INFORMATIONAL CONTENT OF TRADING VOLUME AND OPEN INTEREST – AN EMPIRICAL STUDY OF STOCK OPTIONS MARKET IN INDIA

Derivative securities have emerged as one of the most potent tools for fundamental risk management in the last three decades. In Indian stock market, these securities have been introduced in June 2000 by Securities and Exchange Board of India in line with the recommendations of committee headed by Dr. L.C. Gupta. Currently, there are four derivative securities namely, stock index futures, stock index options, options on individual shares and futures on individual shares, which are being traded in the stock market in India.

It is believed that the derivative market, along with the risk hedging mechanism, leverage and liquidity, also improves the informational efficiency of cash market. Gibson (1994) highlighted information gathering as one of the key functions of derivative securities. The informational content of derivative securities has been an important subject of debate among researchers and practitioners. ***In this paper, we propose to investigate the informational role of transaction volume and open interest in options market.***

In India, the options on individual shares were introduced on July 2, 2001. In almost fifteen months of trading, the monthly volumes in stock options have increased from Rs. 396 crore to as high as Rs. 6,178 crore in July 2002 at National Stock Exchange. Since these contracts in India are of recent origin, no research has taken place, to our knowledge, with regard to the informational content of options and its inter-relationship with the cash market.

I. OBJECTIVES OF STUDY

Keeping in view the above-mentioned facts, this study seeks to examine the role of options market open interest and traded volume in conveying information about the future movement of the underlying shares. It would explore net open interests and option trading volume as the source of potential inside or private information to infer the price trends. We would also show that trading strategies based on the predictor developed herein would yield better returns than the passive strategies like buy and hold and covered call writing.

II. CONTRIBUTION OF STUDY

This study seeks to contribute to the existing knowledge base and literature in many ways. Firstly, it examines the informational efficiency of options trading volume and open interest in predicting the underlying stock prices. Though some studies are in progress in India to determine the impact of option volumes on volatility of underlying shares, this study is different as it seeks to generate a deterministic measure for an investor who does not have any private / insider information about the future direction of market. Secondly, This study would compliment the effort of Bhuyan and Chaudhury (2001) and Bhuyan and Yan (2002) and would provide support for their hypothesis in Indian context, a developing economy. Thirdly, this study would also aim at developing

superior trading strategies based on informational content of options market that would limit the ability of informed traders (possessing private / insider information) to continuously outperform the market. Lastly, study may provide the basis for the argument in favour of increasing number of shares in option market as it would improve the price discovery process which is so very important for any market. Therefore, the results of this study would be relevant for investors, regulators and stock exchanges.

This proposal is organized in five sections. Section I and II, mentioned above, covers the objectives of the study and its contribution. Section III summarises the existing literature followed by Section IV that presents the proposed methodology including the details of the model to be used. The last section, i.e. Section V, outline the data requirements for the study followed by list of references in the end.

III. SURVEY OF LITERATURE

The proponents of Efficient Market Theory claim that security prices reflect all available information at each point of time (Fama, 1970, 1991 and 1998). Black and Scholes (1973) originally priced options by assuming that they are redundant assets and have valued them with a no arbitrage relation. There are several reasons to test this assumption, one of them being Black (1975) admitted that the high leverage available in options market might induce informed traders to transact options rather than stocks. Also Canard (1989) cited that options may allow investors to take position in underlying asset which, prior to its introduction, was not possible given the restrictions on short-selling in cash market. Further, Ross (1976) and Hakansson (1978) have elaborated the welfare aspects of option market. Grossman (1988) has supported the argument in favour of information content of options trading by concluding that synthetic options (comprising of a combination of shares and risk-free bonds) are not identical in its information content.

Others including Manaster and Rendleman (1982), Bhattacharya (1987), Vijh (1988, 1990), Anthony (1988), Stoll and Whaley (1990), Stephen and Whaley (1990), Detemple and Jorion (1990), Damodaran and Lim (1991), Chan, Chung and Johnson (1993), Srinivas, Sarin and Shastri (1995), Fleming, Ostdiek and Whaley (1996), Easley, O'Hara and Srinivas (1998), John, Koticha, Narayanan and Subrahmanyam (2000), Chan, Chung and Fong (2002), Bhuyan and Chaudhury (2001) and Bhuyan and Yan (2002) have empirically investigated the links between option and equity market.

Taking direction from Easley, O'Hara and Srinivas (1998), Bhuyan and Chaudhury (2001) and Bhuyan and Yan (2002) have used open interests and volumes to decipher the informational role of options market in deciphering the underlying stock price as well as for developing the directional trading strategies. They concluded that these predictors demonstrate incremental explanatory and strong predictive power even in presence of the other variables.

IV. MODEL AND METHODOLOGY

The model to be used in this study is based on Bhuyan and Chaudhury (2001) and some refinements have been made in administering the model to improve its performance in Indian context.

We have assumed a stock with a set of call and put options maturing at T, the current time being T_0. The stock price at time t would be S_t and X^C_i and X^P_i are the set of strike prices for call and put options such that X^C_i, i = 1,2,……,k; X^P_i, i = 1,2,……,m and $t \in [T_0, T]$. Let O^C_{it} and O^P_{it} be the net open interest for a call and put option with the strike prices of X^C_i and X^P_i respectively.
The call option open interest based (COP) is defined by:

$$O^c_t = \sum_{i=1}^{k} w^c_{it} X^c_i \qquad \text{Equation 1}$$

$$w^c_{it} = \frac{O^C_{it}}{\sum_{i=1}^{k} O^C_{it}} \qquad \text{Equation 2}$$

where, O^C_t is COP at time t, k is the number of different types of call options having non-zero open interests, w^C_{it} is the weight of call options with strike of X^C_i. Similarly, put option open interest based predictor (POP) is defined as:

$$O^P_t = \sum_{i=1}^{m} w^P_{it} X^p_i \qquad \text{Equation 3}$$

$$W^p_{it} = \frac{O^P_{it}}{\sum_{i=1}^{m} O^p_{it}} \qquad \text{Equation 4}$$

O^P_t is POP at time t, m is the number of different types of put options having non-zero open interests, w^P_{it} is the weight of put options with strike of X^P_i.

Similarly, volume based predictors for both call options, V^C_t, and put options, V^P_t, are defined as follows:

$$V^c_t = \sum_{i=1}^{k} q^c_{it} X^c_i \qquad \text{Equation 5}$$

$$q^c_{it} = \frac{V^c_{it}}{\sum_{i=1}^{k} V^c_{it}} \qquad \text{Equation 6}$$

$$V^{p}{}_{t} = \sum_{i=1}^{m} q^{p}{}_{it} X^{p}{}_{i} \qquad \text{Equation 7}$$

$$q^{p}{}_{t} = \frac{V^{p}{}_{it}}{\sum_{i=1}^{m} V^{p}{}_{it}} \qquad \text{Equation 8}$$

where $q^{C}{}_{it}$ is the weight of call options with exercise price, $X^{C}{}_{i}$, and $q^{P}{}_{it}$ is the weight of put options with exercise price, $X^{P}{}_{i}$, for non-zero volume.

Based on the two open interest based predictors and two volume based predictors, the following regression model is used to see relative significance of each of these predictors.

$$S_T = a_0 + a_1 + (T-t) + a_2 S_t + a_3 O^{c}{}_{t} + a_4 O^{p}{}_{t} + a_5 V^{c}{}_{t} + a_6 V^{p}{}_{t} + \in_t \qquad \text{Equation 9}$$

Where, S_T is the stock price at maturity date T, T-t is the time to maturity, S_t is the current stock price, $O^{C}{}_{t}$ and $O^{P}{}_{t}$ are open interest based predictors, $V^{C}{}_{t}$ and $V^{P}{}_{t}$ are volume based predictors and ε_t is the error term.

In order to refine the methodology adopted by Bhuyan and Yan (2002), we would not be using open interest and volume estimates available at all the strike prices to develop the above-mentioned predictors. Rather, we would use these measures for five strike prices in both upper and lower bound around at-the-money option. Also the impact of change in the open interests on the dependent variable would be examined. This would improve the methodology and may provide better predictor for framing trading strategies.

V. DATA

The data required for this study includes the following:

- Daily closing call and put options data regarding price, volume and open interest by strike price for 30 shares in options on individual shares segment;
- Intra-day call and put option data regarding price, volume and open interest by strike price for 30 shares in options on individual shares segment;
- Closing, intra-day, high and low share price of 30 shares.

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