

Price Discovery and Arbitrage Efficiency Test : A Study of Indian Options Market

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Abstract

This paper examines the mispricing opportunities present in the Indian option market by using put-call-index-parity for European style Nifty index options. The instances of mispricing of options are the most frequent and profitable for investors and provide various arbitrage opportunities in Indian market. Some of these opportunities provide excess return up to a high level. The put options are more overpriced rather than the call options. It shows that the short arbitrage strategy is more profitable relative to long arbitrage strategy and the short arbitrage occurs more frequently relative to long arbitrage. The mispricing increases as time to expiration increases and far the money options have low liquidity in the Indian market. The frequency of mispricing is higher for options with maturity up to days (current month options) but the magnitude of mispricing is larger for options which have longer time to maturity. Further, transaction cost is also incorporated as a result to of this the arbitrage opportunities drops more in case of PCIP as compared to PCFP.

I. Introduction

INDEX OPTION HAS gained popularity over the last few decades, since these were first introduced by Chicago Board Options Exchange in 11 March 1983. Traders often use arbitrage strategies based on Put Call Parity. In the context of put call parity, most of the studies have been conducted in more developed markets of Australia, Canada, Germany, Italy, the United Kingdom, the United States. Studies on the emerging markets are non-existent. This paper is an attempt to contribute in the existing literature by presenting some empirical evidence by using put-call-parity for emerging Indian market. Mispricing and arbitrage opportunities are investigated in the context of Indian Derivatives, using the put-call-parity for Nifty options Index market. Options and futures

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Annexure I
Nifty Index Options and Futures - Contract Specifications

	Index Options	Index Futures
Name	OPTIDX	FUTIDX
Underlying Index	CNX NIFTY	Same
Symbol	NIFTY	Same
Exchange	NSE	Same
Price Steps	₹ 0.05	Same
Listing Date	July 2001	June 2000
Lot Size	Permitted lot size shall be 75 and multiples thereof	Same
Exercise Style	European	
Settlement	Cash settled	Same
Contract Months	3-month trading cycle - the near month (one), the next month (two) and the far month (three)	Same
Expiry Day	Last Thursday of the expiry month. If the last Thursday is a trading holiday, then the expiry day is the previous trading day.	Same
Last trading day	Last Thursday of the expiry month. If the last Thursday is a trading holiday, then the expiry day is the previous trading day.	Same
Trading Hours	9:15 am to 15:30 pm	Same
Settlement Day	The first business day after expiry	Same

Note : Information from NSE website

Source: Self Formulated

Annexure II
Empirical Evidences on Pricing Efficiency of Option Markets

Sr. No.	Author (Year of Study)	Country Understudy	Market Understudy	Period Understudy & Violation	Mispricing
1	Galai (1978)	US	CBOE	26 April 1973 30 Nov 1973	Yes
2	Robert C Klemkosky & Bruce G Rensick (1979)	CBOE	American & Philadelphia Stock Exchange	July 1977 June 1978	Yes
3	Phillips & Smith (1980)	US	CBOE	27 June 1977 19 Sep 1977 5 Dec 1977 13 Feb 1978	Yes
4	Mihir Bhattacharya (1983)	US	CBOE	24 Aug 1976 12 June 1977	Yes
5	Jeremy Evnine & Andrew Rudd (1985)	US	S&P 500 & Major Market Index (MMI)	26 June 1984 30 Aug 1984	Yes
6	Geoffrey F. Loudon (1988)	Australia	Sydney Stock Exchange	1 Jan 1985 31 Jan 1985	No
7	Taylor (1990)	Australia	Australian Options Market	Oct 1982 Oct 1985	Yes
8	Nisbet (1991)	London	London Trade Option Market	27 June 1988 22 Dec 1988	Yes
9	Lee & Nayar (1993)	US	S&P 500 Future & SPX Option	1 Nov 1989 20 June 1991	Yes
10	Vesa Puttonen (1993)	Finland	Finnish Index (FOX)	2 May 1988 21 Dec 1990	Yes
11	Avraham Kamara, Thomas W. Miller & Jr. (1995)	US	SPX Options	May 1986 May 1989	Yes

(Contd....)

Annexure II (Continued)
Empirical Evidences on Pricing Efficiency of Option Markets

Sr. No.	Author (Year of Study)	Country Understudy	Market Understudy	Period Understudy	Mispricing & Violation
12	Berg, Brevik & Sættem (1996)	Oslo	Norwegian Options Market	22 May 1990 31 July 1991	Yes
13	Drew Wagner, David M Ellis & David A. Dubofsky (1996)	US	S&P 100 Index	2 April 1984 31 Dec 1986	Yes
14	Fung Cheng & Chan (1997)	Hong Kong	Hang Seng Index	April 1993 Nov 1994	No
15	Ackert L.F. & Tian Y.S. (2000)	US	S&P 500	1 Jan 1986 31 Dec 1986	Yes
16	Laura Cavallo & Paolo Mammola (2000)	Italy	MIBO30	Dec 1996 Sep 1997	No
17	Paul Draper & Joseph K.W. Fung (2000)	London	FTSE 100	1 Oct 1991 20 Feb 1998	No
18	Stefan Mittik & Sascha Rieken (2000)	Germany	Germany Stock Index (DAX)	Feb 1992 Sep 1995	Yes
19	Anu Bhardwaj & James B. Wiggins (2001)	US	S&P 500 LEAPS	1994-1995	Yes
20	Fung & Mok (2001)	Hong Kong	Hang Seng Index	1 Jan 1994 2 July 1995	No
21	Gunther Capelle-Blancard & Mo Chaudhary (2001)	France	(MONEP)	2 Jan 1997 30 Dec 1999	No
22	Brunetti & Torricelli (2003)	Italy	MibO & Mib30	1 Sep 2002 31 Dec 2002	No
23	Garay, Ordonez & Gozales (2003)	US	S&P 500	2 Jan 2001 31 Dec 2001	Yes
24	Vivek Bhargava & John M. Clark (2003)	US	US Dollar Index	1 Jan 1995 31 Mar 2000	Yes
25	Gianluca Cassese & Massimo Guidolin (2004)	Italy	MIB30	6 April 1999 31 Jan 2000	Yes
26	K.W. Fung, Hanery M.K. Mok & Kenneth C.K. Wong (2004)	Hong Kong	Hang Seng Index	Jan 1994 Aug 1995	No
27	Dr. Dheeraj Misra & Dr. Sangeeta Misra (2005)	India	Nifty	Jan 2004 Dec 2004	Yes
28	Steven Li & Elia Alfay (2005)	Australia	Sydney Futures Exchange	2 Jan 2001 31 Mar 2004	Yes
29	Steven Li (2006)	Japan	Nikkei 225	6 Jan 2003 9 Dec 2005	Yes
30	Laurent Deville & Fabrice Riva (2007)	France	French Index Option	1 Aug 2000 31 July 2001	No
31	Vipul (2008)	India	Nifty	1 Jan 2002 30 Nov 2004	Yes
32	Navdeep Aggarwal & Mohit Gupta (2009)	India	Nifty	1 Jan 2006 31 Mar 2009	Yes
33	Vipul (2009)	India	Nifty	1 Jan 2002 31 Dec 2003	Yes
34	Martin Cremers & David Weinbaum (2010)	US	US Equities	Jan 1996 Dec 2005	Yes
35	Aparna Bhat & Kirti Arekar (2013)	India	USD-INR Ex- Rate NSE	29 Oct 2010 30 June 2013	Yes
36	Debaditya Mohanti & P.K. Priyan (2013)	India	Nifty	1 April 2008 31 Mar 2012	No
37	Debaditya Mohanti & P K Priyan (2014)	India	Nifty	1 April 2008 31 Mar 2012	Yes

Source: Self Formulated