009	76.21	29.92	39.26
July 2009	65.35	38.08	58.27
August 2009	62.62	37.32	59.60
September 2009	62.22	44.89	72.15
October 2009 *	80.99	65.12	80.40

Source: RBI, NSE, MCX-SX (BSE has no trading in Currency Derivatives products) * Data for OTC market available till October 2009

As seen from the table shown, the percentage of Futures turnover as a percentage of OTC Forward turnovers is increasing month by month. The percentage share has already reached a significant level (80.40 in October 2009). Thus, there is a *'shift'* as far as trading in OTC and Exchanges is concerned and the shift is positively towards the Exchange traded market.

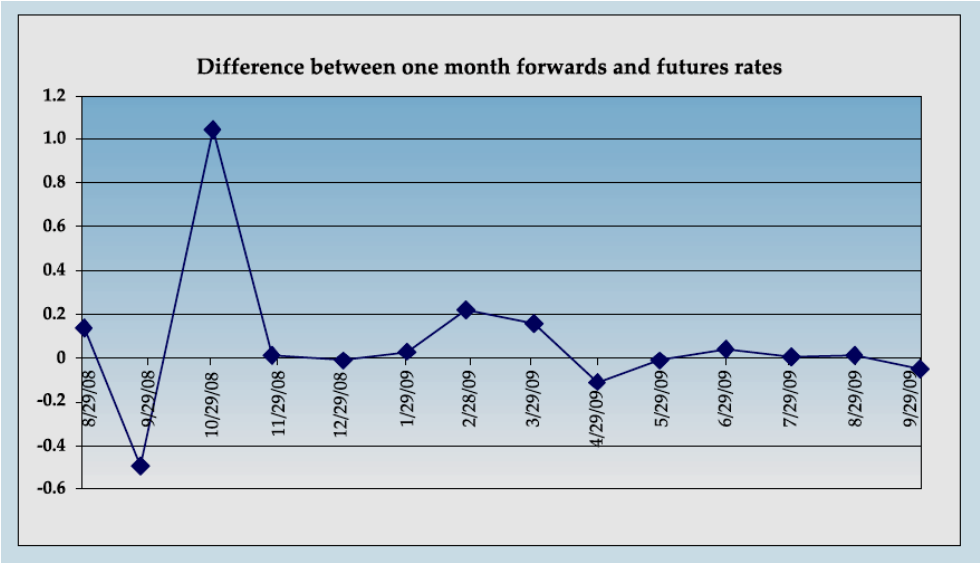
BID ASK SPREAD IN EXCHANGE TRADED USD: INR MARKET VIS-À-VIS OTC FORWARD MARKET

The bid ask spread gives an indication of the cost and ease with which a contract can be traded. A narrow bid ask spread means that the costs of entering and exiting a trade are low. Consequently, a liquid market requires the bid ask spread to be narrow. It can be observed from the Table below that around 95 percent of the trading at NSE and 99 percent of trading at MCX-SX in USD: INR futures takes place at a narrow spread of less than or equal to half a paisa as against only around 7 percent for OTC currency forward market.

Spread Interval (INR)	Cumulative Forward	Cumulative NSE USD/INR Futures	Cumulative MCX-SX USD/INR Futures
0.0025	0.58	62.98	88.58
<=0.005	6.53	94.74	98.97
<=0.01	49.25	99.92	99.93
<=0.02	99.54	99.98	100
<=0.03	100	99.98	100
<=0.04	100	99.99	100
<=0.05	100	99.99	100
<=0.1	100	100	100

Source: NSE and MCX-SX
For OTC market: Reuters
For Currency Futures: NSE trade data and MCX-SX trade data

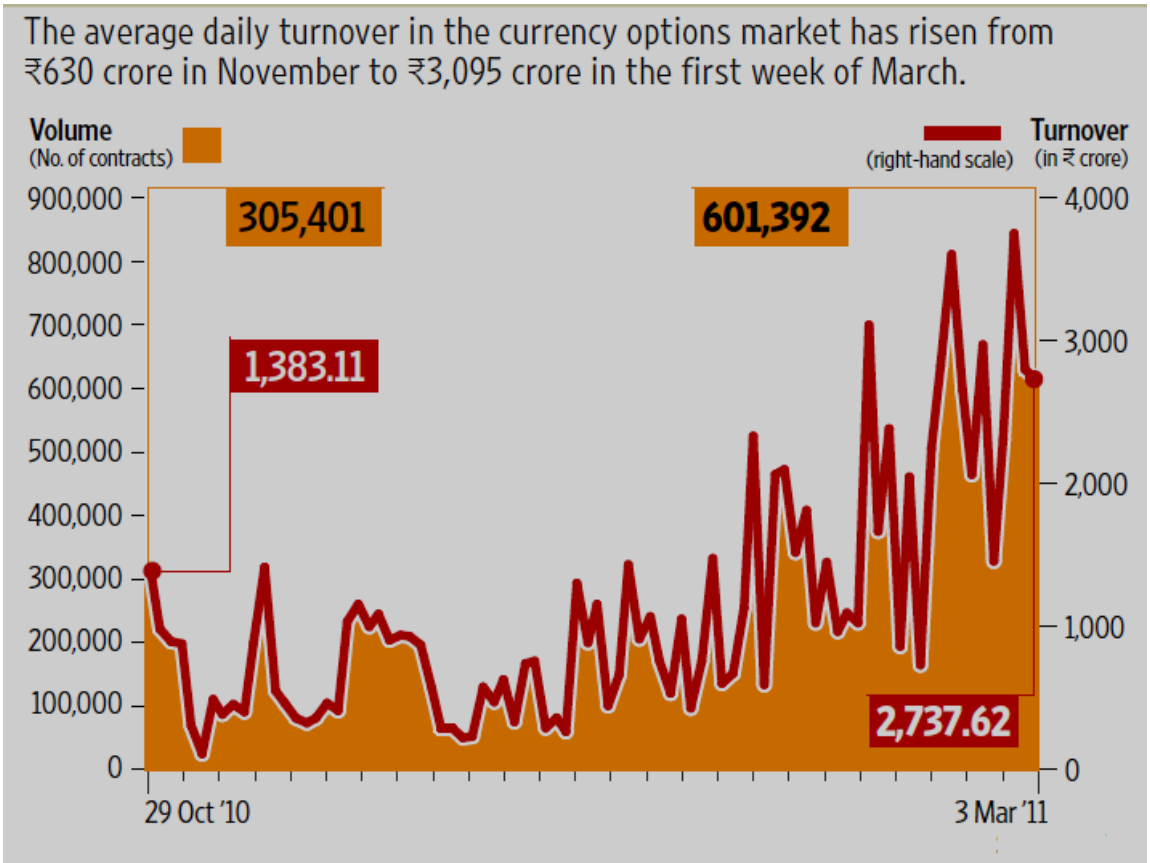
Difference between one month USD/INR Forwards and Futures



Source: NSE and MCX-SX
For OTC market: Reuters
For Currency Futures: NSE trade data and MCX-SX trade data

The line diagram above shows the difference between one month USD/INR Forwards and Futures. As can been seen from the line diagram, the difference between the two is more or less getting converged towards zero i.e. the rates are becoming almost equal. This is particularly the case between April 29 2009 and September 4 2009. This essentially means that arbitrage opportunities between the two markets are diminishing by the day.

Introduction of Currency Options



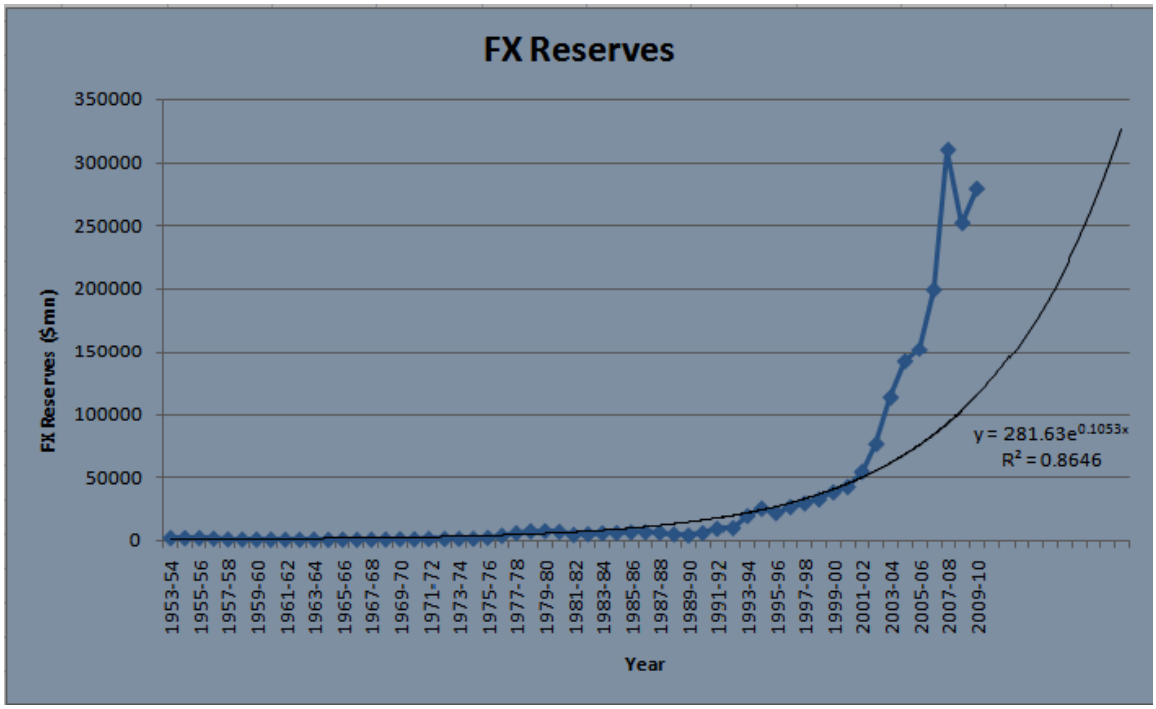
Source: NSE and USE website

Exchange-traded currency options were introduced on 29 October 2010, after NSE received approval from market regulator Securities and Exchange Board of India (SEBI) and the Reserve Bank of India (RBI).The trading volume in the currency options market has grown over threefold on the National Stock Exchange (NSE) between November 2010— when the product was launched—and February 2011.So far, retail investors and smaller companies, which find it easier to hedge their positions on the bourse than through over-the-counter (OTC) transactions, have driven up volumes.The average daily turnover in the currency options market rose from INR 630 crore in November 2010 to INR 1,915 crore in February 2011 and further to INR 3,095 crore in the first week of March 2011.

MATHEMATICAL ANALYSIS OF FOREX DERIVATIVES MARKET IN INDIA

GROWTH OF FOREX RESERVES IN INDIA

Having gone through the market for derivatives in India and particularly the FOREX Derivatives, we now move on to the mathematical analysis of the same. Here we carry out various mathematical analyses and based on the results obtained, try to gauge the dynamics of the FOREX derivatives market.



Source : RBI website

The line diagram above shows the FOREX reserves in India since 1954. The FOREX reserves have grown almost exponentially and the exponential curve is a pretty good fit with the actual curve. This can be concluded from the R^2 value which is equal to 0.8646 (R^2 is equal to 1 for perfect correlation) indicating a strong correlation between the exponential curve and the actual curve. In fact since 2001-02, the FX Reserves have grown more than exponentially. The data shown is till 2010. However, with the exponential equation shown, we have extended (extrapolated) it for a further period of further 5 years. From the above table it is estimated that the FX Reserves will touch around $350 bn in 2015. At present it is already hovering around the $300 bn mark. So, we can assume that it will cross the $500 bn mark.

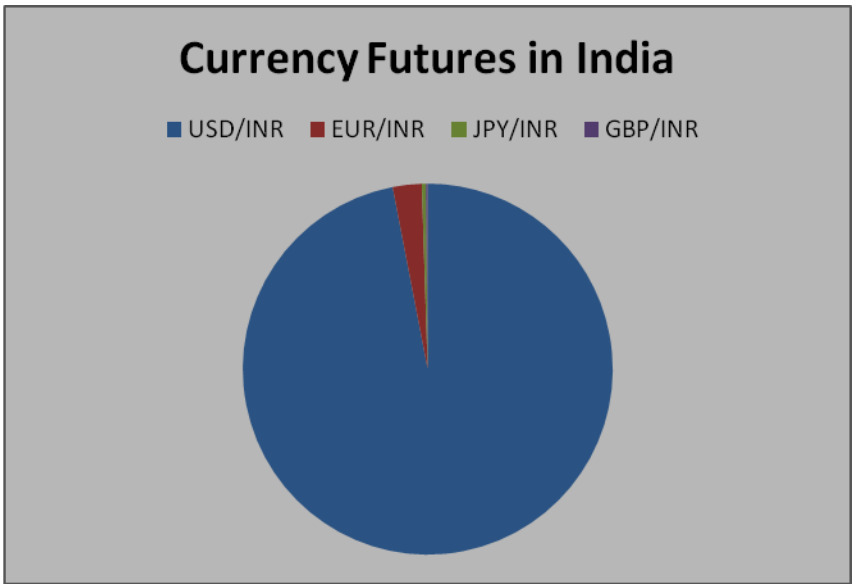
Growth of Currency Futures in India (INR mn)

S.No	Year/Month	USD/INR	EUR/INR	JPY/INR	GBP/INR
1	Apr-09	393857			
2	May-09	664315			
3	Jun-09	753627			
4	Jul-09	965229			

5	Aug-09	903957			
6	Sep-09	1077888			
7	Oct-09	1508430			
8	Nov-09	1575541			
9	Dec-09	1914147			
10	Jan-10	2767419			
11	Feb-10	2276337	184164	2718	5533
12	Mar-10	2642413	174620	7273	8613
13	Apr-10	3359080	95989	467	3786
14	May-10	3438519	149680	903	7696
15	Jun-10	3187766	78212	2383	5465
16	Jul-10	2028844	92370	3343	8977
17	Aug-10	1929224	71785	4379	7003
18	Sep-10	2783444	45116	105222	7959
Total		**34170037**	**891936**	**126688**	**55032**

Source: NSE,SEBI**Note:** Futures other than USD/INR were introduced in Feb 2010

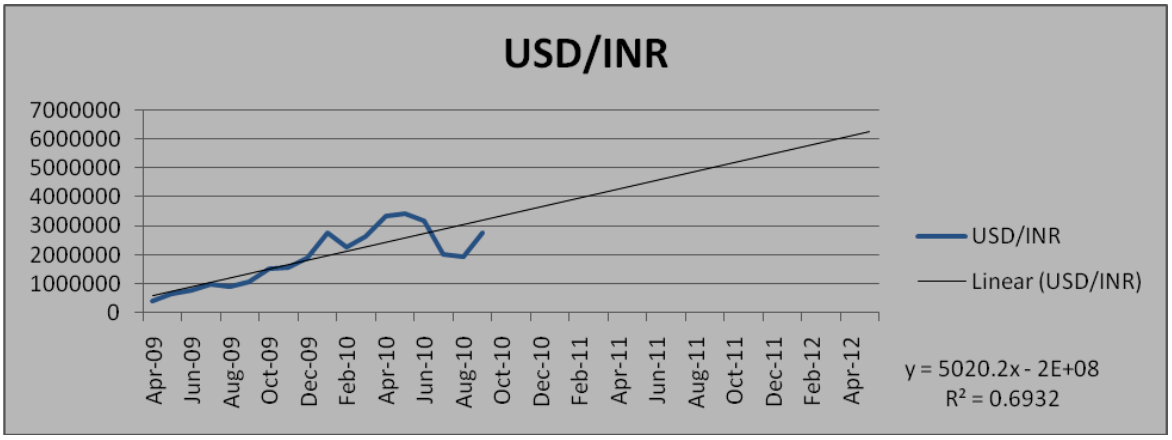
Currency Futures were introduced in India in October 2008. Initially only USD/INR Currency Futures were allowed. Subsequently, Cross-Currency Futures (Currency pairs which do not include USD) were allowed to trade since February 2010. From the above table, we can see that the traded value in USD/INR Futures increased by 22.27 % from Apr -09 to Sep-10. The increase for EUR/INR, JPY/INR and GBP/INR for the period Feb-10 to Sep-10 was -75.5 %, 3771.3% and 43.84% respectively. This shows that EUR/INR Futures have in fact shown a downward trend in terms of the traded value. This may be partially attributed to the Euro sovereign debt crisis of 2010. Also, among the Currency Futures, JPY/INR has risen the sharpest with a growth of a whopping 3771.3% in value terms. The pie chart below shows the relative weights of each of the Futures (for the period Feb-10 to Sep-10):



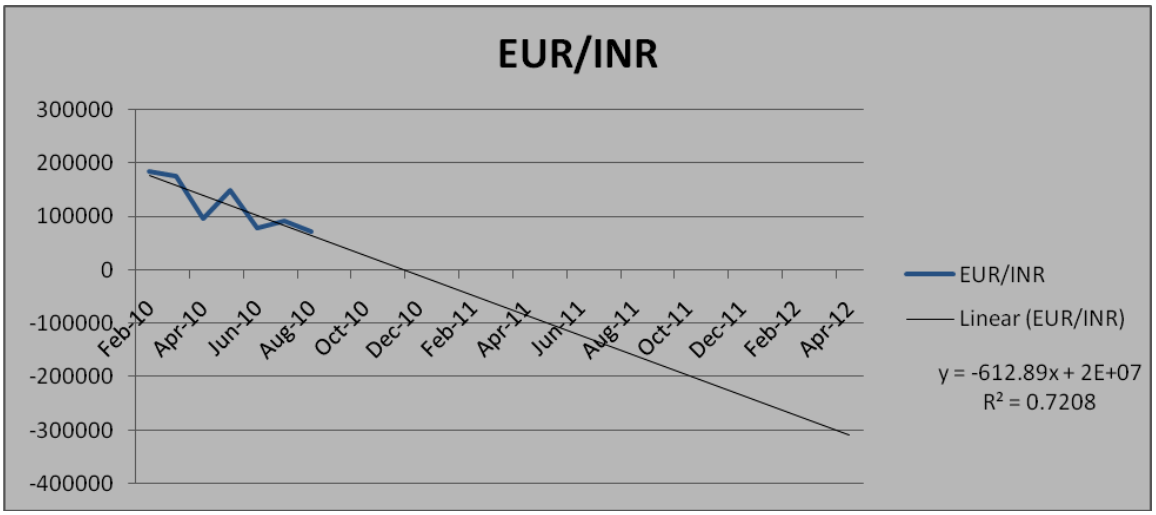
The Currency Futures market in India is dominated by USD/INR and it has a share of around 97% of the total value of the traded contracts in India. This has clear implications that USD is the most traded currency in India. However, in terms of growth, JPY has a clear dominance in India. It remains to be seen as to what will be the effect of the recent Tsunami in Japan on these trends. GBP/INR Futures have grown very little at 43.84%.

Let us now look at each of the currency futures and their behaviour over the months since their inception. The line graphs shown below represent the turnover volume on the Y-axis and the months/years on the x-axis. The graphs have been tried to fit into a trendline and the R^2 values are calculated for the same. The following benchmarks have been used:

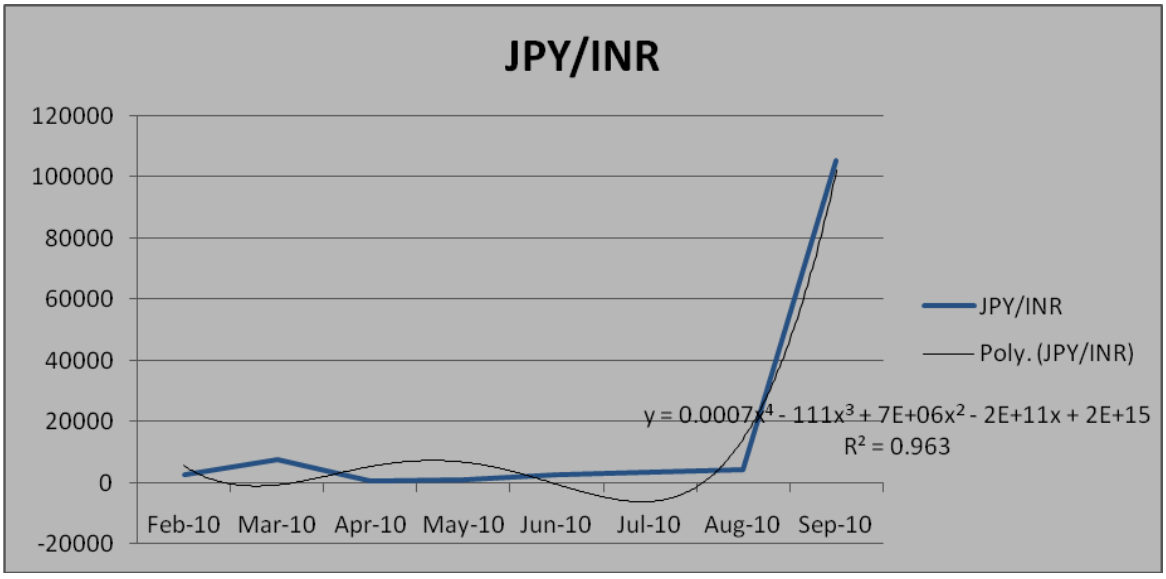
Value of R^2	**Inference**
$R^2 = 0$	No correlation between the trendline and the actual movement of turnover
$0<R^2<0.5$	Weak correlation between the trendline and the actual movement of turnover
$0.5 <R^2< 1$	Strong correlation between the trendline and the actual movement of turnover
$R^2 = 1$	Perfect correlation between the trendline and the actual movement of turnover



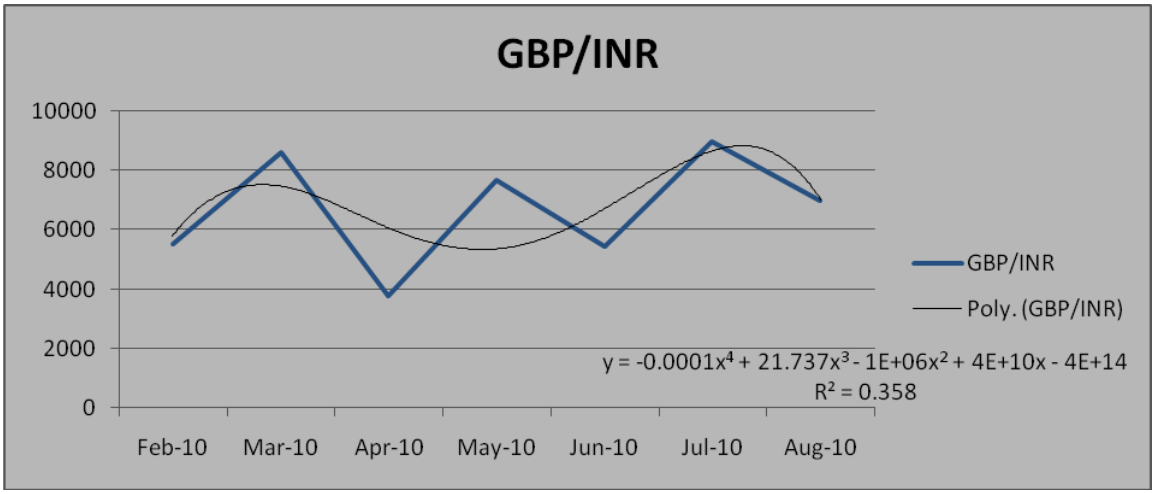
The trendline that fits best for the turnover pattern of USD/INR is a straight line whose equation is as shown in the above figure. The R^2 value is 0.6932 which indicates a positive correlation between the linear trendline and the movement of actual turnover. Using the equation we can predict the possible turnover of USD/INR Futures in the coming months/years.



As discussed earlier, EUR/INR Futures have actually dropped in value terms and this we have partially attributed to the Euro sovereign debt crisis. However, R^2 value in the case for a straight line trendline is 0.7208 which shows a very strong correlation with actual turnovers over the months. Nevertheless, this trend seems to be a one-off case and we should wait for some more time before drawing any conclusion.



The Futures JPY/INR have increased the most since its inception. As can be seen from the above line diagram, the best fit to the trend is a fourth order polynomial and R^2 value for the same is 0.963 which indicates a very strong correlation with the actual turnover pattern.In fact, for the period of Jul-10 to Sep-10, the turnover has grown more than exponentially. Going by this trend, it wouldn't be surprising if JPY/INR becomes the most traded product in India in the years to come.



The Futures on GBP/INR pair have been the most volatile following no particular pattern in particular. Even a fourth order euation doesn't fit in the given context as we see that R^2 in this case is 0.358 which shows a weak relationship between the trendline equation and the actual turnover pattern. Also, as we have seen earlier, the Futures on GBP/INR havent improved much in terms of the value of the traded contracts since its introduction(grown only by 43.84%).

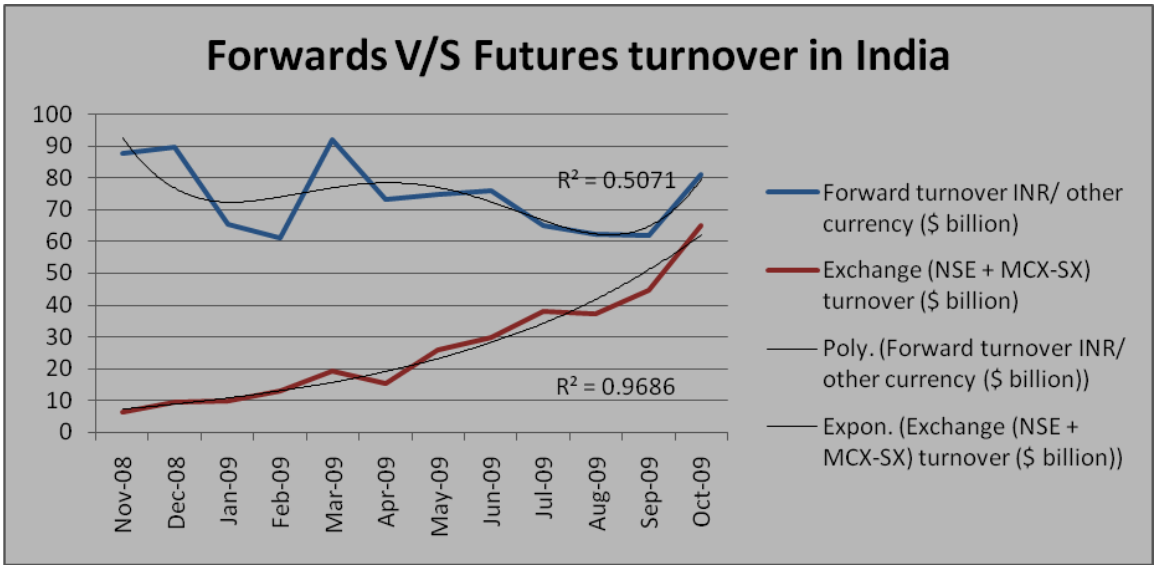
Growth of Currency Options in India

Month/Year	**Turnover (INRCrores)**
November 2010	630
February 2011	1195
March 2011	3095

Source: NSE and USE website

From the above table, it is seen that Currency Options market in India has increased by 391.2% which is very impressive considering the fact that this increase has taken place between November 2010 and March 2011 i.e. within a period of less than 5 months. This also shows the potential of Currency Options market in India.

Comparison between Currency Derivatives in India : Forwards and Futures



Source: For OTC turnover: Reuters For Currency Futures turnover : NSE and MCX-SX

As seen from the above diagram, Futures market has grown almost exponentially (R^2 value of 0.9686) and that it is fast catching-up with the Forwards market which hasn't grown substantially over the same period. The best trendline that fits the turnover pattern for Forwards is a second order polynomial with a R^2 value of 0.5071 which doesn't show too strong a relationship with the actual turnover pattern. Thus, we can clearly decipher that Currency Futures market is growing more rapidly as compared to Currency Forwards market in India.

CONCLUSION:

We have so far seen what are FOREX markets, Derivatives, Derivatives in India, FOREX Derivatives in India.We also tried to do some mathematical analysis on FOREX Derivatives in India and tried to find out whether they follow any particular pattern. Well, we found that some products follow a pattern (JPY/INR Futures follow almost an exponential pattern) and some products are volatile in nature in that they do not follow any fixed pattern (for example GBP/INR). However, one thing that can be positively concluded from the analysis is that the derivatives market in India is becoming more and more liquid and that it is growing at a much faster pace than the cash market. The introduction of currency options has heralded a new chapter in the derivatives segment in India and has received tremendous response from the traders and alike. Regulatory bodies like the RBI and SEBI have been very proactive in the derivatives segment and the introduction of various derivatives products in a phased manner has been phenomenal.

However, as the number of products introduced is increasing, the very nature of Derivatives market is becoming more and more complex. In the case of OTC markets, since the contracts are customizable, the parties attached to the contracts are under no compulsion to follow a fixed set of rules as is done in the Exchange traded markets. There is always a risk of counterparty defaulting on the contract in case of OTC markets. Not that the risk is not there in the Exchange traded market but as discussed earlier, the presence of a clearing house acts as an insurance cover in case the counter party defaults. Nevertheless, Indian Derivatives market is poised to grow at a very rapid pace in the years to come.