



ANALYSIS OF DERIVATIVES – A CASE STUDY

Dr. B. Ravi Kumar* & G. D. V. Kusuma**

* Department of MBA, Amrita Sai Institute of Science and Technology, Andhra Pradesh

** Research Scholar, Rayalaseema University, Kurnool, Andhra Pradesh

Cite This Article: Dr. B. Ravi Kumar & G. D. V. Kusuma, “Analysis of Derivatives – A Case Study”, International Journal of Scientific Research and Modern Education, Volume 2, Issue 2, Page Number 80-85, 2017.

Copy Right: © IJSRME, 2017 (All Rights Reserved). This is an Open Access Article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract:

Derivatives are the products whose value is derived from the value of one or more basic variables, called bases (underlying asset, index, or reference rate), in a contractual manner. The underlying asset can be equity, forex, commodity or any other asset. In precise we can say that Derivatives are financial contracts whose value/price is dependent on the behavior of the price of one or more basic underlying assets (often simply known as underlying). The present study is an attempt to analyse the performance of futures and options of NCL Industries Ltd.

Key Words: Derivatives, Futures, Options & NCL Industries Ltd.

Introduction:

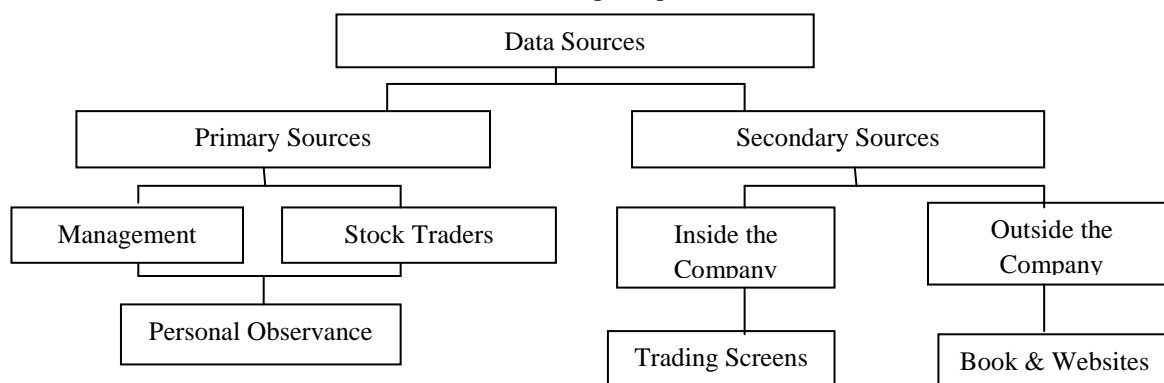
These commodities primarily emerged as hedging devices against fluctuations in commodity prices, and commodity-linked derivatives remained the sole form of such products for almost three hundred years. Financial derivatives came into spotlight in the post-1970 period due to growing instability in the financial markets. At present the market for financial derivatives has grown enormously in terms of diversity of instruments available, their complexity and also turnover. Even small investors find these useful due to high correlation of the popular indexes with various portfolios and ease of use.

Objectives of the Study:

- ✓ To study the role of derivatives in Indian financial markets.
- ✓ To study the functioning and trading of futures and options
- ✓ To know are the pay-offs of futures & options.
- ✓ To critically analyze the strategies of futures and options (call and put options).
- ✓ To know the trading system in derivatives.
- ✓ To offer suggestions based on the findings of the study.

Research Methodology:

Methodology is a systematic procedure of collecting information in order to analyze and verify a phenomenon. The collection of information is done two principle sources, Viz.



Data Analysis and Interpretation:

Table 1: Business Growth in Derivatives Segment (Futures) in 2011-2012

Month /Year	Futures	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-11	205458	296629.3
May-11	214523.5	400096.1
Jun-11	240796.9	451314.3
Jul-11	238577	647356.1
Aug-11	363987.6	519384.6
Sep-11	256470.3	670968.5
Oct-11	485079.2	1120263

Nov-11	365564	989112.6
Dec-11	287357	849996.8
Jan-12	450657.1	851213.2
Feb-12	352226.4	421838.1
Mar-12	359970.2	330390.4

Interpretation:

In the year 2011-2012 the futures index starts with a turnover of 205458 and ends with 359970.2 and futures stock started with a turnover of 296629.3 and ends with 330390.4. Here the turnovers are very high when compared to the previous year. There is a severe decline in the world financial markets in this year because of sub-prime crisis and decline in wealth's and consumption pattern of people.

Table 2: Business Growth in Derivatives Segment (options) in 2011-2012

Month / Year	Options	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-11	97149.56	17049.77
May-11	85465.42	23357.81
Jun-11	92503.32	21927.59
Jul-11	94561.19	34582.28
Aug-11	140960.8	32398.36
Sep-11	107964.8	37485.17
Oct-11	173992.5	54327.99
Nov-11	116951.6	45676.22
Dec-11	103165.4	33710.77
Jan-12	118827.2	33183.34
Feb-12	110251.4	14901.05
Mar-12	120317.7	10536.2

Interpretation:

In the year 2011-2012 the options index starts with a turnover of 97149.56 and ends with 120317.7 and options stock started with a turnover of 17049.77 and ends with 10536.2 with many fluctuations. In this period options decreases because the consumption patterns decreases and therefore expenditure on premiums also decreased. At the end of 2012 options are effected with recession.

Table 3: Business Growth in Derivatives Segment (Futures) in 2012-2013

Month / Year	Futures	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-12	280100.3	336900.9
May-12	267640.7	380160.7
Jun-12	377939	375986.7
Jul-12	395380	382600.8
Aug-12	300448.9	324010.9
Sep-12	380197.8	332728.5
Oct-12	324961.7	239263.9
Nov-12	256949.7	187211.3
Dec-12	269997.3	230465.6
Jan-13	234140.5	215830.3
Feb-13	205679.2	185121
Mar-13	276676.5	289361.7

Interpretation:

In the year 2012-2013 the futures index starts with a turnover of 280100.3 and ends with 276676.5 and futures stock started with a turnover of 336900.9 and ends with 289361.7. In this period Of 2012 September we can notice a high turnover of 380197.8 which is high in previous 3 years.

Table 4: Business Growth in Derivatives Segment (options) in 2012-2013

Month / Year	Options	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-12	133564.9	15864.65
May-12	129066.5	21040.45
Jun-12	308708.6	21429.93
Jul-12	357208.6	24984.68
Aug-12	312101.7	20883.4
Sep-12	461622.7	23323.43

Oct-12	364509.6	12911.06
Nov-12	292134.3	9060.8
Dec-12	313615.4	15087.96
Jan-13	309271.3	18876.23
Feb-13	305599	15971.1
Mar-13	444099.2	29793.12

Interpretation:

In the year 2012-2013 the options index starts with a turnover of 133564.9 and ends with 444099.2 and options stock started with a turnover of 15864.65 and ends with 29793.12 with many fluctuations. Because of recession many of the leading emergent economies seeks aid from the International Monetary Fund.

Table 5: Business Growth in Derivatives Segment (Futures) in 2013-2014

Month / Year	Futures	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-13	301764.1	356383.1
May-13	317415.2	448154.8
Jun-13	346934.1	589657.5
Jul-13	382923.7	450631.8
Aug-13	366312	412362.5
Sep-13	302424.9	434119.3
Oct-13	329609.7	465829.3
Nov-13	363522.8	438219.8
Dec-13	329496.2	395953.8
Jan-14	298849.2	444133.8
Feb-14	326870.8	354484.6
Mar-14	268266.1	405316.4

Interpretation:

In the year 2013-2014 the futures index starts with a turnover of 301764.1 and ends with 268266.1 and futures stock started with a turnover of 356383.1 and ends with 405316.4 with an average daily turnover of 47082.31. In June 2013 the Indian Economy has been spending too much and borrowing too much for years and the rest of the world depended on the U.S. consumer which results in decrease in GDP's of various countries. As a result the growth for futures stock increases gradually.

Table 6: Business Growth in Derivatives Segment (options) in 2013-2014

Month / Year	Options	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-13	453788.2	31427.09
May-13	430514.7	31167.87
Jun-13	545643.3	49745.53
Jul-13	701247.2	38706.49
Aug-13	658756.9	36214.36
Sep-13	609075.6	42758.22
Oct-13	669591	45387.33
Nov-13	816407.8	43665.54
Dec-13	756677.1	42855.33
Jan-14	695860	51453.82
Feb-14	847235.8	41285.34
Mar-14	843166.7	51398.26

Interpretation:

In the year 2013-2014 the options index starts with a turnover of 453788.2 and ends with 843166.7 and options stock started with a turnover of 31427.09 and ends with 51398.26 with gradual increase in the stock options. The unemployment rate increased to 10.1% by October 2013, the highest rate since 1983 and roughly twice the pre-crisis rate. As a result people invested more on index options because they do not want to take risks by investing more in stocks.

Table 7: Business Growth in Derivatives Segment (Futures) in 2014-2015

Month / Year	Futures	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-14	279572.3	409844.3
May-14	395612.7	431593
Jun-14	372265.7	421843.2

Jul-14	289423.2	423421.9
Aug-14	299130.5	496266.7
Sep-14	383871.6	555581
Oct-14	402457.3	608829.6
Nov-14	424789.1	539872.5
Dec-14	322793.3	432644.3
Jan-15	384484.4	411149.1
Feb-15	402759.1	401306.5
Mar-15	399595.4	363404.7

Interpretation:

In the year 2014-2015 the futures index starts with a turnover of 279572.3 and ends with 399595.4 and futures stock started with a turnover of 409844.3 and ends with 363404.7 with an average daily turnover of 101166.5. In this period the rupee value decreased as a result many of the people invested in export based companies. As a result overall stocks decreased but not all the stocks.

Table 8: Business Growth in Derivatives Segment (Options) in 2014-2015

Month / Year	Options	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-14	905472.3	76731.05
May-14	1217458	79832.44
Jun-14	1169943	71547.16
Jul-14	1043354	73710.49
Aug-14	1157466	100864.8
Sep-14	1688469	108470.1
Oct-14	1705514	107692.7
Nov-14	1902944	98240.98
Dec-14	1519280	82391.22
Jan-15	1962516	83684.81
Feb-15	2044353	80875.71
Mar-15	2048597	66302.82

Interpretation:

In the year 2014-2015 the options index starts with a turnover of 905472.3 and ends with 2048597 and options stock started with a turnover of 76731.05 and ends with 66302.82 with tremendous fluctuations. Here index options increased heavily when compared with stock options because of less value of the country's currencies.

Table 9: Business Growth in Derivatives Segment (Futures) in 2015-2016

Month / Year	Futures	
	Index turnover (Rs. cr.)	Stock turnover (Rs. cr.)
Apr-15	282302.7	353159.3
May-15	305744.6	336688.6
Jun-15	265177.7	322695
Jul-15	265640.9	349890.7
Aug-15	347176.6	333790.9
Sep-15	346826.3	326289.5
Oct-15	265945.0	279970.9
Nov-15	312138.9	305421.5
Dec-15	307197.7	279920.7
Jan-16	250737.9	350848.1
Feb-16	291138.4	451869.3
Mar-16	337971.8	384126.3

Interpretation:

In the year 2015-2016 the futures index starts with a turnover of 282302.7 and ends with 337971.8 and futures stock started with a turnover of 353159.3 and ends with 384126.3. During this period there were many un-certainties because of the European crisis. In this period also people invested more in exporting companies and not in the index.

Findings:

- ✓ Because of inflation in 2011 the investments in stock futures increases than investments in futures index.

- ✓ By early November 2012, a stock index was down by 45% from its 2011 high. With futures markets signaling a 30–35% potential drop.
- ✓ At the end of October 2012 a currency crisis developed, with investors transferring vast capital resources into stronger currencies.
- ✓ In 2013 because of recession a gradual decrease in stocks and index futures reduced by 20%. It is because of lack of purchasing power.
- ✓ In 2014 major fluctuations have occurred in both stocks and indexes. This is because of fall in consumption patterns
- ✓ In 2015 the markets of futures and options decreased because of many uncertainties and decrease in rupee value
- ✓ During the period between 2015-2016 the trade in options markets increases because of awareness in options market in India
- ✓ Finally futures and options trading increased as a hedging tool in order to protect from risks.

Suggestions:

- ✓ Futures and Options are risk management tools, frequently used for protection of the underlying portfolio by institutional and retail investors.
- ✓ This is usually used to protect the underlying portfolio especially in a declining market when its value erodes.
- ✓ As it is exchange traded, the pricing and volume transacted is transparent to all market players. It results in high liquidity.
- ✓ To avoid the risk the seller must estimate future price at security with proper techniques and tools.
- ✓ This allows investors to have the same amount of exposure but with the benefit of a cheaper transaction cost
- ✓ Although the contract value fluctuates, investors pay a fixed amount per contract, compared to a fixed percentage
- ✓ In buying call options the investor concentrate on strike price, it must be less than spot price the net payoff is positive, the buyer get benefit.
- ✓ In buying put options the investor concentrate on strike price, it must be greater than spot price the net payoff is positive.

References:

1. Amin, K.I. "Jump Diffusion Option Valuation in Discrete Time." *The Journal of Finance*, Vol. 48, No. 5 (1993), pp. 1833-1863.
2. Andricopoulos, A.D., Widdicks, M., Duck, P.W., and Newton, D.P. "Universal Option Valuation Using Quadrature Methods." *Journal of Financial Economics*, Vol. 67, No. 3 (2003), pp. 447-471.
3. Andricopoulos, A.D., Widdicks, M., Newton, D.P., and Duck, P.W. "Extending Quadrature Methods to Value Multi-Asset and Complex Path Dependent Options." *Journal of Financial Economics*, Vol. 83, No. 2 (2007), pp. 471-499.
4. Ballestra, L.V., and Sgarra, C. "The Evaluation of American Options in a Stochastic Volatility Model with Jumps: An Efficient Finite Element Approach." *Computers & Mathematics with Applications*, Vol. 60, No. 6 (2010), pp. 1571-1590.
5. Bates, D.S. "Jumps and Stochastic Volatility: Exchange Rate Processes Implicit in Deutsche Mark Options." *Review of Financial Studies*, Vol. 9, No. 1 (1996), pp. 69-107.
6. Black, F., and Scholes, M. "The Pricing of Options and Corporate Liabilities." *Journal of Political Economy*, Vol. 81, No. 3 (1973), pp. 637-654.
7. Boyle, P.P. "Options: A Monte Carlo Approach." *Journal of Financial Economics*, Vol. 4, No. 3 (1977), pp. 323-338.
8. Brennan, M.J., and Schwartz, E.S. "Finite Difference Methods and Jump Processes Arising in the Pricing of Contingent Claims: A Synthesis." *Journal of Financial and Quantitative Analysis*, Vol. 13, No. 3 (1978), pp. 461-474.
9. Broadie, M., and Detemple, J. "American Option Valuation: New Bounds, Approximations, and a Comparison of Existing Methods." *Review of Financial Studies*, Vol. 9, No. 4 (1996), pp. 1211-1250.
10. Broni-Mensah, E.K. "Numerical Solutions of Weather Derivatives and Other Incomplete Market Problems." PhD dissertation, University of Manchester, 2012.
11. Chang, C., Chung, S., and Stapleton, R.C. "Richardson Extrapolation Techniques for the Pricing of American-Style Options." *Journal of Futures Markets*, Vol. 27, No. 8 (2007), pp. 791-817.
12. Chen, D., Härkönen, H.J., and Newton, D.P. "Advancing the Universality of Quadrature Methods to Any Underlying Process for Option Pricing." *Journal of Financial Economics*, Vol. 114, No. 3 (2014), pp. 600-612.

13. Chiarella, C., Kang, B., Meyer, G.H., and Ziogas, A. “The Evaluation of American Option Prices under Stochastic Volatility and Jump-Diffusion Dynamics using the Method of Lines.” *International Journal of Theoretical and Applied Finance*, Vol. 12, No. 3 (2009), pp. 393-425.
14. Chiarella, C., and Ziogas, A. “Pricing American Options on Jump-Diffusion Processes using Fourier Hermite Series Expansions.” Research paper, Quantitative Finance Research Centre, 2005.
15. Chiarella, C., and Ziogas, A. “American Call Options Under Jump-Diffusion Processes—A Fourier Transform Approach.” *Applied Mathematical Finance*, Vol. 16, No. 1 (2009), pp. 37-79.
16. Clarke, N., and Parrott, K. “Multigrid for American Option Pricing with Stochastic Volatility.” *Applied Mathematical Finance*, Vol. 6, No. 3 (1999), pp. 177-195.
17. Cox, J.C., Ross, S.A., and Rubinstein, M. “Option Pricing: A Simplified Approach.” *Journal of Financial Economics*, Vol. 7, No. 3 (1979), pp. 229-263.
18. Davis, P.J. *Circulant Matrices*, 2nd edition. American Mathematical Society, 2013.
19. Duffie, D., Pan, J., and Singleton, K. “Transform Analysis and Asset Pricing for Affine Jump-Diffusions.” *Econometrica*, Vol. 68, No. 6 (2000), pp. 1343-1376.
20. Gatheral, J. *The Volatility Surface: A Practitioner’s Guide*. Hoboken, NJ: John Wiley & Sons, 2006.
21. Heston, S.L. “A Closed-Form Solution for Options with Stochastic Volatility with Applications to Bond and Currency Options.” *Review of Financial Studies*, Vol. 6, No. 2 (1993), pp. 327-343.
22. Ibáñez, A. “Robust Pricing of the American Put Option: A Note on Richardson Extrapolation and the Early Exercise Premium.” *Management Science*, Vol. 49, No. 9 (2003), pp. 1210-1228.
23. Kilin, F. “Accelerating the Calibration of Stochastic Volatility Models.” *The Journal of Derivatives*, Vol. 18, No. 3 (2011), pp. 7-16.
24. Kou, S.G. “A Jump-Diffusion Model for Option Pricing.” *Management Science*, Vol. 48, No. 8 (2002), pp. 1086-1101.
25. Lewis, A.L. *Option Valuation under Stochastic Volatility II: With Mathematica Code*. Newport Beach, CA: Finance Press, 2016.
26. Lord, R., Fang, F., Bervoets, F., and Oosterlee, C.W. “A Fast and Accurate FFT Based Method for Pricing Early-Exercise Options under Lévy Processes.” *SIAM Journal on Scientific Computing*, Vol. 30, No. 4 (2008), pp. 1678-1705.
27. Merton, R.C. “Theory of Rational Option Pricing.” *Bell Journal of Economics and Management Science*, Vol. 4, No. 1 (1973), pp. 141-183.
28. Merton, R.C. “Option Pricing When Underlying Stock Returns Are Discontinuous.” *Journal of Financial Economics*, Vol. 3, No. 1-2 (1976), pp. 125-144.
29. Oosterlee, C.W. “On Multigrid for Linear Complementarity Problems with Application to American-Style Options.” *Electronic Transactions on Numerical Analysis*, Vol. 15, No. 1 (2003), pp. 165-185.
30. O’Sullivan, C. “Path Dependant Option Pricing under Lévy Processes.” EFA 2005 Moscow Meetings Paper, 2005.
31. Rubinstein, M. “Edgeworth Binomial Trees.” *The Journal of Derivatives*, Vol. 5, No. 3 (1998), pp. 20-27.
32. Sanderson, C. “Armadillo: An Open Source C++ Linear Algebra Library for Fast Prototyping and Computationally Intensive Experiments.” Technical report, NICTA, Australia, 2010.
33. Simonato, J.-G. “Computing American Option Prices in the Lognormal Jump-Diffusion Framework with a Markov Chain.” *Finance Research Letters*, Vol. 8, No. 4 (2011a), pp. 220-226.
34. Simonato, J.-G. “Johnson Binomial Trees.” *Quantitative Finance*, Vol. 11, No. 8 (2011b), pp. 1165-1176.
35. Simonato, J.-G. “A Simplified Quadrature Approach for Computing Bermudan Option Prices.” *International Review of Finance*, Vol. 16 (2016), pp. 647-658.
36. Wilmott, P., Howison, S., and Dewynne, J. *The Mathematics of Financial Derivatives: A Student Introduction*, Cambridge University Press, 1995.