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**STATEMENT OF THE PROBLEM**

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**HYPOTHESIS (ES)**

**RESEARCH METHODOLOGY**

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## THE IMPACT OF FINANCIAL DERIVATIVES MARKET ON THE UNDERLYING CASH MARKET IN NSE

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### ABSTRACT

*Integration of economies world over has brought in multiple growths in the volume of international trade and business. This in turn has led to increase in the demand for international money and need for innovative financial instruments both at national and global level. Changes in the interest rates, exchange rates and equity prices in different financial markets led to increase in the volatility and manifold increase in the financial risk to the individual as well as institutional investors. Adverse changes in these variables have even threatened the very survival of the business world. To manage these risks, new financial instruments have been developed in the financial market, which are popularly known as Financial Derivatives. The basic purpose of Financial Derivatives is to provide commitments to prices for future dates for giving protection against adverse movements in the future prices of underlying assets thereby reduce/manage/control the extent of financial risk. Derivative instruments are different from Insurance, in that they cover general risks whereas the latter covers specific risks. Financial Derivatives also provide an opportunity to earn profit for those persons who have higher risk appetite. These instruments indeed facilitate to transfer the risk from those who wish to avoid it to those who are willing to accept the same. The rate of growth of derivatives is so phenomenal all over the world that now it is called as the derivatives revolution. This paper covers the impact of derivative market on the underlying cash market. To bring out the relationship between derivative market and cash market, variables like turnover, traded quantity, and market capitalisation in the cash segment are analysed before and after the introduction of derivatives.*

### KEYWORDS

financial derivatives, traded quantity, turnover, market capitalisation, options, futures, NSE.

### INTRODUCTION

Derivatives markets in India have been in existence in one form or the other for a long time. In the area of commodities, the Bombay Cotton Trade Association started futures trading back in 1875. In 1952, the Government of India banned cash settlement and options trading. Derivatives trading shifted to informal forwards markets. In recent years, government policy has shifted in favour of an increased role of market-based pricing and less suspicious derivatives trading. The first step towards introduction of financial derivatives trading in India was the promulgation of the Securities Laws (Amendment) Ordinance, 1995. It provided for withdrawal of prohibition on options in securities. The last decade, beginning the year 2000, saw lifting of ban on futures trading in many commodities. Around the same period, National Electronic Commodity Exchanges were also set up. Financial Derivatives trading commenced in India in June 2000 after SEBI granted the final approval to this effect in May 2000 on the recommendation of L. C Gupta committee. Securities and Exchange Board of India (SEBI) permitted the derivative segments of two stock exchanges, NSE and BSE and their clearing house/corporation to commence trading and settlement in approved derivative contracts. Initially, SEBI approved trading in Index Futures contracts based on various stock market indices such as, S&P CNX, Nifty and Sensex. Subsequently, index-based trading was permitted in Options as well as individual securities. The trading in BSE Sensex Options commenced on June 4, 2001 and the trading in Options on individual securities commenced in July 2001. Futures contracts on individual stocks were launched in November 2001. The derivatives trading on NSE commenced with S&P CNX Nifty Index Futures on 12<sup>th</sup> June 2000. The trading in Index Options commenced on 4<sup>th</sup> June 2001 and trading in Options on individual securities commenced on 2<sup>nd</sup> July 2001. Single Stock Futures were launched on 9<sup>th</sup> November 2001. The Index Futures and Options contract on NSE are based on S&P CNX. At the present Futures and options in Stocks are permitted in 143 stocks belonging to 13 industrial sectors as on June 2013. According to an estimate recorded in the NSE Fact Book, the present annual trading volume of derivative market has reached Rs. 5,56,06,453.00 Cr for the year 2014-15.

### REVIEW OF LITERATURE

The relationship between Derivatives segment and Cash segment was analysed in the past by many researchers. Several studies have made an attempt to examine the behaviour of cash market after the introduction of derivatives. The conclusions drawn by these studies show mixed evidences on the impact of derivative trading on stock market. **Anand Sharma, Namita Rajput and Anurag Agnihotri**<sup>1</sup> (2011), analysed the impact of launch of financial derivatives on cash segment of Indian stock market in terms of trading turnover and tried to establish a correlation between turnover in derivative segment and cash segment by applying the method of least squares. They concluded that the introduction of financial derivatives resulted in a decrease in trading in cash segment and almost equal to this decline was the turnover of derivative segment. **Thenmozhi**<sup>2</sup> (2002) reported lower level volatility in cash market after introduction of derivative contracts. **Raju and Karande**<sup>3</sup> (2003) reported a decline in volatility of the cash market after the introduction of derivatives in Indian market. **Stewart Mayhew**<sup>4</sup> (2000) opined that derivative markets are in growth stage so it is difficult to generate any theory of derivatives impact on cash market. **Gupta**<sup>5</sup> (2002) did find that the overall volatility of underlying market declined after introduction of derivatives contracts on indices. **Satya Swaroop Debasish**<sup>6</sup> (2008) observed that futures market plays price discovery role in market. Futures market is more efficient than spot market in reflecting new information and spot market follow the same. Indian investors exploit information about future trend from futures market. **Debasish**<sup>7</sup> (2008) studied the effect of derivatives trading on volatility & operating efficiency of the underlying Indian stock market by using paired sample statistic and found that introduction of financial derivatives trading in India is associated with both reduction in spot price volatility & reduced trading efficiency in underlying stock market.

### IMPORTANCE OF THE PROBLEM

'Capital' is the most important scarce resource among all the factors of production. Thus, efficient allocation of capital assumes significance for accelerating the economic growth in a country. Efficient capital allocation is ensured by efficient financial markets, which in turn largely depends upon informational efficiency and the resultant price signals, that induces investors including small, retail, uninformed to actively participate in the stock market. Since the introduction of derivative instruments in Indian capital market in the year 2001, informational efficiency has enhanced which has resulted in increased participation of investors in the stock market. This has led to increase in volumes of trade in the underlying cash market. Empirical evidence shows that derivative segment prices provides additional information over and above that already exists in spot prices and thereby serves as a leading indicator for prices in the underlying cash market. Since the introduction of financial derivatives in India in June 2000, there is a phenomenal growth in Derivatives in terms of both value and volume of traded contracts and the stock markets are becoming informationally efficient. Therefore, the present study an attempt is made to analyse the impact of derivative market on the

underlying cash market. To bring out the relationship between derivative market and cash market, variables like turnover, traded quantity, and market capitalisation in the cash segment are analysed before and after the introduction of derivatives.

**OBJECTIVES OF THE STUDY**

This study has been undertaken with the following specific objectives:

1. To know the origin and history of Financial Derivatives in India
2. To analyse the relationship between Derivative Market and Cash Market
3. To project the Cash turnover trend after introduction of Financial Derivatives
4. To analyse the impact of Derivative Market on Underlying Cash Market

**METHODOLOGY**

This study covers twenty one year’s data i.e. from 1994-1995 to 2014-2015 to analyse the relationship between derivative segment and cash segment. This period includes both pre introduction and post introduction of derivatives periods. The relationship is studied in terms of turnover, traded quantity, and market capitalisation in cash segment before and after the introduction of derivatives. The data have been drawn from websites of National Stock Exchange and Securities Exchange Board of India.

Time series method of least squares has been applied to study the effect of launch of derivatives segment on these variables and to forecasting the cash segment turnover

$$Y = a + b_x \dots \dots \dots (1)$$

The correlation between the turnover of cash and derivatives segments have been calculated to find out the strong relationship between these two segments.

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)\sqrt{b^2 - 4ac}}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}} \dots \dots \dots (2)$$

Further, the growth rates for traded quantity and market capitalisation before and after the introduction of Derivatives segment have also been analysed. Year to year growth rate and from base year to current year growth rate have been calculated.

**DATA ANALYSIS**

**IMPACT OF LAUNCH OF DERIVATIVES ON CASH SEGMENT IN NSE**

Table-1 presents actual turnover of Cash segment and Derivatives segment. Data relating to turnover in cash segment from 1994-95 (X=1) to 2000-01 (X=7) have been taken as dependent variable (Y) to estimate values for 2001-2002 (X=8) the year of introduction derivatives and project the values up to 2014-2015 (X=21). The calculations based on least squares method relating to the expected turnover from 2001-02 to 2014-15 are presented in Table-2 along with differences between the expected turnover and actual turnover in absolute terms as well as in terms of percentage.

**TABLE 1: TURNOVERS IN CASH AND DERIVATIVE SEGMENTS IN NSE**

Year	Cash Segment	Derivative Segment	Year	Cash Segment	Derivative Segment
	Turnover in ₹ Cr	Turnover in ₹ Cr		Turnover in ₹ Cr	Turnover in ₹ Cr
1994-1995	1805	-	2005-2006	15,69,556	48,24,174.00
1995-1996	67,287	-	2006-2007	19,45,285	73,56,242.00
1996-1997	2,94,503	-	2007-2008	35,51,038	1,30,90,477.75
1997-1998	3,70,193	-	2008-2009	27,52,023	1,10,10,482.20
1998-1999	4,14,474	-	2009-2010	41,38,024	1,76,63,664.57
1999-2000	8,39,052	-	2010-2011	35,77,412	2,92,48,221.09
<b>2000-2001</b>	<b>13,39,510</b>	<b>2,365</b>	2011-2012	28,10,893	3,13,49,731.74
2001-2002	5,13,167	1,01,926.00	2012-2013	27,08,279	3,15,33,003.96
2002-2003	6,17,989	4,39,862.00	2013-2014	28,08,488	3,82,11,408.00
2003-2004	10,99,535	21,30,610.00	2014-2015	43,29,655	5,56,06,453.00
2004-2005	11,40,071	25,46,982.00			

Source: www.nseindia.com

It can be observed from Table-2 that actual turnover was around 60 per cent less than the expected turnover as for the trend line in the year 2001-2002 when the derivative trading was launched. Up to 2006-07, the actual turnover was less than the expected turnover. But the percentage gap has been decreasing year after year. Thus, in the initial years of the introduction of derivative instruments a negative effect was observed on the quantum of trade in cash segment. This decline in trade in cash segment however, cannot be totally attributed to introduction of derivatives alone. Other factors like, declining economic growth, bearish stock market, and financial crisis world over also might have resulted in the decline in cash market activities. But from the year 2007-2008 to 2010-2011 actual turnover in cash segment has overtaken the expected turnover. This indicates the positive impact of derivatives on the cash segment apart from other economic factors. But again, in 2011-2012 actual turnover fell short of expected turnover, this trend has continued till 2013-2014. In the present financial year it has shown a positive impact on cash segment.

**TABLE 2: PROJECTION OF THE TURNOVER OF CASH SEGMENT AS PER LEAST SQUARES METHOD DURING 2001-02 TO 2014-15**

Year	X	Actual turnover in ₹ cr.	Expected turnover in ₹.Cr.	Difference in ₹ Cr.	Difference in %
2001-2002	8	5,13,167	12,86,205.71	7,73,038.71	60.10
2002-2003	9	6,17,989	14,88,909.83	8,70,920.83	58.49
2003-2004	10	10,99,535	16,91,613.97	5,92,078.97	35.00
2004-2005	11	11,40,071	18,94,318.11	7,54,247.11	39.82
2005-2006	12	15,69,556	20,97,022.25	5,27,466.25	25.15
2006-2007	13	19,45,285	22,99,726.39	3,54,441.39	15.41
2007-2008	14	35,51,038	25,02,430.53	-10,48,607.47	-41.90
2008-2009	15	27,52,023	27,05,134.67	-46,888.33	-1.73
2009-2010	16	41,38,024	29,07,838.81	-12,30,185.19	-42.31
2010-2011	17	35,77,412	31,10,542.95	-4,66,869.05	-15.01
2011-2012	18	28,10,893	33,13,247.09	5,02,354.09	15.16
2012-2013	19	27,08,279	35,15,951.23	8,07,672.23	22.97
2013-2014	20	28,08,488	37,18,655.37	9,10,167.37	24.47
2014-2015	21	43,29,655	39,21,359.51	-4,08,295.49	-10.41

Source: calculated from the data from nseindia.com

The Table-3 clearly depicts a rapid increase in the traded quantity in NSE from the 1994-1995 to 2000-2001. In 1994-95, the traded quantity was only ₹.1391 lakh. In the succeeding year, it reached to ₹.39,912 lakh, registering a growth rate of 2,769.30 per cent. This trend continued up to 2000-2001. A sudden decrease was

registered in 2001-2002 the year of introduction of Derivatives. Since then, the growth of traded quantity has recovered and started increasing which continued up to 2007-2008. In 2008-2009 the financial crisis world over, the traded quantity registered a decline over the previous year but sharply recovered in the very next year. The traded quantity in the year 2014-2015 recorded the highest growth rate during the study period. Overall, it could be observed that the introduction of derivatives in NSE stabilized the cash segment and led to improved confidence in the minds of investors. The Compound Annual Growth Rate (CAGR) of traded quantity during 21 years was 61.78 per cent. This indicates the positive impact of derivatives on the cash segment. These results are presented in Graph -1.

TABLE 3: GROWTH IN TRADED QUANTITY OF CASH MARKET IN NSE DURING 1994-95 TO 2014-15

Year	Traded Quantity (lakh)	Change from base year to current year	Growth Rate over the base year in %
1994-1995	1,391	-	-
1995-1996	39,912	38,521	2769.3
1996-1997	1,35,561	1,34,170	9645.58
1997-1998	1,35,685	1,34,294	9654.49
1998-1999	1,65,327	1,63,936	11785.48
1999-2000	2,42,704	2,41,313	17348.17
2000-2001	3,29,536	3,28,145	23590.58
2001-2002	2,78,408	2,77,017	19914.95
2002-2003	3,64,065	3,62,674	26072.9
2003-2004	7,13,301	7,11,910	51179.73
2004-2005	7,97,684	7,96,293	57246.08

Year	Traded Quantity (lakh)	Change from base year to current year	Growth Rate over the base year in %
2005-2006	8,44,486	8,43,095	60610.71
2006-2007	8,55,456	8,54,065	61399.35
2007-2008	14,98,469	14,97,078	107626
2008-2009	14,26,354	14,24,963	102441.6
2009-2010	22,15,530	22,14,139	159176.1
2010-2011	18,24,515	18,23,124	131065.7
2011-2012	16,16,978	16,15,587	116145.7
2012-2013	16,59,158	16,57,767	119178.1
2013-2014	15,33,716	15,32,325	110159.96
2014-2015	23,61,779	23,60,388	169690.01

Source: calculated from www.nseindia.com data

TABLE 4: BUSINESS GROWTH IN THE CASH SEGMENT OF NSE IN TERMS OF TURNOVER ₹ IN Cr

Year	Turnover (₹ in cr)	Change from base year to current year (₹ in Cr)	Growth Rate over the base year in %
1994-1995	1805	-	-
1995-1996	67,287	65,482	3627.81
1996-1997	2,94,503	2,92,698	16215.96
1997-1998	3,70,193	3,68,388	20409.31
1998-1999	4,14,474	4,12,669	22862.55
1999-2000	8,39,052	8,37,247	46384.88
2000-2001	13,39,510	13,37,705	74111.08
2001-2002	5,13,167	5,11,362	28330.3
2002-2003	6,17,989	6,16,184	34137.62
2003-2004	10,99,535	10,97,730	60816.07

Year	Turnover (₹ in cr)	Change from base year to current year (₹ in Cr)	Growth Rate over the base year in %
2005-2006	15,69,556	15,67,751	86856.01
2006-2007	19,45,285	19,43,480	107672.02
2007-2008	35,51,038	35,49,233	196633.41
2008-2009	27,52,023	27,50,218	152366.65
2009-2010	41,38,024	41,36,219	229153.41
2010-2011	35,77,412	35,75,607	198094.57
2011-2012	28,10,893	28,09,088	155628.14
2012-2013	27,08,279	27,06,474	149943.16
2013-2014	28,08,488	28,06,683	155494.9
2014-2015	43,29,655	43,27,850	239770.08

Source: Calculated from NSE India data

Table-4 depicts the changes in the growth rate of turnover of cash segment before and after introduction of derivatives. It could be observed that the turnover of cash segment in NSE has been continuously increasing up to 2000-2001 i.e. before introduction of derivative. But in the very next year, more than 61 per cent of turnover in cash segment declined compared to previous year due to the introduction of derivatives and other factors like economic instability, bearish trend in the stock markets and financial crisis. However, this decline did not continue for long. The growth rate turned positive from the very next year and reached to 82.55 per cent by the year 2007-08. Due to the financial crisis world over, the growth rate in the turnover again registered a negative per cent of 22.5 and continued since then except in 2009-10, 2013-14 and 2014-15. Thus, the introduction of derivatives strengthened the operations in cash segment by infusing more confidence in the minds of the investors. The bearish trend in the stock market caused by heavy withdrawals of FIIs, increasing rate of inflation and overall economic slow-down again led to sluggish activity in the cash segment from 2009-10 onwards except in the year 2009-10. 2013-14 and 2014-15 years have registered a positive growth rate. This indicates that the cash market has stabilised. The results are presented in Graph-2

TABLE 5: GROWTH IN MARKET CAPITALISATION OF THE CASH SEGMENT OF NSE DURING 1994-95 TO 2012-13

Year	Market Capitalisation	Change from base year to current year (₹ in Cr)	Growth Rate over the base year in %
1994-1995	3,63,350	-	-
1995-1996	4,01,459	38,109	10.49
1996-1997	4,19,367	56,017	15.42
1997-1998	4,81,503	1,18,153	32.52
1998-1999	4,91,175	1,27,825	35.18
1999-2000	10,20,426	6,57,076	180.84
2000-2001	6,57,847	2,94,497	81.05
2001-2002	6,36,861	2,73,511	75.27
2002-2003	5,37,133	1,73,783	47.83
2003-2004	11,20,976	7,57,626	208.51
2004-2005	15,85,585	12,22,235	336.38

Year	Market Capitalisation	Change from base year to current year (₹ in Cr)	Growth Rate over the base year in %
2005-2006	28,13,201	24,49,851	674.24
2006-2007	33,67,350	30,04,000	826.75
2007-2008	48,58,122	44,94,772	1237.04
2008-2009	28,96,194	25,32,844	697.08
2009-2010	60,09,173	56,45,823	1553.82
2010-2011	67,02,616	63,39,266	1744.67
2011-2012	60,96,518	57,33,168	1577.86
2012-2013	62,39,035	58,75,685	1617.09
2013-2014	72,77,720	69,14,370	1902.95
2014-2015	99,30,122	95,66,772	2632.94

Source: Calculated from NSE India data

Table-5 depicts the changes in the growth rate of market capitalization of cash segment before and after introduction of derivatives in absolute terms and in percentage terms over the base year as well as over the previous year. Here market capitalisation represents the aggregate market value of all stocks comprising CNX NIFTY. It could be observed from the Table-5 that market capitalisation of cash segment has increased in 1999-2000 with a growth rate of 180.84 per cent over the base year. But, in the year of introduction of derivatives i.e. 2000-01, this has declined to 81.05 per cent, a decrease of about 100 per cent. This decline continued up to 2002-03. Since 2003-04, the growth rate has been increasing except in 2008-09 in which year the growth rate registered a decline of about 41 per cent and in 2011-12 in which the growth declined by 9 per cent. By the year 2012-13, the growth rate registered a peak per cent of 20,622.37 per cent over the base year and 1135.04 per cent over the previous year. As already stated, the impact of financial crisis is clearly reflected in the reduction of growth rate of market capitalisation in 2008-09 and 2011-12. But the Indian stock markets could quickly overcome this financial turmoil, reaching a new milestone in market

capitalisation with ₹.99,30,122 cr in the year 2014-15. In terms of the growth over the base year, it is 2632.94 per cent and in terms of the growth in the previous year, it is 36.45 per cent. These results are presents in the Graph-3.

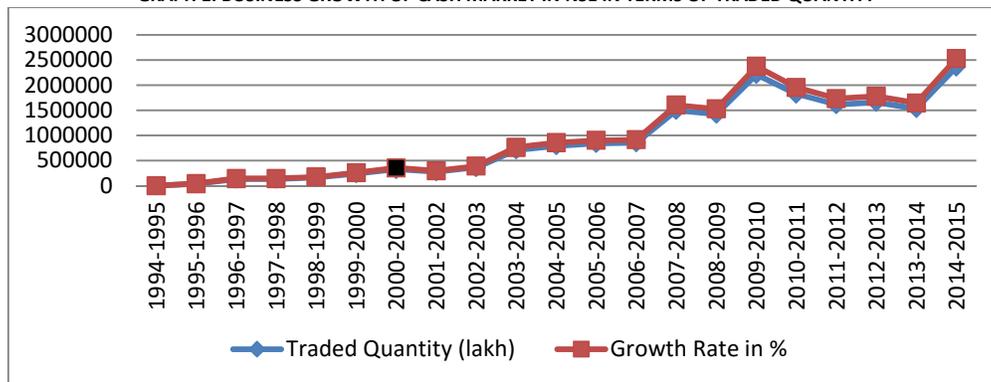
TABLE 6: CORRELATION BETWEEN THE TURNOVERS OF CASH AND DERIVATIVES SEGMENT IN NSE

Year	Cash Segment		Derivatives Segment		Correlation
	Turnover in ₹ Cr	Growth rate %	Turnover in ₹ Cr	Growth rate %	
2000-01	13,39,510	100	2365	100	-
2001-02	5,13,167	38	1,01,926.00	4,310	-1
2002-03	6,17,989	46	4,39,862.00	18,599	-0.585633357
2003-04	10,99,535	82	21,30,610.00	90,089	0.24191104
2004-05	11,40,071	85	25,46,982.00	1,07,695	0.380980117
2005-06	15,69,556	117	48,24,174.00	2,03,982	0.683056938
2006-07	19,45,285	145	73,56,242.00	3,11,046	0.840881871
2007-08	35,51,038	265	1,30,90,477.75	5,53,509	0.952616219
2008-09	27,52,023	205	1,10,10,482.20	4,65,560	0.960142999
2009-10	41,38,024	309	1,76,63,664.57	7,46,878	0.977041469
2010-11	35,77,412	267	2,92,48,221.09	12,36,711	0.882257389
2011-12	22,10,602	165	3,13,49,731.74	13,25,570	0.725245593
2012-13	27,08,279	202	3,15,33,003.96	13,33,319	0.700705569
2013-14	28,08,488	210	3,82,11,408.00	16,15,704	0.676771735
2014-15	43,29,655	323	5,56,06,453.00	23,51,224	0.753941803

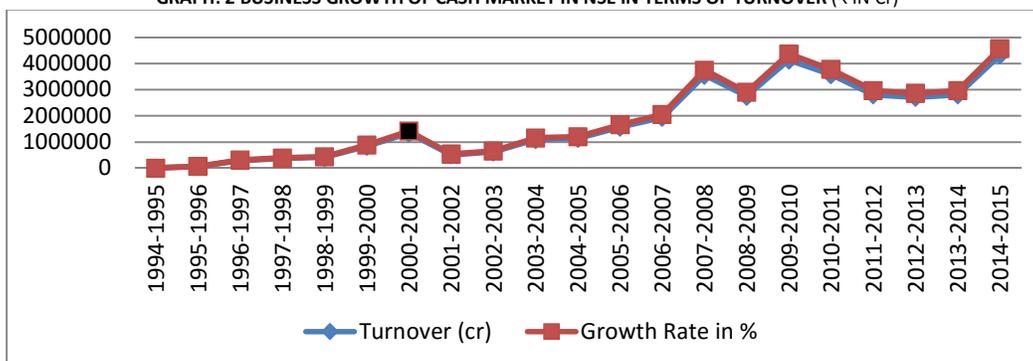
Source: Calculated from NSE India data

Table-6 presents the correlation between the cash and derivatives segment in NSE after introduction of derivatives in absolute terms and in percentage terms over the previous year. From the calculations presented in the Table-6, it is observed that there is high degree of positive correlation between cash and derivatives segments. A high degree of positive correlation after the initial four year of introduction of derivatives indicates that both cash and derivative segments are affected by the same factors and the population of investors is the same for these two segments. From this analysis it is evident that introduction of derivatives has a positive impact on the trading activity in the cash segment. The results are presented in the Graph-4.

GRAPH 1: BUSINESS GROWTH OF CASH MARKET IN NSE IN TERMS OF TRADED QUANTITY



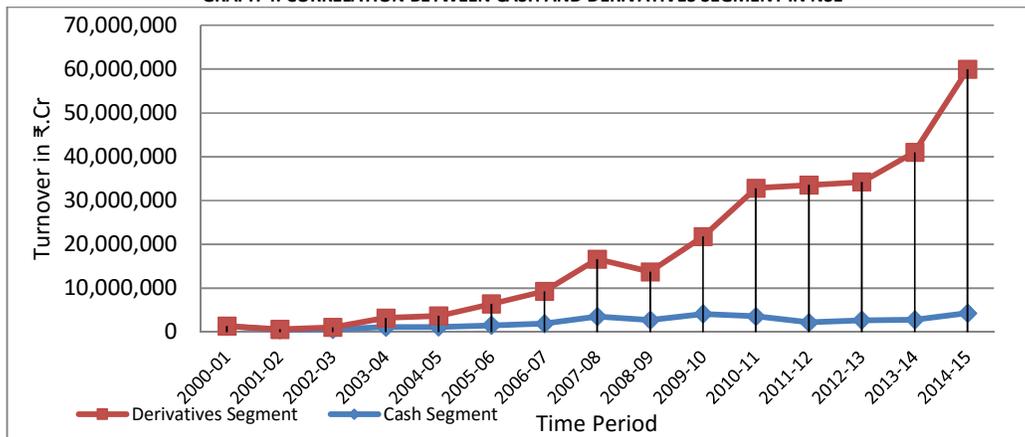
GRAPH 2: BUSINESS GROWTH OF CASH MARKET IN NSE IN TERMS OF TURNOVER (₹ IN Cr)



GRAPH 3: BUSINESS GROWTH OF CASH MARKET IN NSE IN TERMS OF MARKET CAPITALISATION (₹ in Cr)



GRAPH 4: CORRELATION BETWEEN CASH AND DERIVATIVES SEGMENT IN NSE



**THE MAJOR FINDINGS**

To test the impact of financial derivatives on underlying cash market, study uses Least Squares, Correlation and Annual growth rate methods. It is observed that actual turnover of cash market has been declined around 60 per cent less than the expected turnover as for the trend line in the year 2001-2002 when the derivative trading was launched. Thus, in the initial years of the introduction of derivative instruments a negative effect was observed on the quantum of trade in cash segment. But from the year 2007-2008 to 2010-2011 and 2014-2015 actual turnovers in cash segment has overtaken the expected turnover. This indicates the positive impact of derivatives on the cash segment apart from other economic factors. The Turnover of cash segment also declined in the initial years after derivatives introduced. This decline cannot be totally attributed to introduction of derivatives. The later years were witnessed that the turnover was in uptrend. Thus, the introduction of derivatives strengthened the operations in cash segment by infusing more confidence in the minds of investors. The growth rate of market capitalisation has been registered a peak per cent of 2632.94 over the base year by the year 2014-15. The overall market capitalisation trend of cash segment in the present study is in uptrend, thus, it clearly depicts that introduction of derivatives have increased the confidence in the minds of investors on cash market. There is a high degree of positive correlation between cash and derivatives segments. A high degree of positive correlation after the initial four year of introduction of derivatives indicates that both cash and derivative segments are affected by the same factors and the population of investors is the same for these two segments. From this analysis it is evident that introduction of derivatives has a positive impact on the trading activity in the cash segment.

**CONCLUSION**

On the basis of above discussion and data analysis, it is clear that the Financial Derivatives are influencing the cash market movement to a greater extent. Further it is evident that the turnover of cash market has increased and stabilised. The overall market capitalisation trend of cash segment in the present study is in uptrend, thus, it clearly depicts that introduction of derivatives have increased the confidence in the minds of investors on cash market. There is a high degree of positive correlation between cash and derivatives segments. A high degree of positive correlation after the initial four year of introduction of derivatives indicates that both cash and derivative segments are affected by the same factors and the population of investors is the same for these two segments.

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