CHAPTER 4

RELATIONSHIP BETWEEN FUTURES PRICE AND OPEN INTEREST

This chapter probes the relationship between the price of the futures contract in the derivatives market with the open interest in that futures contract. The objective is to examine the popular presumption that the change in open interest leads to a change in the price behaviour of the futures contract. The change in prices of futures contracts of sixteen stocks and NIFTY are used to find out the correlation between the change in futures price and the change in open interest in these contracts to prove or disprove the existence of a relationship between the futures price and the open interest.
4. RELATIONSHIP BETWEEN FUTURES PRICE AND OPEN INTEREST

Participants in the stock markets believe that the amount of open interest in a particular contract has a bearing on the behaviour of the price of the contract. This popular perception is put to test in the following research by correlating the change in open interest in stock futures with the change in the futures prices.

Empirical data has been collected from bhav copies published by the National Stock Exchange, India and then the data is subjected to correlation analysis to find out the significance of these parameters. The daily price data and open interest data is collected for sixteen stocks and the index (NIFTY) for a period of 4 years. The correlation between the change in futures price and the change in open interest is calculated for near month contracts of these seventeen futures contracts.

4.1 THEORETICAL BACKGROUND

Futures: Futures contracts are exchange-traded agreements to buy or sell a given quantity of a particular asset/ stock for delivery at a specified future date but at a price agreed today.

A look at the definition raises two questions in the mind. They are:

a. What are the determinants of the price of the futures contract?

b. How do we go about determining the fair price of the contract?

When a futures contract is traded it creates a contract between a seller of the contract and the buyer of the contract. This also means that the buyer and the seller have a contract open in the market or they have an open
position in the market. These open positions can be closed by way of expiry of the contract or by closing out a position in the market. Open interest is defined as the number of contracts existing in a futures market that have not yet been closed out. It is reported as the number of outstanding contracts at the end of a trading day. Open interest increases from zero when a contract is first listed for trading, falling back to zero on the maturity date of the underlying contract when trading ceases. The number of open positions in the market is measured in terms of open interest thus, the open interest in a contract tells us about the popularity of the said contract in the market. Futures markets differ from equity markets in many respects. One specific element of difference has to do with open interest, as there is no directly comparable measure in equity markets. In the latter, there are a number of outstanding shares that may be traded, in which case the trading volume captures the number of shares traded by market participants. Of specific note is the fact that trading volume does not affect the number of outstanding shares, which is determined by a policy decision of the corporate board, thus increasing or decreasing infrequently.

In the futures markets, however, there is no set number of outstanding contracts to be traded. Contracts come into existence simply by two parties who are interested in buying and selling a contract. There is no direct, link between trading volume and open interest, which are effectively stock and flow measures of activity, respectively. For any given trading volume, the open interest for a contract may rise, fall, or remain unchanged.
Let us see, what happens when open interest rises. If two new traders (not already holding positions in the market) come to the market, one buying (going long) and the other selling (going short) a single contract, their trading activity will result in a trading volume of one contract, and it will increase open interest by one contract. If a new trader comes to the market and goes long, this activity will result in a trading volume of one contract, but there will be no change in open interest if the contract purchased had previously been owned by some other trader who has decided to close an existing position and this activity will resemble that observed in equity markets. Finally, let us see how does the open interest fall. If two traders who are already in the market (one long and the other short) close their respective positions against one another, it will result in a trading volume of one contract and a decrease in open interest of one contract. In this case, the long trader closes the position by going short, and the short trader closes by going long. In each case, the observed trading volume is one regardless of the effect on open interest. Therefore, the observation of a trade does not tell us whether or not open interest has increased, decreased, or remained unchanged. It is therefore necessary to include observations on open interest directly to be able to determine whether or not this trading activity variable influences the volatility of futures prices separately from trading volume.

Participants in the stock markets believe that the amount of open interest in a particular contract has a bearing on the behaviour of the price of the contract. This popular perception is put to test in the following research by
correlating the change in open interest in stock futures with the change in the futures prices.

Research in this area has shown some interesting results, Christos Floros examines the relation between price and open interest in the Greek stock index futures market. The focus is on GARCH effects and the long-run information role of open interest. The results show that current open interest helps in explaining GARCH effects, while a negative impact on returns is reported. Furthermore, evidence from the co integration tests shows that there is a long-run relation between open interest and futures price. This suggests that one can use the information of open interest to predict futures prices in the long run. Sandeep Srivastava (2003) examines the role of open interest and trading volume, from the stock option market in determining the price of underlying shares in cash market. The study provides deterministic parameters that can be used by the uninformed investors to predict the price of underlying shares using stock options market data and formulate the profitable trading strategies based on it. Harrison Hong (2001) has developed a dynamic, equilibrium model of a futures market to study optimal hedging and the term structure of open interest and futures prices. The model predicts that in markets with substantial and mean reverting convenience yield shocks (e.g. energy futures), open interest is evenly distributed among contracts of different maturities. In markets where these shocks are persistent (e.g. metal futures), open interest is concentrated in near-to-maturity futures. The model generates additional implications regarding how the term structure
of futures price volatility and the futures risk premium depend on the nature of convenience yield shocks. Ronald D. Ripple and Imad A. Moosa (2007) have examined the determinants of the volatility of crude oil futures prices using an intra-day range-based measure of volatility. The contract-by-contract analysis reveals that trading volume and open interest have a significant impact on volatility and that they dominate the Samuelson-maturity effect. While the results support earlier findings of positive and significant role for trading volume, they also show the importance of open interest as a determinant of volatility. The results of the full-period time series analysis also demonstrate the significant role played by open interest in the determination of futures price volatility and further confirm the importance of trading volume.

4.2 RESEARCH PROBLEM AND DEFINITION:

"To find out the relationship between the changes in future prices of stocks and change in open interest on the National Stock Exchange"

4.2.1 Objectives:

4.2.1.1 To understand the relation between the changes in Open Interest in individual futures contracts to the change in price of futures contract.

4.2.1.2 To understand the relation between the change in the price of NIFTY to the change in Open Interest in Nifty Futures contract.

4.2.2 Hypotheses

4.2.2.1 There is a strong and positive correlation between the change in open interest and change in futures price in single stock futures
4.2.2.2 There is a strong and positive correlation between the change in open interest and nifty futures.

4.3 METHOD OF STUDY

4.3.1 Data Collection

Sixteen liquid stocks were selected on a random basis from the universe of the S&P CNX NIFTY along with the NIFTY itself. The futures prices for the months of the contract expiring in July 2002 to June 2006 were considered for computing the cost of carry in the stock on a daily basis.

The data collected for the sixteen stocks and Nifty consisted of 48 files each for each stock. Each file contained the OPEN, HIGH, LOW, CLOSE, Last Traded Price, Settlement Price, Number of Contracts Traded, open interest and Change in Open Interest for the specified Contract. The data was available on an average for about 90 days per contract, from the day of introduction of the contract to the expiry of the contract. It was observed that these contracts were traded thinly until they became near-month contracts. Therefore only the data pertaining to the near month contracts was selected and a single data set of near month contract prices was prepared for each of these stocks. The data for the day of expiry was omitted and data for the next contract was included for the day of contract expiry as the cost of carry is expected to be zero on the contract expiry date for a specific contract.

The stocks selected were:
Table 4.1
List of the companies selected for analysis

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Industry</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated Cement Companies Ltd.</td>
<td>Cement and cement products</td>
<td>ACC</td>
</tr>
<tr>
<td>Bajaj Auto Ltd.</td>
<td>Automobiles - 2 and 3 wheelers</td>
<td>BAJAJAUTO</td>
</tr>
<tr>
<td>Bharti Airtel Ltd.</td>
<td>Telecommunication – services</td>
<td>BHARTIAIRTEL</td>
</tr>
<tr>
<td>Bharat Heavy Electricals Ltd.</td>
<td>Electrical equipment</td>
<td>BHEL</td>
</tr>
<tr>
<td>Cipla Ltd.</td>
<td>Pharmaceuticals</td>
<td>CIPLA</td>
</tr>
<tr>
<td>GAIL (India) Ltd.</td>
<td>Gas</td>
<td>GAIL</td>
</tr>
<tr>
<td>Housing Development Finance Corporation Ltd.</td>
<td>Finance – housing</td>
<td>HDFC</td>
</tr>
<tr>
<td>Hero Honda Motors Ltd.</td>
<td>Automobiles - 2 and 3 wheelers</td>
<td>HEROHONDA</td>
</tr>
<tr>
<td>Infosys Technologies Ltd.</td>
<td>Computers – software</td>
<td>INFOSYSTCH</td>
</tr>
<tr>
<td>I T C Ltd.</td>
<td>Cigarettes</td>
<td>ITC</td>
</tr>
<tr>
<td>National Aluminium Co. Ltd.</td>
<td>Aluminium</td>
<td>NATIONALUM</td>
</tr>
<tr>
<td>Reliance Industries Ltd.</td>
<td>Refineries</td>
<td>RELIANCE</td>
</tr>
<tr>
<td>State Bank of India</td>
<td>Banks</td>
<td>SBIN</td>
</tr>
<tr>
<td>Tata Motors Ltd.</td>
<td>Automobiles - 4 wheelers</td>
<td>TATAMOTORS</td>
</tr>
<tr>
<td>Tata Steel Ltd.</td>
<td>Steel and steel products</td>
<td>TATASTEEL</td>
</tr>
<tr>
<td>Tata Tea Ltd.</td>
<td>Tea and coffee</td>
<td>TATATEA</td>
</tr>
<tr>
<td>Nifty</td>
<td>-</td>
<td>NIFTY</td>
</tr>
</tbody>
</table>
The time series of the open interest of the single stock futures of all the stocks and NIFTY were downloaded and collected for the purpose of analysis. Only the near month futures were considered for analysis, because it was found that the stock futures and NIFTY futures picked up volumes only when they became near month futures. When these contracts are two-month or three-month futures contracts the volume was found to be negligible. The open interest was found to have been picked up whenever the contract became a near month contract. Therefore only the near month contracts (or One-month contracts) and their open interest was considered for calculations.

4.3.2 Limitations of the study:

4.3.2.1 The study is limited to the 17 futures contracts selected for a period of June 2002 June 2006. The underlying dynamics of the economy were changing fast and the popularity of futures trading were just picking up in these years and therefore this study would at best describe the phase of evolution of futures market in India.

4.3.2.2 The study aims to find out whether open interest and the change in open interest in a stock futures contract and index contract have any effect on the change in the prices of the contract. There are not many articles written on this subject available in the public domain so this attempt is only to prove a point. The popular market premise is being tested with limited period data of Indian markets.
4.3.3 **Data Consolidation:**

The futures Price data collected from the NSE website (www.nseindia.com) was available in the form of contract wise price volume data for the specific contract. The data for the above said stocks and the nifty was downloaded from the NSE website. Data for each stock was contained in a contract-wise file making it upto 48 files per stock. These 48 files were further pruned to one month or near month contract data and then merged into a single data set containing the one month or near month contract price data for the period of 28 June 2002 to 29 June 2006.

The spot prices for all the stocks for the period from 28 June 2002 to 29 June 2006 were downloaded from the NSE website and placed alongside the futures data for the purpose of consolidation.

Thus each data set had the following fields: SYMBOL, EXPIRY DATA, DATE OF TRADE, DAYS TO EXPIRY, FUTURES CLOSE, SPOT CLOSE and OPEN INTEREST.

4.4 **DATA ANALYSIS**

4.4.1 **Correlation**

In determining the correlation we use the measure of linear correlation. The population parameter is denoted by the Greek letter rho and the sample statistic is denoted by the roman letter r and is given by the equation mentioned in chapter 3 as eq. (3.1) In our analysis when x denotes change in OPEN INTEREST, y denotes change in FUTURES PRICE.
Determination of Change in Futures Price

The change in futures price is found by using the following simple equation

\[ \Delta F = \frac{F_t - F_{t-1}}{F_{t-1}} \]  

(4.1)

Where

\( \Delta F \) is the change in futures price.

\( F_t \) is the closing futures price of the day.

\( F_{t-1} \) is the closing futures price of the previous day.

Determination of change in Open Interest

The change in open interest is found by using the following simple equation

\[ \Delta OI = \frac{OI_t - OI_{t-1}}{OI_{t-1}} \]  

(4.2)

Where

\( \Delta OI \) is the change in Open Interest.

\( OI_t \) is the open interest for the day.

\( OI_{t-1} \) is the Open Interest for the previous day.
4.5 PROCEDURE

4.5.1 We determine change in Open Interest (x) as given by equation (4.2) for each of the stocks selected.

4.5.2 We determine change in Futures Price (y) as given by equation (4.1) for each of the stocks selected.

4.5.3 For each of the stocks we have x as change in Open Interest and y as change in Futures price.

4.5.4 We determine coefficient of correlation r using equation (3.1).
4.6 FINDINGS:

4.6.1 Associated Cement Companies (ACC)

The behaviour of the futures price and the open interest in the futures contract of ACC—for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.2

| Correlation between the change in futures price and change in Open Interest for ACC | 0.083087 |

The correlation between the change in futures price and the change in open interest for the period under study was found to be 0.083087 indicating that only 8.3% of the change in futures price can be explained by the change in Open Interest in the futures contract of ACC. This indicated that the change in futures price and the change in open interest have a low correlation with each other and changes in one variable cannot be fully or partially explained by the changes in the other variable.
4.6.2 Bajaj Auto Limited (Bajaj Auto)

The behaviour of the futures price and the open interest in the futures contract of Bajaj Auto for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.3

Correlation between the change futures price and change in Open Interest for Bajaj Auto

| Correlation between the change in futures price and change in Open Interest | -0.0481 |

The correlation between the change in futures price for futures contracts of Bajaj Auto and the change in open interest was -0.0481 indicating that the variables are negatively correlated to the extent of 4.81%. This also brings us to the conclusion that the change in futures price and change in open interest in Bajaj Auto futures contracts are not related to each other and one cannot be explained by the behaviour of the other statistically as their correlation coefficient is very low at -0.0481.
4.6.3 Bharti Airtel Limited (Bharti)

The behaviour of the futures price and the open interest in the futures contract of Bharti for the period 20\textsuperscript{th} April 2005 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed. The period of study is truncated as futures contracts in Bharti Airtel were introduced only in the month of April 2005.

Table 4.4

Correlation between the change futures price and change in Open Interest for Bharti

| Correlation between the change in futures price and change in Open Interest | -0.0598 |

The correlation between the change in prices of the futures contracts in Bharti and the change in open interest in the same contract was -0.0598 indicating that the changes in the prices of futures contracts cannot be explained by the change in the open interest in the futures contract as there is a negative correlations and that too of a very small magnitude. This leads us to the conclusion that change in futures have no relation to the change in open interest in these futures contracts.
4.6.4 Bharat Heavy Electricals Limited (BHEL)

The behaviour of the futures price and the open interest in the futures contract of BHEL for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.5

Correlation between the change futures price and change in Open Interest for BHEL

| Correlation between the change in futures price and change in Open Interest | 0.0323 |

The correlation between the change in price of the futures contract of BHEL and the change in Open interest in the near month contract of BHEL was 0.0323 indicating that only 3.23% of the change in the price of the futures contract can be explained by the change in open interest in the futures contracts of BHEL. That would also mean that the change in price of futures contracts of BHEL has no relation to the change in Open interest in the futures contracts of BHEL.
4.6.5 Cipla Limited (Cipla)

The behaviour of the futures price and the open interest in the futures contract of Cipla for the period 28\textsuperscript{th} June 2002 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.6

**Correlation between the change futures price and change in Open Interest for Cipla**

| Correlation between the change in futures price and change in Open Interest | -0.234 |

The correlation between the change in price of the futures contract and the change in Open Interest was -0.234 indicating a negative correlation between the two variables. This negative correlation would mean that the changes in futures price of Cipla do not have a relation with the changes in the Open Interest in Cipla Futures contracts and the change in one cannot be explained by the change in other.
4.6.6 Gas Authority of India Limited (GAIL)

The behaviour of the futures price and the open interest in the futures contract of GAIL for the period 20\textsuperscript{th} September 2003 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed. The Dates are truncated as the futures contracts in GAIL were introduced in September 2003.

Table 4.7

Correlation between the change futures price and change in Open Interest for GAIL

| Correlation between the change in futures price and change in Open Interest | 0.00142 |

The Correlation between the change in prices of the futures contract of GAIL and the change in open interest was 0.00142 indicating that only 0.14\% of the change in futures prices of GAIL can be explained by the changes in Open interest in Gail futures contracts. This leads us to a conclusion that the change in futures prices of GAIL and the change in Open interest in Gail contracts are not independent of each other.
4.6.7 Housing Development Finance Corporation Limited (HDFC)

The behaviour of the futures price and the open interest in the futures contract of HDFC for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

**Table 4.8**

**Correlation between the change futures price and change in Open Interest for HDFC**

<table>
<thead>
<tr>
<th>Correlation between the change in futures price and change in Open Interest</th>
<th>-0.1534</th>
</tr>
</thead>
</table>

The correlation between change in HDFC futures contract prices and change in open interest in the near month contracts for HDFC futures was -0.1534 indicating that the change in futures prices for HDFC cannot be explained by the change in Open Interest in the HDFC futures contracts. This leads us to conclude that HDFC futures contracts' prices and the open interest in the HDFC futures contracts are independent of each other.
4.6.8 **Hero Honda Limited (Hero Honda)**

The behaviour of the futures price and the open interest in the futures contract of Hero Honda for the period 27\textsuperscript{th} February 2003 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed. Futures contracts in Hero Honda were introduced in February 2003 hence the date of start of the data is 27\textsuperscript{th} February 2003 which happens to be the first day of trading in the March 2003 contract.

**Table 4.9**

<table>
<thead>
<tr>
<th>Correlation between the change in futures price and change in Open Interest for Hero Honda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation between the change in futures price and change in Open Interest</td>
</tr>
</tbody>
</table>

The correlation between the change in futures price of Hero Honda and the change in open interest in futures contracts of Hero Honda was -0.13167, which means that the two variables are independent of each other and they do not have a strong and positive correlation.
4.6.9 Infosys Technologies Limited (Infosys)

The behaviour of the futures price and the open interest in the futures contract of Infosys for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.10

Correlation between the change futures price and change in Open Interest for Infosys

| Correlation between the change in futures price and change in Open Interest | -0.11383 |

The Correlation between the change in futures price of Infosys and the change in Open Interest was -0.11383 which indicates that the change in futures prices and the change in Open interest are independent of each other and they do not have a strong positive correlation amongst them.
4.6.10 ITC Limited (ITC)

The behaviour of the futures price and the open interest in the futures contract of ITC for the period 28\textsuperscript{th} June 2002 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.11

| Correlation between the change in futures price and change in Open Interest for ITC | -0.01054 |

The correlation between the change in futures prices of ITC near month contracts and the change in Open interest for the same contracts was -0.01054 indicating that the change in open interest and the change in prices of futures contracts are independent of each other and they do not have a strong and positive correlation amongst each other.
4.6.11 National Aluminium Company Limited (NALCO)

The behaviour of the futures price and the open interest in the futures contract of NALCO for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.12

Correlation between the change futures price and change in Open Interest for NALCO

<table>
<thead>
<tr>
<th>Correlation between the change in futures price and change in Open Interest</th>
<th>-0.00277</th>
</tr>
</thead>
</table>

The correlation between the change in futures price and the change in Open interest was -0.00277, which means that the change in futures price and the change in open interest are independent of each other and they do not have a strong and positive correlation.
4.6.12 Reliance Industries Limited (Reliance)

The behaviour of the futures price and the open interest in the futures contract of Reliance for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.13

Correlation between the change futures price and change in Open Interest for Reliance

| Correlation between the change in futures price and change in Open Interest | 0.05911 |

The correlation between the change in price of futures contracts of Reliance and the change in Open interest was 0.05911 indicating that 5.9% of the change in futures price of Reliance can be explained by the change in the Open interest of Reliance futures contracts. This leads us to conclude that there is no strong correlation between the change in futures price and the Open Interest in these contracts.
4.6.13 State Bank of India Limited (SBI)

The behaviour of the futures price and the open interest in the futures contract of SBI for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.14

| Correlation between the change in futures price and change in Open Interest for SBI |
|---------------------------------|------------------|
| Correlation between the change in futures price and change in Open Interest | 0.1806 |

Correlation between the change in futures price of SBI and the change in Open Interest in SBI futures contracts was 0.1806 indicating that 18.06% of the change in futures prices of SBI could be explained by the change in Open interest. This leads us to conclude that there is a weak-positive correlation between the change in futures price and the change in Open Interest in the SBI futures contracts.
4.6.14 Tata Motors Limited (Tata Motors)

The behaviour of the futures price and the open interest in the futures contract of Tata Motors for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

<table>
<thead>
<tr>
<th>Correlation between the change in futures price and change in Open Interest for Tata Motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.04476</td>
</tr>
</tbody>
</table>

The correlation between the change in futures prices of Tata Motors and the change in open interest was 0.04476 indicating that only 4.47% of the change in futures prices could be attributed to the change in open interest. Thus leading us to the conclusion that the change in prices of Tata Motors futures contracts and the change in Open interest are not strongly correlated and they are independent of each other.
4.6.15 Tata Power Limited (Tata Power)

The behaviour of the futures price and the open interest in the futures contract of Tata Power for the period 28th June 2002 to 28th June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.16

Correlation between the change futures price and change in Open Interest for Tata Power

| Correlation between the change in futures price and change in Open Interest | 0.05067 |

The Correlation between the change in futures contracts in Tata Power and the change in Open interest in the Tata power futures contracts was 0.05067 indicating that only 5.06% of the change in futures prices of Tata Power can be explained by the changes in the Open interest of these contracts. This leads us to conclude that there is no strong and positive correlation between the two variables. The change in futures prices and change in Open interest are independent of each other.
4.6.16 Tata Steel Limited (Tata Steel)

The behaviour of the futures price and the open interest in the futures contract of Tata Steel for the period 28\textsuperscript{th} June 2002 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

\textbf{Table 4.17}

\textbf{Correlation between the change futures price and change in Open Interest for Tata Steel}

| Correlation between the change in futures price and change in Open Interest | 0.0170 |

The Correlation between the change in futures price and the change in Open interest was 0.0170 indicating that the change in futures price and the change in open interest are independent of each other and they do not have a strong correlation between each other.
4.6.17 Tata Tea Limited (Tata Tea)

The behaviour of the futures price and the open interest in the futures contract of Tata Tea for the period 28\textsuperscript{th} June 2002 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

Table 4.18

Correlation between the change futures price and change in Open Interest for Tata Tea

<table>
<thead>
<tr>
<th>Correlation between the change in futures price and change in Open Interest</th>
<th>0.15176</th>
</tr>
</thead>
</table>

The Correlation between the change in futures prices and the change in Open Interest was 0.15176 indicating that 15.18\% of the change in futures price can be explained by the change in open interest in Tata tea futures. This leads us to conclude that there is a weak correlation between the change in futures price and the change in open interest.
4.6.18 S&P CNX Nifty (Nifty)

The behaviour of the futures price and the open interest in the futures contract of NIFTY for the period 28\textsuperscript{th} June 2002 to 28\textsuperscript{th} June 2006 was studied using correlation to observe the changes in the futures price when the Open interest changed.

| Table 4.19 |
| Correlation between the change futures price and change in Open Interest for NIFTY |

| Correlation between the change in futures price and change in Open Interest | -0.0611 |

In the case of NIFTY, which is the most liquid of all the futures contracts, the change in open interest and change in futures price have a correlation of -0.0611, which suggests that the change in futures price changes independent of the change in open interest in the NIFTY contract. This also suggests that the change in futures prices of Nifty and the change in Open Interest do not have a strong and positive correlation meaning that we do not need to monitor changes in open interest to predict/ foretell/ expect changes in prices of futures contracts of the NIFTY.
**Table 4.20**

Correlation between the change in futures price and change in Open Interest

<table>
<thead>
<tr>
<th>Company</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>0.0831</td>
</tr>
<tr>
<td>Bajaj Auto</td>
<td>-0.0481</td>
</tr>
<tr>
<td>Bharti Airtel</td>
<td>-0.0598</td>
</tr>
<tr>
<td>BHEL</td>
<td>0.0323</td>
</tr>
<tr>
<td>Cipla</td>
<td>-0.2344</td>
</tr>
<tr>
<td>GAIL</td>
<td>0.0014</td>
</tr>
<tr>
<td>HDFC</td>
<td>-0.1534</td>
</tr>
<tr>
<td>Hero Honda</td>
<td>-0.1317</td>
</tr>
<tr>
<td>Infosys</td>
<td>-0.1138</td>
</tr>
<tr>
<td>ITC</td>
<td>-0.0105</td>
</tr>
<tr>
<td>NALCO</td>
<td>-0.0028</td>
</tr>
<tr>
<td>Reliance</td>
<td>0.0591</td>
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<tr>
<td>SBI</td>
<td>0.1806</td>
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<tr>
<td>Tata Motors</td>
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<td>Tata Power</td>
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</tr>
<tr>
<td>Tata Steel</td>
<td>0.0170</td>
</tr>
<tr>
<td>Tata Tea</td>
<td>0.1518</td>
</tr>
<tr>
<td>NIFTY</td>
<td>-0.0611</td>
</tr>
</tbody>
</table>

The Table 4.20 is depicted in the form of a chart to pictorially describe the correlations of the change in future prices of different futures contracts with the change in Open Interest in those contracts. This chart shows that the overall correlation of nearing ZERO meaning that the change in...
Futures prices and change in Open Interest are independent of each other. Thus we can conclude that the Open Interest would only indicate the liquidity in the particular futures contract and it does not contain any directional information due to the increase or decrease in the open interest in that particular contract.

Chart 4.1
Correlation Between Change in Futures Price and Change in Open Interest

4.7 Conclusions:
The above chart 4.1 and the data in Table 4.20 show that the correlation between the change in Futures Price and the change in Open Interest is between +0.18 and -0.23 and The correlation between the change in open interest in the NIFTY futures contract and the change in the futures price
of the NIFTY futures is -0.0611 suggesting that the correlation is spread around zero meaning that change in Futures Price does not have any correlation with the change in Open Interest.

Hypothesis 1. There is a strong and positive correlation between the change in open interest and change in futures price in single stock future. The hypothesis stands rejected as the correlations hovers around ZERO

Hypothesis 2. There is a strong and positive correlation between the change in open interest and nifty futures. The hypothesis stands rejected as the correlation coefficient is nearly ZERO.

This relationship or the absence of it suggests that change in open interest in futures contracts is just a phenomenon of the trading volume and it in no way has some directional information. We can conclude from this analysis that open interest changes as and when the number of open positions increase or decrease in a given contract and it has no bearing over the direction of the market. Thus we can also say that a change in open interest will not lead to a change in futures price in any direction. A corollary of the conclusion is that open interest is a measure of liquidity in the futures contract and not a fore bearer of the price direction of the futures contract.