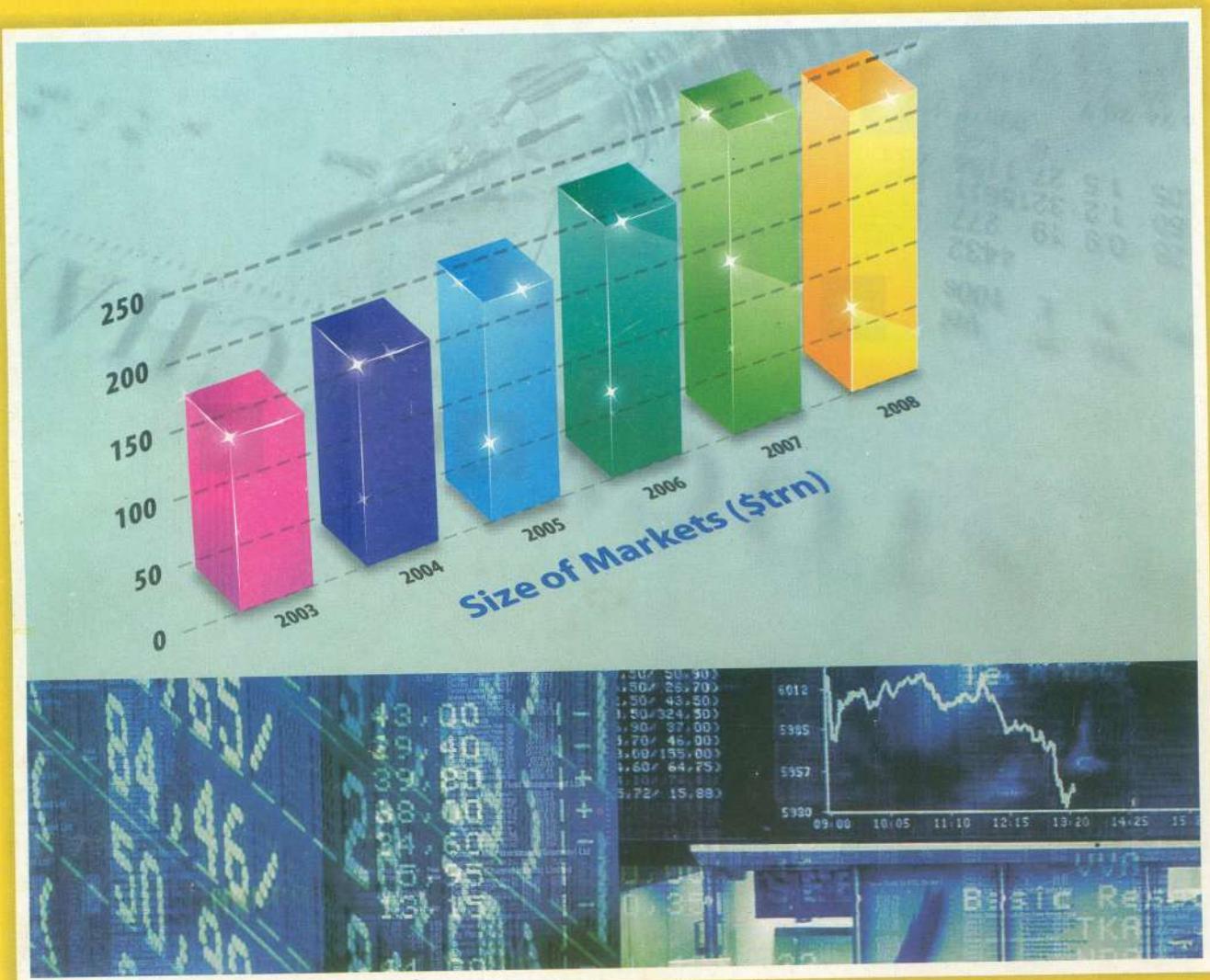




MFP-2 EQUITY DERIVATIVES



“शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।”

— इन्दिरा गांधी

“Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances.”

— Indira Gandhi

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BLOCK 2 EQUITY FUTURES & OPTION BASICS

Equity Derivative markets have been active from the year 2000 onwards when NSE launched the futures in equity derivatives on the platform NEAT. Indian Equity markets can be bifurcated between two major segments; Equities and Equity derivatives. In India, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) have been permitted by Securities Exchange Board of India (SEBI) to set up their derivatives segment. In this block, we will be discussing basics of Equity Futures and Options.

Unit 5 explains the basic concept of equity futures and various components of Index and stock futures' contract specification. The unit enhances our knowledge by explaining the usage of equity futures in market, comprehending market indicators (volume and open interest) and risk management strategies.

Unit 6 elaborates on options and its different types by computing risks and rewards and the limited/unlimited nature of gains and losses in long and short positions in Calls and Puts. It explains the computation and interpretation of option payoffs for different types and through some light on concepts like exercising or assigning the option.

Unit 7 explains various trading strategies using Equity futures and options. By reading this unit, one will understand the mechanism of hedging, speculating and arbitraging using equity futures. It further explains equity futures are used to minimise risk and points out the importance of clear strategies using futures as derivatives instruments.

Unit 8 explains various factors that impact the prices of stock futures and options. The real impact of few factors on the price is also elaborated. Some of these factors could be: Dividends declared by the company, stock split announced by the company, company issuing additional shares as rights or bonus, Merger/ demerger or corporate restructuring.

UNIT 5 INDEX AND STOCK FUTURES

Objectives

By the end of the unit, you should be able to:

- understand and appreciate the basic concepts of Equity Futures;
- explain the various components of Index and stock futures' contract specification;
- discuss how equity futures are used in practice;
- describe market indicators like Volume and Open Interest; and
- identify the Risk management strategies.

Structure

- 5.1 Introduction
- 5.2 Indian Equity Derivatives Segment
- 5.3 Equity Futures Pay Off
- 5.5 Risk Management
- 5.6 Summary
- 5.7 Self Assessment Questions
- 5.8 Further Readings

5.1 INTRODUCTION

This unit deals with Index and Stock Futures. It deals with understanding the product, its risks and rewards, the players who dwell in this space and the strategies that they typically adopt. It deals with risk management and good trading practices in handling futures, which are a high risk high return instrument. The unit will provide you with a micro and macro understanding of the futures universe. The unit will also cover basic documentation that you would need to be aware of while dealing in Stock or Index Futures.

5.2 INDIAN EQUITY DERIVATIVES SEGMENT

Indian Equity markets can be bifurcated between two major segments; Equities (also commonly known as the Cash market) and Equity derivatives (also commonly known as Futures & Options or F&O). In India, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) have been permitted by Securities Exchange Board of India (SEBI) to set up their derivatives segment since the year 2000. As per the Dr. L.C. Gupta Committee's suggestion (approved by SEBI and circulated in June, 1998), the derivatives segment commenced with Index futures. Index Futures have been popular since that time and you will find that even today, the volume of trading in Index Futures is significant.

The total turnover in the cash market for 2008-09 is Rs. 38,52,097 crores. While in the F&O segment, the total turnover was Rs. 110,22,750 crores, in 2008-09. The high volume indicates the trading interest, ease and popularity of the segment. Within the Futures & Options segment, bulk of the trading volume emanates from Futures.

Stock and Index Futures

Generally, investors try and replicate the performance of their portfolio against a benchmark. The benchmark should be such that it can act as an efficient proxy for the market. Indexes arise out of this need for a proxy by the investor community and by the market at large. Being a proxy of the market means that returns on the index should represent returns on the market i.e., the returns that an Investor could make if he had the entire market in his portfolio. This is because for someone who wishes to replicate the return on the market it is infinitely more expensive to buy the whole market and for small portfolio sizes it is almost impossible.

The index value is arrived at by calculating the weighted average of the prices of a basket of stocks of a particular portfolio. This portfolio is called the index portfolio and attempts a high degree of correlation with the market. Indexes differ based on the method of assigning the weightages to the stocks in the portfolio. There are various methods of calculating the Index values like Market Capitalization weighted, price weighted, and equal weighted. Market capitalization method is the most popular method. Both BSE Sensex and S& P CNX Nifty follow this approach.

Market Capitalization: The market cap for a single company can be understood as the total value of its entire equity.

Market Capitalization = Current stock price*Shares outstanding

Free-Float Market Capitalization

Free float is defined as shares available for trading in the market. The following shares are excluded in the definition of free float.

- Holdings by founders/directors/acquirers which has control element.
- Holdings by persons/bodies with “controlling interest”.
- Government holding as promoter/acquirer.
- Holdings through the FDI Route.
- Strategic stakes by private corporate bodies/individuals.
- Equity held by associate/group companies (cross-holdings).
- Equity held by employee welfare trusts.
- Locked-in shares and shares which would not be sold in the open market in normal course.

Free float market capitalization is computed as the free float number of shares multiplied by the market price per share of each company. For an index, the companies comprising the index are decided by a body, generally a committee of the exchange. The sum of the free float market cap of all companies in the index provides the free float market cap of the index. Suppose on a certain day, this sum was equal to Rs. 25 lakh crores. At this point, the index value was say 4,000.

As the prices of individual stocks move, the free float market cap of the index will also change. Suppose this value moves to Rs. 26 lakhs, the index will also move proportionately and become $26 / 25 \times 4,000 = 4,160$ points.

Both the Sensex and the Nifty are based on the free float market cap model as of now. The Sensex moved to free float methodology in 2002 while the Nifty moved in 2009.

Index futures

Index futures are future contracts for which underlying is the cash market index. For example: BSE launched a future contract on “BSE Sensitive Index” and NSE launched “S&P CNX NIFTY”. Some of the popular indices in the Indian Equity market are:

BSE-30 SENSEX	S&P CNX Nifty
BSE-100	S&P CNX Nifty Jr.
BSE Dollex	S&P CNX Defty
BSE-200	S&P CNX Midcap
BSE-500	S&P CNX 500

The BSE also has a list of liquid Sectoral Index futures like, BSE Auto Index, BSE Bankex, BSE Capital goods Index, BSE FMCG, BSE Realty, BSE Oil and Gas and few more. In NSE, there are few popular Indices such as CNX IT, Bank Nifty etc. However, the exchanges have not defined Futures on all indices. Exchanges will introduce futures only those indices where they foresee investor interest and potential trading volumes. The most liquid index futures in both NSE and BSE are Sensex and S&P CNX Nifty respectively. These indices contain the stocks of companies which are financially sound and reliable in terms of earnings and dividends disbursements in good as well as bad times. Such companies' stocks are also called as Blue chip stocks.

Product Features Comparison

Each futures contract is technically defined by the exchange in detail so that the investor/trader is familiar with its features. Such a definition is termed as "contract specification". The contract specification defines the product underlying clearly and would typically include features like the contract month, size, tick size and expiry month.

Below is a comparative analysis on the product features for a typical Index Futures contract and a Stock Futures contract. Please note that other contracts with different features are also traded and this is an example:

Contract feature	Index Future	Stock Future
Underlying Instrument	Index	Stock
Trading cycle	Maximum of 3-month trading cycle – the near month (one), the next month (two) and the far month (three). New contracts are introduced on the trading day following the expiry of the near month contract.	3-month trading cycle – the near month (one), the next month (two) and the far month (three). New contracts are introduced on the trading day following the expiry of the near month contracts.
Expiry day	Last Thursday of the expiry month	Last Thursday of the expiry month
Contract size	Every Index has a specified permitted lot size (May not be less than Rs. 2 Lakhs)	Every Index has a specified permitted lot size (May not be less than Rs. 2 Lakhs)
Tick size	Minimum price movement of Re. 0.05.	Minimum price movement of Re. 0.05.
Base Prices	Base price on the first day of trading would be theoretical futures price. On subsequent trading days would be the daily settlement price of the futures contracts.	Base price on the first day of trading would be theoretical futures price. On subsequent trading days would be the daily settlement price of the futures contracts.

Price bands	Price can move between a range of +/- 10 %.	Price can move between a range of +/- 20 %.
Quantity freeze	Specific to each Index (But can take place in cases with lots more than 15000)	Specific to each Index (Quantity freeze for the underlying stock is based on a notional value of the contract of Rs. 5 crores (approx))
Order type	Regular lot order, Stop loss order, Immediate or cancel, Spread order	Regular lot order, Stop loss order, Immediate or cancel, Spread order

Note: The terms in the table above are explained in the next section

Activity 1

What is tick size?

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Terminology

Some common terms which you should be familiar with in the Equity Derivatives market are discussed in this section:

a) **Price related terms**

- **Last traded Price:** The last price a stock was traded for.
- **Closing Price:** This price is calculated by computing a volume weighted average of the stock prices in the last 30 minutes of trading. Typically, in India the prices between 3 pm and 3.30 pm are considered as markets close at 3.30 pm.
- **Settlement Price:** In the F&O segment, settlement happens: (a) every day, and (b) (ii) End/Expiry of the contract. The daily settlement is done on Mark to market basis (MTM). The concept of MTM suggests that on each trading day, the positions of clients are marked to market i.e., the positions are revalued based on closing prices of each position open. The end of contract settlement price is the price on which contract is finally settled. In case of Equities, the final settlement price is the Closing price of the relevant underlying index / security in the Capital Market segment of NSE/BSE, on the last trading day of the futures contracts. It is observed that while daily closing prices are based on the closing prices of futures, the expiry settlement price is based on the closing price of the underlying. For example, if you have a long position in Infosys Futures, (you have bought Infosys Futures) your mark to market on a daily basis will be based on closing price of Infosys Futures. However, on expiry day, your mark to market will be based on closing price of Infosys Equity.

b) **Open position:**

The number of future contracts that are not yet closed. The term Open position is used from the perspective of an investor. For example, if you bought 200 units of Nifty Futures today morning and squared up only 150 units of these Futures in the afternoon, your open position will be 50 units. If you bought another 100 units of Nifty Futures tomorrow and squared up 150 units tomorrow, your open position will be zero at tomorrow's close.

Open interest: This represents the total open position open at market level. The total number of positions open will comprise both long and short positions. For example, if the open interest in Nifty futures is 10 lakh contracts at today's close, it is understood that there are 10 lakh long open positions and 10 lakh short open positions. Long and short position: Long position is buying of a security, commodity, currency or other asset class with an expectation that there would be a price rise. As we are concerned with Futures in this Unit, a long position in Futures would mean a bought position. Correspondingly, a short position in Futures would mean that you have sold Futures.

- c) **Short selling:** This is a little different from short position. Here, the investor sells a security which he does not have (not applicable to Equity Futures market in India where there is no concept of delivery). In the cash market, if you sell an equity share which you don't possess, you will be obliged to deliver the equity share to the exchange. You will then borrow this security from someone else and deliver to the exchange. The short seller is of the view that the stock price will decline. He also believes that he can buy the stock back at a lower price and return the borrowed shares to the lender in the future. The lender will charge the borrower compensation similar to interest, which the borrower will be willing to pay.
- d) **Physical delivery:** It means that the actual underlying product should be delivered on the specified delivery date. This generally happens in case of commodity futures where the underlying is deliverable like Gold, Silver, Copper and, Wheat. In the Indian equity futures market, the underlying stock or index is not delivered. The settlement happens based on price difference. This settlement methodology is called 'cash settlement' or 'net settlement'.
- e) **Lot Size:** A futures or option contract makes you buy a particular number of the underlying share. For instance the market lot size for Infosys share is 600. This means that an investor wishing to buy Infosys will have to buy a minimum quantity of 600 shares.
- f) **Cash settlement:** Since, there is no delivery of the underlying in Equities, the settlement happens by the loss making party making a cash payment to the profit making counterparty. For example if you bought Infosys Futures for Rs. 2,100 and the contract was settled at Rs. 2,225, you will receive Rs. 125 as profit. You will not receive the underlying Infosys equity share.
- g) **Market order:** An order to buy or sell a stock (or futures) immediately at the best available current price. A market order guarantees execution as there is no price limit specified.
- h) **Stop loss order:** An order placed with a broker to sell a security (or futures) when it reaches a certain price. A stop-loss order is designed to limit an investor's loss on a security position. Setting a stop-loss order for 10% below the price you paid for the stock will limit your loss to 10%. This strategy allows investors to determine their loss limit in advance, preventing emotional decision-making.
- i) **Immediate or cancel order:** An order requiring that all or part of the order be executed immediately after it has been placed in the trading system. Any portions not executed immediately are automatically cancelled.
- j) **Spread order:** It is a combination of individual orders that work together to create a single trading strategy. A simple spread order includes taking two opposite positions, one long and another short for the same underlying. In case there is an increase in price of the future contract in which we have placed a spread order, then the long position will make a profit and the short will make a loss. So, gains on one side of the spread will be offset by losses on the other side. The spreading goal is to profit from a change in the difference between these two prices.

Activity 2

What is the difference between Open position and Open Interest?

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Activity 3

How does exchange calculate closing price for a day?

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Activity 4

What is short selling?

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Futures Trading

As a trader in the Futures market, you will either buy Futures (go long) or sell Futures (go short). If you are bullish (you see an upside move), you will go long and if you are bearish (you see a downside move) you will go short. This buying or selling of Futures based on views is called as speculation or trading.

Futures are best understood with payoff diagrams. A pay off diagram lets you see the amount of profit or loss that you would make or suffer at various price points. It helps you in understanding your potential reward and what is the risk that you are assuming when you enter into such positions. Conventionally, pay off diagrams has the price of the underlying on the X axis and the gain/loss on the Y axis.

Long futures: When you buy a Futures contract, you expect the price to rise in the near future. Figure 5.1 explains that the investor has bought a Futures contract on the S&P CNX Nifty at 5700. Now, if the value of the index rises above 5700, then you will gain. Your profit will be equal to difference in price (between your entry price and the now prevailing price) x no of units purchased.

Short futures: When you sell a Futures contract, you would expect the price to fall in the near future. Figure 5.2 explains that the investor has sold a Futures contract on the S&P Nifty at a price of 5700. If the value of Index falls below 5700, then he gains from the short position.

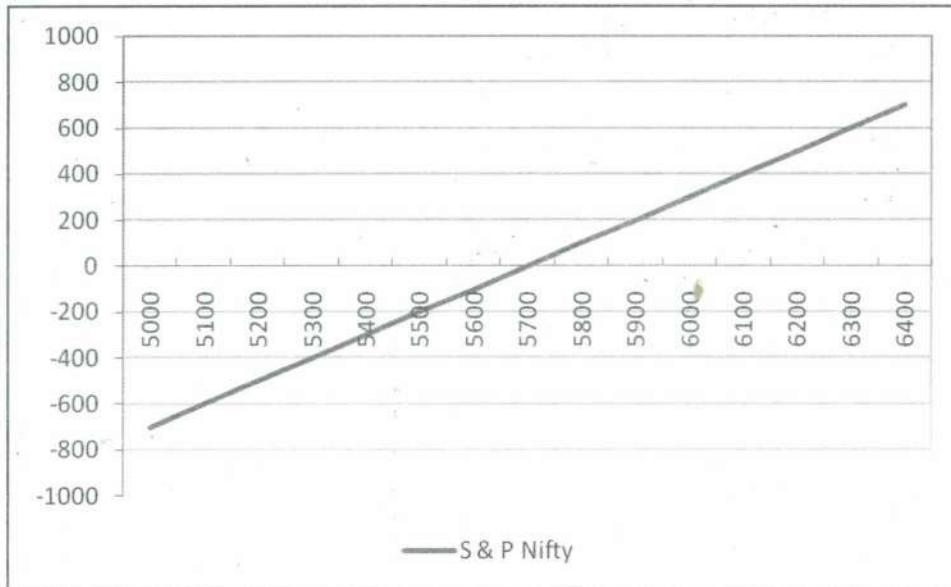


Figure 5.1: Future Contract on S&P CNX Nifty

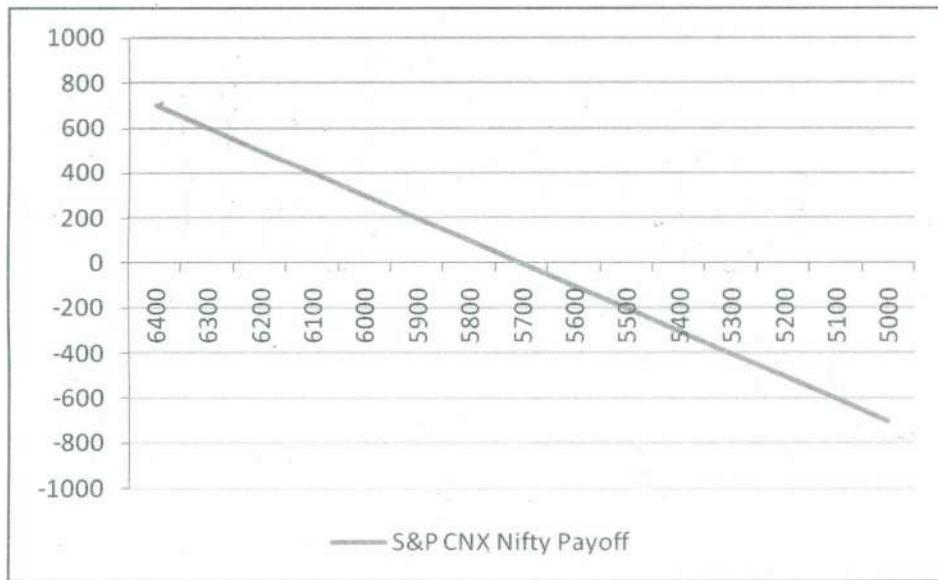


Figure 5.2: Future Contract on S&P CNX Nifty

5.3 EQUITY FUTURES PAY OFF

Hedging Pay Offs

Hedging: Hedging is an attempt to reduce risks of holding a portfolio. Hedging could be attempted using various strategies including some derivative instruments. In this section, we will discuss hedging using Equity Futures assuming you are holding an equity portfolio.

The key point to remember in Hedging is that there is always a certain and concrete underlying for which hedging is done. In some complex hedge situations, the underlying may be a forecasted transaction. We are concerned here with simpler forms of hedging. For instance, let's assume you are holding an equity portfolio which is well represented by the Nifty. The total value of your portfolio is Rs. 2 lakhs and the present Nifty Index value is 4555. Your portfolio is approximately equal to 50 units of the Nifty.

Due to a global recession scenario you are nervous that the Nifty may fall below its current level which will generate a loss on your portfolio. To offset the potential loss on the equity portfolio, you will short Nifty Futures (50 units).

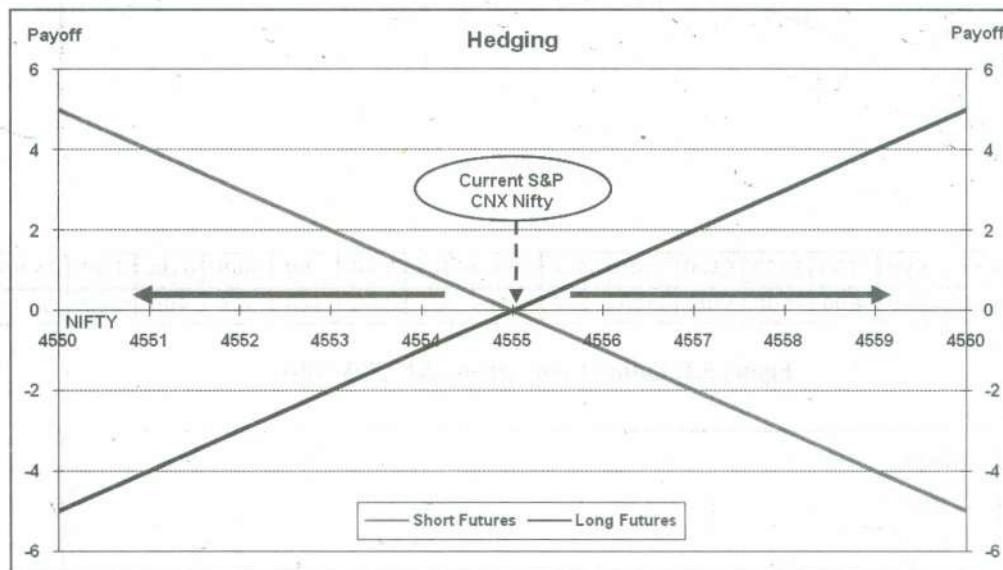


Figure 5.3: Current S&P CNX Nifty

If the Nifty were to fall to say 4000, you will make a loss of 555 points on your equity portfolio. However, your short position on Nifty Futures will generate a profit of 555 points thus offsetting your equity portfolio. In real life, the loss on one will not exactly offset the profit from the other. But if you achieve an offset of over 70% you should be reasonably pleased with your hedging efforts.

Ineffectiveness in hedging can arise due to:

- Your portfolio may not exactly mirror the Nifty. An investor can have securities in his portfolio which are not a part of Nifty. This will lead to a diversion in the performance of the portfolio as compared to the benchmark index, which is Nifty in this case.
- Movement in spot prices (equity prices) may not exactly mirror movements in Futures prices, the loss on equity may therefore not be equal to profit on Futures and *vice-versa*.
- Futures lot sizes may be such that you may not be able to short Futures for an amount exactly equal to your equity portfolio.

Imperfect Hedging

As explained, Hedging is an activity to protect a producer or a consumer against unpredictable price movements due to unforeseen market scenario. However, the process involves a lot of external and internal factors that makes hedging imperfect. For instance, an Investor has an investment of Rs. 2 million Reliance Industries Ltd.

In order to hedge his portfolio, he decides to sell in September Reliance futures. On the 9th of September 2009, the price of Reliance futures stand at Rs.2168.45. If the minimum

lot of futures is 150, technically he buys 6.14 lots. This is calculated by dividing 2 million by $(2168.45 * 150)$. Now, in reality, the lots cannot be dealt with in decimals. Therefore, either the investor has to short 6 lots or 7 lots. On September 9th, 2009, when the price is Rs. 2168.45, the total amount invested in futures, as per 6 lots would be Rs. 1.952 million, when the portfolio amount to be hedged is Rs. 2 million. If he shorts 7 lots, the amount invested in futures would be Rs. 2.280 million, when the portfolio amount to be hedged is Rs. 2 million. So, the hedging is not exact; in the first scenario, the portfolio is under-hedged and in the second scenario, the portfolio is over-hedged. Therefore, we would always find hedging as a process will never be exact.

On 9th September, 2009, the cash price of Reliance equity is Rs. 2164.05, whereas the September futures price was at Rs. 2168.45. At expiry, the futures price was Rs. 2100.95. If we assume that the investor doesn't have to carry his investment in Reliance after 24th September (No Rollover), pay offs would be something like in the Table 5.1.

Table 5.1: Hedging Payoff

	Future Price	Cash Price	Spread	Sold	Bought	Shares (In Spost)	Round-off	Lots (in Futures)	Round-off
9-Sep-09	2168.45	2164.05	4.4	2276872.5 Bought	2001746.25 Sold	924.19	925	6.15	7
24-Sep-09	2100.95	2100.6	0.35	2205997.5 70875	1953055 -58691.25	12183.75			
Profit/Loss									

While hedging a portfolio, it is always better to over-hedge than to under-hedge. This is because the hedger never likes to take risk on any part of his portfolio value. Therefore, the number of future contracts shorted is 1050 (No. of Future contracts in one lot*no. of lots invested=150*7). Whereas, the number of shares investor invested in Reliance was 925 (Portfolio investment/Current Market Price=2000000/2164.05=924.19). Therefore, in order to hedge a portfolio worth of Rs. 2 Million, invested in Reliance equity, the investor has to invest in Reliance futures but the number of Equity and Futures are not the same.

Continuing the earlier example, the spot price on 9th September 2009 was 2164.05 and investor feared that this price might fall. So, he hedged through shorting Reliance futures at Rs. 2168.45 on the same date. At Expiry, on the 24th September, the September futures price is Rs. 2100.95 and price of Reliance share is Rs. 2100.60. On squaring off at expiry, Investor makes a loss on Reliance equity to the extent of Rs. 58691.25 but the same is covered by profit made on Reliance futures where he gains Rs. 70875. So, not only his entire loss is covered, but makes an additional profit of Rs. 12183.75 in this hedge.

Inefficiency in hedge may sometimes result into large losses if price moves against the expectation of the investors. For instance, on the 7th of September 2009, the price of Reliance Equity was Rs. 2008.9 (His investment is Rs. 2008.9 times 996 shares equal to Rs. 2000864.4. The number of shares are calculated by dividing the initial amount of portfolio i.e., 2000000 by the current market price Rs. 2008.9) and the investor fears decline in prices and therefore he simultaneously gets into a hedge by shorting the Reliance futures by taking seven lots of 150 shares per lot (Number of futures contract to be invested in = Portfolio amount/current future contract price i.e. 2002.85 and 1 lot consists of 150 shares). Therefore, the total amount invested in futures is 2102992.5. On expiry the Reliance September 2009 Futures was quoted at Rs. 2100.95. At the same time, Reliance equity share on cash segment was quoted higher at Rs. 2100.6 against his anticipation of decline in the price. The investor would make a profit on equity to the extent of Rs. 91333.20 (Bought equity at Rs. 2008.90 and sold at expiry at Rs. 2100.60), but the investor makes loss on Reliance futures to the extent of Rs. 103005 (Sold Futures at Rs.2002.85 and squares off at expiry at Rs.2100.95). This results in the hedge being unfavourable as he incurs net loss of Rs. 11671.8. The same has been summarized in the Table 5.2.

Table 5.2

	Future Price	Cash Price	Spread	Sold	Bought	Shares (In Spost)	Round- off	Lots (in Futures)	Round- off
7-Sep-09	2002.85	2008.9	-6.05	2102992.5 Bought	2000864.4 Sold	995.57	996	666	
24-Sep-09 Profit/Loss	2100.95	2100.6	0.35	2205997.5 103005	2092197	-			
						11671.8			

Speculation

Speculation is different than hedging. In case of former, there is no underlying. The speculator begins with a view - he is either bullish or bearish (in a simplistic scenario). More complex views are possible but may not be managed with Futures alone. The speculator simply makes a profit or a loss depending on whether his view was right or not. For instance he expects that the Nifty will rise from 4555 to 4700. So, he will buy Nifty contracts at 4555 and when the Index increases, he will square up his Futures contracts and make a profit.

Arbitrage

Arbitrage is the practice of taking advantage of a price differential between two or more markets: striking a combination of matching deals that capitalize upon the imbalance, the profit being the difference between the market prices. The general arbitrage activity is carried out between the cash market and the future market of the same underlying. For instance, an arbitrage opportunity can be identified between the Reliance futures and Reliance equities. Reliance futures contract with an expiry on 31st December 2009 is taken as an example. We take the contract prices on 14th December 2009 and try and identify an arbitrage between the futures and spot.

Symbol	Nstrument type	expiry	Date	Time	Bid Qty	Bid	Ask	Ask Qty	LTP
Reliance	EQ		14-Dec-09	10:45:03	2351	1045.05	1045.15	1592	1045.05
Reliance	FUTSTK	31-Dec-09	14-Dec-09	10:45:02	300	1051.35	1051.40	1500	1051.45
Symbol	Nstrument Type	Expiry	Date	Time	Dio Qty	Bid	ask	Ask Qty	LtP
Reliance	EQ		17-Dec-09	11:36:03	1024	1048:35	1048.40	220	1045.30
Reliance	FUTTK	31-Dec-09	17-Dec-09	11:36:02	600	1049.05	1049.10	900	1049.10

On 14th of December 2009, The Cash price of Reliance is Rs. 1045.15 (Ask price) and Reliance Futures price is Rs. 1051.35 (Bid price). So, we establish an arbitrage here by buying 300 shares i.e., two lots in the cash market and selling 2 lots in the future market, considering the buy low sell high strategy. In Reliance futures, the minimum contracts which can be bought or sold is one lot which 150 shares. On the 17th of December 2009, we will reverse the positions and sell 300 shares (equivalent to two lots of futures) in Cash market and buy two lots in futures markets. On the 17th of December, the price in cash market was Rs. 1048.35 (Bid price) and that in the futures markets is Rs. 1049.10 (Ask price). Therefore, with the completion of the arbitrage, we would make a profit of Rs. 3.2 in Cash market and Rs. 2.25 on Futures market. Aggregating the profit for 300 lots we have made a profit of Rs. 960 in Cash market and Rs. 675 in futures market. Given below is the pay off table which shows the aggregate profit earned from arbitrage between cash and futures.

Spot P/L	3.2	300	960
Futures P/L	2.25	300	675
1635			

5.4. FUTURE MARKET INDICATORS

Zero sum game

At the overall market level, Futures markets are zero sum games. If you buy a Futures contract, there will necessarily be a seller of this contract. Thus, if today's volume has been 5 lakh contracts, each of these contracts would have a buyer and a seller. If the buyer makes a gain, the seller would have lost an identical amount and *vice-versa*.

At any point of time, there will be x number of contracts which are open (that is, not yet squared up). Each of these contracts would have an open long (buy side) and an open short (sell side).

Interpreting volumes and open positions is an interesting part of the lives of Futures market traders. While interpretations using indicators are merely indicative, it is common practice to attempt to read patterns and provide expert opinions on which way the market is headed.

Volume

Futures markets are characterized by few important factors – one of which is Volume. Although, many traders know how to use volume in their technical analysis of stocks, interpreting volume in the context of the futures market may require more understanding. Considerably less research has been conducted on the volume of futures than that of stocks.

The most basic use of volume on futures markets is to analyze it in relation to liquidity. Futures traders will receive the best execution price where there is the greatest liquidity, which occurs in the delivery month i.e., most active by volume. Yet, as contracts move from second month out, traders naturally move their positions to the closest delivery month, causing a natural increase in volume. By contrast, volume declines as the delivery date gets close. This is explained with the help of S&P CNX Nifty, where we have plotted the near month, mid month and Far month contract.

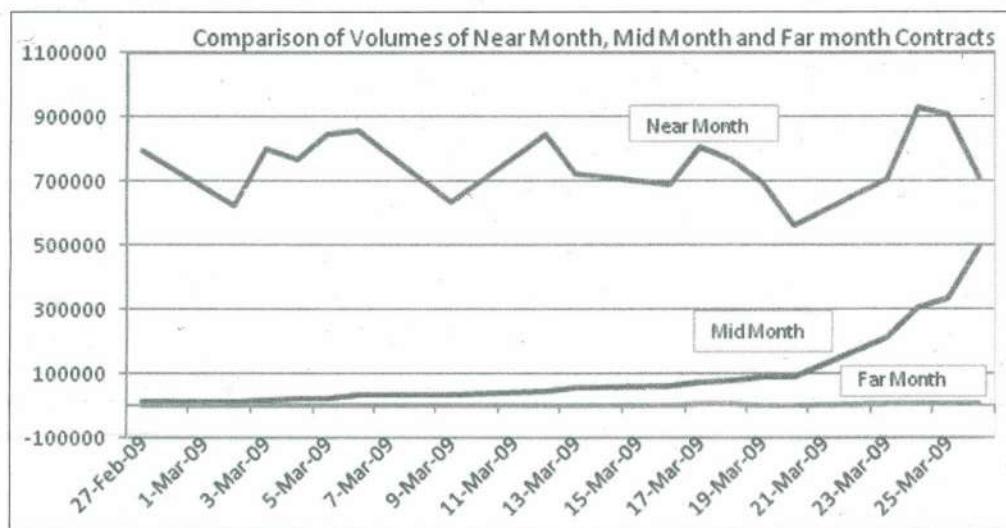


Figure 5.4: S&P CNX Nifty contract with an expiry of March 26th 2009

Date	Near Month	Mid Month	Far Month
27-Feb-09	793016	13039	981
2-Mar-09	625476	10535	793
3-Mar-09	798885	15336	831
4-Mar-09	769793	21208	2587
5-Mar-09	842741	20815	1347
6-Mar-09	857878	31363	3440
9-Mar-09	637835	32093	4064
12-Mar-09	846812	44882	1092
13-Mar-09	725316	54594	3536
16-Mar-09	692566	60825	4455
17-Mar-09	805195	69782	4664
18-Mar-09	768415	77455	5281
19-Mar-09	698430	85811	2432
20-Mar-09	564173	90874	2286
23-Mar-09	704842	211999	4564
24-Mar-09	927200	305436	7500
25-Mar-09	905875	332516	6580
26-Mar-09	713089	493029	8332

As discussed earlier, the near month contract shows exceptionally high volumes compared to the mid month as well as the far month contracts.

Total Volume

Traders must analyze volume of the aggregate of all contracts to give their analysis more than one dimension. The measurement of total volume will level out the patterns of increasing and decreasing participation based on the coming and going of individual delivery months. In stock market terms, using total volume to garner an overall picture of the market would be to add together the volume for all stocks in a similar group, perhaps for a specific industry group. This smoothens over the periods when the volume of one particular contract was very low.

Beginning and end of the trading day Volume

It should be noted that volume is expected to be clustered on both ends of the trading day. In the morning, orders are entered into the market early as traders are reacting to overnight news and events as well as the previous day's data that is calculated and analyzed after the close. The end of the day is active due to traders juggling for position based on today's price movements. Closing price is typically the most dependable value of the day.

Open Interest

Open interest is the measurement of those participants in the futures market with outstanding trades. Open interest is the net value of all open positions in one market or contract and portrays the depth of volume i.e., possible in that market. A market with a low number of contracts per day but also a large open interest tells the trader that there are many participants who will enter the market only when the price is right.

In India open interest is measured and reported either in terms of number of units or number of contracts or in Rs. cr. All these measures are equally compatible with the definition. For the purpose of understanding trends in open interest, you may use any measure consistently. For market wide open interest, Rs. crores is the best measure as adding up heterogeneous contracts of various underlying would be illogical.

New interest in a market brings new buyers or sellers, which increases the value of open interest. When the open interest increases with a correspondingly quick rise in

prices, more traders are likely entering long positions. That said, for every new buyer of a futures contract there must be a new seller, but the seller is likely to be looking to hold a position for a few hours or days, hoping to profit from the ups and downs of price movement. The open interest is attributed to the position trader, but such a trader is willing to hold the long position for a much longer period of time. If the prices keep rising, the longs will have the ability to hold their position for a greater period of time while the shorts are more likely to be forced out of their positions.

Some rules of thumb for interpreting changes in volume and open interest in futures market are as follows:

- 1) A rising volume and a rising open interest are confirmation of a trend.
- 2) A rising volume and a falling open interest suggest position liquidation.
- 3) A falling volume and a rising open interest point to a period of slow accumulation.
- 4) A falling volume and a falling open interest depict a congestion phase.

Volume and open interest can be used in a practical sense to guide one's trades as follows:

- 1) Open interest increases during a period of an exhibited trend.
- 2) During the accumulation phase, volume may decline while open interest builds, but volume occasionally spikes.
- 3) Rising prices and a declining volume or open interest indicate a pending change of direction.

These rules, however, have exceptions, especially on days or at times when volume is expected to differ from the "norm". For example, it has been internationally observed that volume is usually lighter on the first day of the week, on the day before a holiday, and during the entire summer period. Also volume may actually be heavier on Fridays and Mondays during a trending market. Liquidation of positions often occurs before the weekend, with positions being re-entered on the first day of the week. Finally, volume is heavier on a triple witching day, when stock-index futures, stock-index options and stock options all expire on the same day.

Cost of Carry

This is another important Futures market indicator which is based on difference between prices of spot equity and Futures. This metric is discussed later in the unit on Pricing.

5.5 RISK MANAGEMENT

Need for Risk Management

Futures are very high risk instruments. As the amount required to be invested in such positions is very low (due to the cash out flow being restricted to a small margin and not the notional value), it has been commonly observed that traders over-extend their exposures and are willing to place huge bets based on their views. Extreme volatility is not uncommon and on such days, even experienced traders are known to lose huge unaffordable amounts.

Let us review a couple of days when there were extreme movements on the up and downsides:

- 1) **Exceptional Price increase:** In recent history, the best example for an exceptional price rise was the Monday after the results of General Elections, 2009. The S&P CNX Nifty moved 17%, which is considered a huge jump for the Index.

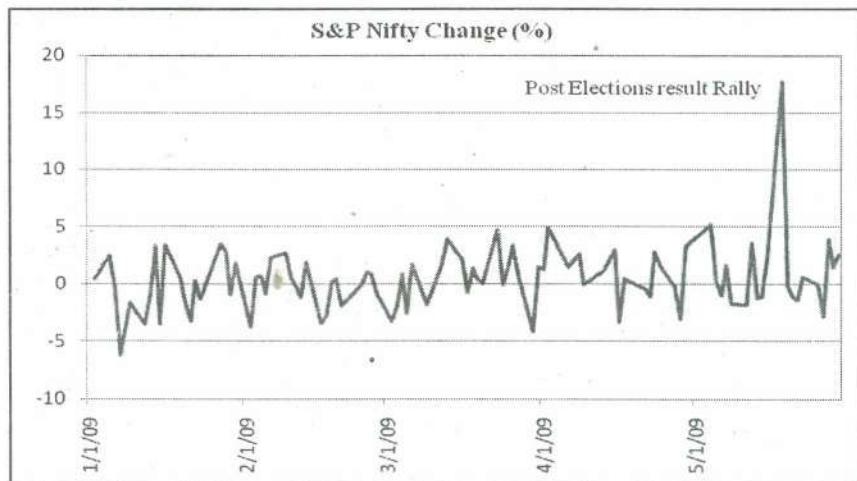


Figure 5.5: Exceptional Price Increase

The data taken is from 1st Jan 2009 to May 29th 2009. The price movement recorded for Nifty was high mainly because of the positive sentiments and expectations that the new government having won with a clear majority will be in a position to implement positive reforms and bring about economic progress.

- 2) **Exceptional Price decrease:** An exceptional fall in Nifty in recent times was the global recession that gathered momentum in the Indian equity markets in January and continued till October 2008. The fall is evident in the diagram, as more of returns in the time period taken are in negative. Precisely, the worst days of trading were the 24th of October, which was a Friday and the Monday that followed after it. On the 24th October, Nifty fell by 13.33% which was the lowest levels the Index has recorded in the recent past.

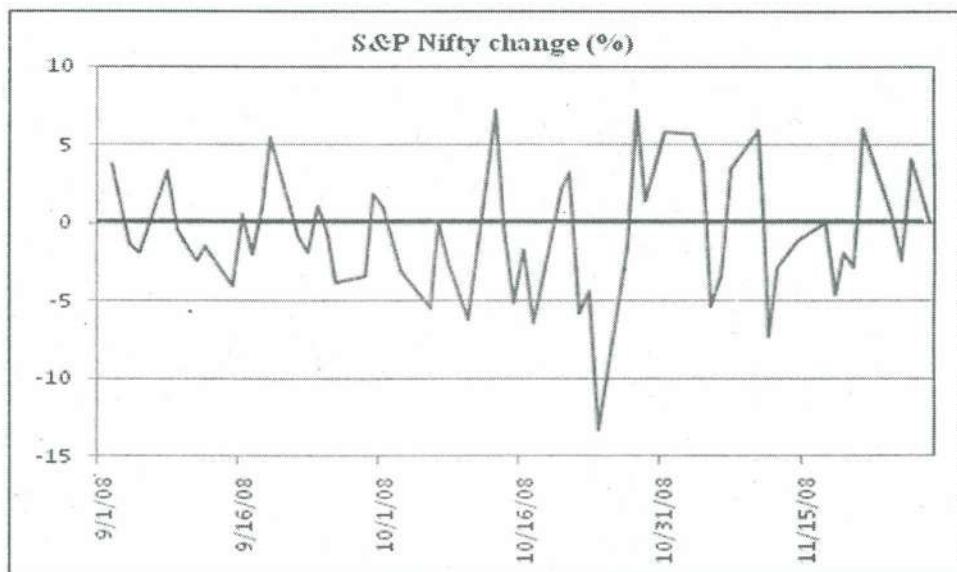


Figure 5.6: Exceptional Price Decrease

Assuming an investor thinks of investing Rs. 50 lakhs in the time period covered above in the diagram (1st September to 28th October). On 1st Sep 2008, Investor purchased 23 lots of S&P CNX Nifty (1 lot=50 contracts) at 4346.75 levels. Total investment is Rs. 4998763 in portfolio. But on 24, October, 2008 Nifty price falls down by 13.33% i.e., 2756.25 and overall value of Investment is reduced by 36.59%. The notional loss would be around Rs.1829075.

Date	Price Per Lot	Quantity Purchased	No. of Contracts	Total Amount
1-Sep-08	4346.75	1150	23	4998763
24-Oct-08	2756.25	1150	23	3169688
Total Loss	1590.5			(1829075)

Index and Stock Futures

Risk Management Strategies

These stock markets events as discussed above are not very common but when they occur they have a tendency to wipe out all the capital gains achieved in a stock or portfolio. Therefore, from time to time an investor or trader should introspect on his decisions and ensure that sound risk management strategies are in place to avoid unaffordable losses. The most important and immediate step a trader can take is through employing day trading strategies.

Every day trading strategy must take into consideration the maximum percentage of the total trading capital that should be risked in any one transaction. In fact, a day trader's ability to limit his losses is just as important (or even more important) as his success in managing winning trades. There are few trading strategies that can be used to avoid the trading risks: Entry and exit signals, Stop loss orders.

- i) **Exit and Entry Signals:** A quick and genuine alternative to fundamental analysis for tracking the movements of stock and also to ascertain the entry and exit points is technical analysis. Where the fundamental analysis guides the trader on which stock to buy, technical analysis guides the trader on when to buy. There are a lot of tools in Technical analysis which a trader can utilize to generate the buy and sell signals. For instance;

Relative Strength Index (RSI): The RSI compares the magnitude of a stock's recent gains to the magnitude of its recent losses and turns that information into a number that ranges from 0 to 100. It takes a single parameter, the number of time periods to use in the calculation. As per the recommendation, 14 is the standard number of periods used when calculating the RSI. The formula to calculate RSI is:

$$RSI = 100 - \frac{100}{1 + RS}$$

$$RS = \text{Average Gain} / \text{Average Loss}$$

Average Gain = [(previous Average Gain) x 13 + current Gain] / 14. The average gain is a running calculation and therefore to increase the accuracy for the estimate, we should calculate First Average Gain = Total of Gains during past 14 periods / 14.

Average Loss = [(previous Average Loss) x 13 + current Loss] / 14. Similarly, we can calculate for the First Average Loss = Total of Losses during past 14 periods / 14.

Note: "Losses" are reported as positive values.

This process is followed to smoothen the returns. When the Average Gain is greater than the Average Loss, the RSI rises because RS will be greater than 1. Conversely, when the Average Loss is greater than the Average Gain, the RSI declines because RS will be less than 1. The last part of the formula ensures that the indicator oscillates between 0 and 100. Note: If the Average Loss ever becomes zero, RSI becomes 100 by definition. The usage of this tool can be understood as follows:

- i) **Overbought/Oversold:** Wilder recommended using 70 and 30 and overbought and oversold levels respectively. Generally, if the RSI rises above 30 it is considered bullish for the underlying stock. Conversely, if the RSI falls below 70, it is a bearish signal. Some traders identify the long-term trend and then use extreme readings

for entry points. If the long-term trend is bullish, then oversold readings could mark potential entry points.

- ii) **Divergences:** Buy and sell signals can also be generated by looking for positive and negative divergences between the RSI and the underlying stock. For example, consider a falling stock whose RSI rises from a low point of (for example) 15 back up to say, 55. Because of how the RSI is constructed, the underlying stock will often reverse its direction soon after such a divergence. As in that example, divergences that occur after an overbought or oversold reading usually provide more reliable signals.
 - iii) **Centerline Crossover:** The centerline for RSI is 50. Readings above and below can give the indicator a bullish or bearish tilt. On the whole, a reading above 50 indicates that average gains are higher than average losses and a reading below 50 indicates that losses are winning the battle. Some traders look for a move above 50 to confirm bullish signals or a move below 50 to confirm bearish signals.
 - iv) **Support and Resistance:** A support level is a price level where the price tends to find support as it is going down. This means the price is more likely to “bounce” off this level rather than break through it. However, once the price has passed this level, it is likely to continue dropping until it finds another support level. A resistance level is where the price tends to find resistance as it is going up. This means the price is more likely to “bounce” off this level rather than break through it. However, once the price has passed this level, it is likely that it will continue rising until it finds another resistance level. It is noticed chart formations and areas of support and resistance could sometimes be more easily seen on the RSI chart as opposed to the price chart. The center line for the relative strength index is 50, which is often seen as both the support and resistance line for the indicator.
- 2) **Stop loss orders:** A stop loss order is an order to buy (or sell) a security once the price of the security has climbed above (or dropped below) a specified stop price. When the specified stop price is reached, the stop order is entered as a market order (no limit).
- i) **A sell stop order** is an instruction to sell at the best available price after the price goes below the stop price. A sell stop price is always below the current market price. For example, if an investor holds a stock currently valued at Rs. 50 and is worried that the value may drop, he/she can place a sell stop order at Rs. 40. If the share price drops to Rs. 40, the broker sells the stock at the next available price. This can limit the investor’s losses (if the stop price is at or below the purchase price) or lock in some of the investor’s profits.
 - ii) **A buy stop order** is typically used to limit a loss (or to protect an existing profit) on a short sale. A buy stop price is always above the current market price. For example, if an investor sells a stock short – hoping for the stock price to go down so they can return the borrowed shares at a lower price (Covering)-the investor may use a buy stop order to protect against losses if the price goes too high. It can also be used to advantage in a declining market when you want to enter a long position close to the bottom after turn-around.
 - iii) **A stop limit order** combines the features of a stop order and a limit order. Once the stop price is reached, the stop-limit order becomes a limit order to buy (or to sell) at no more (or less) than a specified price. As with all limit orders, a stop-limit order doesn’t get filled if the security’s price never reaches the specified limit price.
 - iv) **A trailing stop order** is entered with a stop parameter that creates a moving or trailing activation price, hence the name. This parameter is entered as a percentage change or actual specific amount of rise (or fall) in the security price. Trailing stop sell orders are used to maximize and protect profit as a stock’s price rises and limit losses when its price falls. Trailing stop buy orders

are used to maximize profit when a stock's price is falling and limit losses when it is rising. For example, a trader has bought a stock at Rs. 10.00 and immediately places a trailing stop sell order to sell it with a Re. 1 trailing stop. This sets the stop price to Rs. 9.00. After placing the order, the stock doesn't exceed Rs. 10 and falls to a low of Rs. 9.01. In this case, the trailing stop order is not executed because stock has not fallen by Re. 1. Later, the stock rises to a high of Rs. 15, which resets the stop price to Rs. 14. It then falls to Rs.14.00 (i.e., Re. 1 from its high of Rs. 15.00) and the trailing stop sell order is entered as a market order.

5.6 SUMMARY

The unit discussed different practical aspects of Investment in Equity futures, both stock and Index. The aspects explain the essence of the equity stock and index futures supported with arguments. The unit illustrates various important utilities of futures markets and how we can use the various strategies to avoid price volatility and losses on our portfolio. The unit also discussed various macro economic factors (also called as financial indicators) which can affect the stock markets.

The unit discusses in detail, the dynamics involved in the equity derivatives segment in Indian stock markets. The market has grown many times in a lot of aspects like size, complexity, type of participants. In order to operate in the market we need to not only understand the dynamics but also understand the futures market indicators which are covered in the unit. The unit has established the need for Risk management strategies with the help of scenario analysis and also discussed the various risk management strategies thereafter.

5.7 SELF ASSESSMENT QUESTIONS

- 1) What is hedging? What are the various inefficiencies persisting in the process of hedging?
- 2) What is arbitrage? Explain it with the help of an example?
- 3) Explain in how many ways volume can be interpreted and explained?
- 4) What is open interest? How is it different than open position?
- 5) What is a stop loss order? How many types of stop loss orders can be imposed in stock markets and in which situations?
- 6) List the various kinds of inefficiency involved in hedging and explain each with example.
- 7) What is Risk management? Explain the various strategies of risk management with examples?
- 8) Explain the various futures market indicators? What is the significance of Volume, open interest in understanding the dynamics of the future markets?

5.8 FURTHER READINGS

- 1) John C Hull, 2005, *Futures, Options and other derivatives*, Fifth Edition, Prentice Hall Publications.
- 2) Paul Davidson, 2002, *Financial Markets, Money and the Real world*, Edward Elgar Publishing Limited.
- 3) John C Hull, 2005, *Fundamentals of Futures and options markets*, fourth edition, Prentice Hall Publications.
- 4) *Indian Securities Markets Review*, 2007, National Stock Exchange Publication, Mumbai.

UNIT 2 INDEX AND STOCK OPTIONS

Objectives

After studying this Unit, you should be able to:

- define an Option;
- understand the meaning of a Call and a Put and the distinction between the two;
- analyse the risks and rewards and the limited/unlimited nature of gains and losses in long and short positions in Calls and Puts;
- draw payoff tables and payoff graphs for simple long and short positions in Calls and Puts;
- differentiate between American and European style options; and
- identify the implications of Exercise and Assignment of options.

Structure

- 6.1 Option: An Overview
- 6.2 Call Option
- 6.3 Put Option
- 6.4 Summary of Call and Put Option Pay Off and Risk
- 6.5 American and European Options
- 6.6 Stock and Index Option
- 6.7 Price Determination for Exercise/Assignment
- 6.8 Statistics on Exercise and Assignment
- 6.9 Summary
- 6.10 Self Assessment Questions
- 6.11 Further Readings

6.1 OPTION: AN OVERVIEW

Futures offer a symmetrical payoff, in the sense that profits and losses from Futures are unlimited. If you bought Infosys Futures for Rs. 1,591 and the price of Futures increases to Rs. 1,700, you will generate a profit of Rs. 109 if you exit at this level. Similarly, having bought Infosys Futures at Rs. 1,591, if its price declines to Rs. 1,500 you would suffer a loss of Rs. 91 if you exit at this level. Profits and losses from Futures are unlimited.

One might argue that losses for a long position (Futures bought) are limited to the price at which Futures were bought. For example, if you bought Infosys Futures at Rs. 1,591, the maximum loss is limited to Rs. 1,591. This is indeed quite correct, but in practice, a loss of such high magnitude is so high as to make it almost unlimited.

While investors and traders are quite happy with unlimited profits, they are certainly not happy with unlimited loss prospects. Hence, the investing and trading community searched for other products where gains could be unlimited (in the same manner as Futures), but losses could be restricted to known levels / limits. This quest for a relatively safe set of products leads the community to an entirely new range of “Options”.

Options allow buyers to enjoy benefits of unlimited gains while at the same time arresting losses. Thus, the payoff profile is - unlimited gains, limited losses. Such payoffs are understood to be asymmetrical in the sense that there is lack of symmetry between profit potential and loss potential.

Equity and Futures – Background Example

Consider a situation where you are bullish on a certain stock, say Reliance Industries. The equity price of Reliance Industries on May 26, 2009 is Rs. 2,142.70 (closing price considered for this discussion). As you are bullish, you will prefer to buy this equity share. Your capability to buy this share will however be limited by the amount of cash you are able to invest. In equity markets, you are expected to pay for the shares that you buy. For example, if you buy 50 shares, you will be required to invest Rs. 107,135 (plus brokerage and other transaction costs).

If you are not in a position to spare such a large amount, you could consider buying Reliance June Futures. The price of Reliance June Futures on May 26, 2009 is Rs. 2,155.75 (closing price considered for this discussion). If you buy Reliance Futures at this price, you may be required to deposit an Initial Margin. If we assume for the purpose of illustration that the Initial Margin is 15%, the amount to be invested for 50 Futures Units will work out to $Rs. 2,155.75 \times 50 \times 15\% = Rs. 16,168$. You may be able to spare this amount. However, you face a high risk of the possibility that Reliance prices may fall, which will lead to a fall in the prices of Reliance June Futures.

The amount of loss as a percentage of investment could be significant. For example, if Reliance falls to say Rs. 2,000 and Reliance Futures fall to Rs. 2,010, the loss you will face will be Rs. 145.75 per unit, i.e. Rs. 7,288. As a percentage of the amount invested (Rs 16,168), this works out to 45%. You should observe that a mere 6.6% fall in the price of Reliance Equity generated a loss of 45% of the amount invested for a trader who is long on Reliance June Futures, because Futures are leveraged products (where the margin invested is much smaller than the exposure assumed).

6.2 CALL OPTION

You could consider buying a Call Option on Reliance Industries (instead of buying equity or buying June Futures). On May 26, 2009, there is a product called **Reliance CA 25JUN2009 2250** quoting at Rs. 80.50 (closing price considered for the purpose of this discussion).

In the above product definition:

- Reliance stands for Reliance Industries Ltd,
- CA stands for Call American (this is explained later in this Unit),
- 25JUN2009 stands for the date of expiry which is June 25, 2009, and
- 2250 stands for the Strike Price.

The Strike Price is a very important component of the product definition, which is now discussed. If you buy this Call and pay the price of Rs. 80.50, what will you get?

Let us assume that you have bought this Call Option and are prepared to wait till the date of expiry (June 25, 2009). You will get on the date of expiry, appreciation beyond strike price of Rs. 2,250 if any. In other words, if Reliance Equity price at 3.30 pm on June 25, 2009 is above Rs 2,250, then you will get the difference between the closing price of Reliance Equity and Rs. 2,250.

For example, if Reliance Equity were to close at Rs. 2,400 on June 25, 2009 at 3.30 pm, then you will get Rs. 150 (Rs. 2,400 closing price minus Rs. 2,250 strike price). If Reliance Equity closes below the strike price of Rs 2,250, then you will get nothing. You

will not be required to pay any additional amount merely because the closing price was lower than your strike price.

The payoffs on expiry at various possible closing prices are tabulated in Table 6.1 with your net profit or loss in each case.

Table 6.1: Closing Prices of Reliance Equity

<i>Closing Price of Reliance Equity on Expiry</i>	<i>Your Strike Price</i>	<i>Your payoff on Expiry (appreciation above Strike)</i>	<i>Your cost</i>	<i>Net Profit / (Loss)</i>
				<i>All in Rs per Unit</i>
2,500	2,250	250	80.50	169.50
2,400	2,250	150	80.50	69.50
2,350	2,250	100	80.50	19.50
2,300	2,250	50	80.50	(30.50)
2,250	2,250	0	80.50	(80.50)
2,200	2,250	0	80.50	(80.50)
2,000	2,250	0	80.50	(80.50)

You will observe that if the closing price of Reliance Equity is above Rs. 2,250, you will receive a payoff on expiry. The amount of the payoff is unlimited as the price of Reliance Equity could close at any level. However, if the closing price is below Rs. 2,250, then you are not required to pay any additional amount. You have already paid the price (also called Option Premium) of Rs. 80.50 at the point of buying the option and that is the maximum loss that you can suffer in this product. (Please note that in practice, brokerage and other transaction costs may be incurred over and above the price of Rs. 80.50).

Net Settlement Framework

The method of settlement of the Option by payment of the ‘appreciation above Strike’ to the buyer of the Option is called ‘net settlement’ or ‘cash settlement’. This is the method of settlement used in Indian Equity Derivative segment at present. In this net settlement framework, equity shares of Reliance do not change hands. The option buyer merely receives cash difference, which is paid by the option seller (we will discuss the option seller’s payoff in further sections in this Unit).

Another possible settlement framework is “Gross Settlement” or “Physical Settlement”. In this framework, the option buyer is expected to pay the strike price on the day of expiry and the option seller will deliver shares to the buyer. The financial impact will be similar to the above computation of gains.

For example, if Reliance closes at Rs. 2,500 and you have bought a Call option at a strike of Rs. 2,250, you will pay Rs. 2,250 on the day of expiry and the counterparty will hand over one share of Reliance. Thus, you are getting the share at a discount of Rs. 250. If you sell this share in the market at the same moment, you will be able to realize Rs. 2,500. Thus, you can generate a profit of Rs 250, the same amount that you generate in the cash settlement alternative directly.

In the Gross Settlement framework, the Call Option is defined as a “right to buy” the underlying at the strike price. Thus, you get the right to buy Reliance equity at Rs. 2,250 regardless of the actual closing price. Obviously, if the price is below Rs. 2,250, you will not exercise the Option (to pay cash and buy shares of Reliance) and the option will expire worthless.

As an option buyer (also called option holder in the derivative market), you have a ‘right to receive’ appreciation above strike in a net settled framework and a ‘right to buy’ at strike price in a gross settled framework. You have no obligations in the sense that you are not obliged to make any payments unless you choose do so (which could happen if you operate in a gross settled framework and you exercise the option and you pay for the shares at the strike price). All your obligations are fulfilled the moment you have paid the option premium, which is paid upfront when you buy the option.

Payoff Graph

The convention in Payoff Graphs is to represent the price of the underlying (Reliance Equity in our example) on the X Axis and the net gain/loss from the Option on the Y Axis.

The above payoff can be expressed in a graphic format as under:

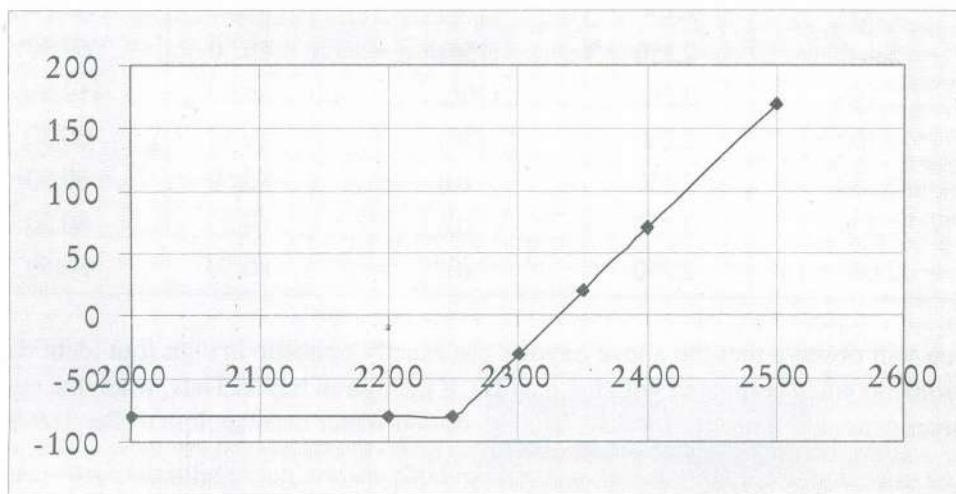


Figure 6.1: Payoff Graph

You can observe the nature of the payoff being unlimited gains and limited losses from the above graphic representation. The maximum loss is restricted to the amount of premium paid Rs. 80.50.

Call Writing

You may now wonder how the option buyer enjoys this abundance of gains with restricted losses. Who is the counterparty in this transaction and what kind of payoff does that counterparty face? Obviously, the exchange where such transactions are entered into does not pay for these unlimited gains that accrue to the buyer of the option. It must be that counterparty – the option seller (also referred to commonly as the Option Writer in the derivative market).

The option writer has sold the Reliance CA 25JUN2009 2250 for Rs. 80.50. He has received this premium on the day of sale of the option. In return, he is obliged to the buyer to pay the appreciation above strike price on the day of expiry (assuming that both the buyer and the seller have not squared up their respective positions till the date of expiry). If Reliance Equity closes below the strike price of Rs. 2,250 on the day of expiry, the option writer is overjoyed as he gets to retain the entire premium of Rs 80.50. However, if Reliance Equity closes above Rs. 2,250 (say at Rs. 2,400), then the option writer is obliged to pay the buyer Rs. 150 (appreciation above strike price). His net loss will work out to Rs. 69.50 (Rs. 150 minus Rs. 80.50).

In a simplistic understanding of option players, it is possible to imagine that Call option buyers are bullish in their view and Call option writers are bearish. It is possible that both players, especially writers, have entered into their positions on the basis of mathematical models and volatility views and not necessarily simple bearishness. We will discuss such complex strategies in later sections.

The payoff profile of the option writer is - limited gains and unlimited losses. The payoff table for the option writer (at various Reliance Equity closing prices on expiry day) can be understood in Table 6.2.

Table 6.2: Payoff Table for Option Writer

<i>Closing Price of Reliance Equity on Expiry</i>	<i>Your Strike Price</i>	<i>Your payoff on Expiry (appreciation above Strike)</i>	<i>Your cost</i>	<i>Net Profit / (Loss)</i>
<i>All in Rs per Unit</i>				
2,500	2,250	(250)	80.50	(169.50)
2,400	2,250	(150)	80.50	(69.50)
2,350	2,250	(100)	80.50	(19.50)
2,300	2,250	(50)	80.50	30.50
2,250	2,250	(0)	80.50	80.50
2,200	2,250	(0)	80.50	80.50
2,000	2,250	(0)	80.50	80.50

You will observe that the above payoffs are exactly opposite in sign (but identical in numbers) when compared with the payoffs of the option buyer. Thus, when the option buyer generates a profit of Rs. 169.50, the option writer makes a loss of Rs. 169.50.

You must understand that the total profits of both players put together is zero – i.e., to say, these products (futures and options) are zero sum games at the macro market level.

Payoff graph of Option Writer

You will observe from the figure 6.2 that the option writer generates a limited premium income (maximum possible gain) but his potential loss is unlimited and would occur if Reliance Equity were to rise upwards.

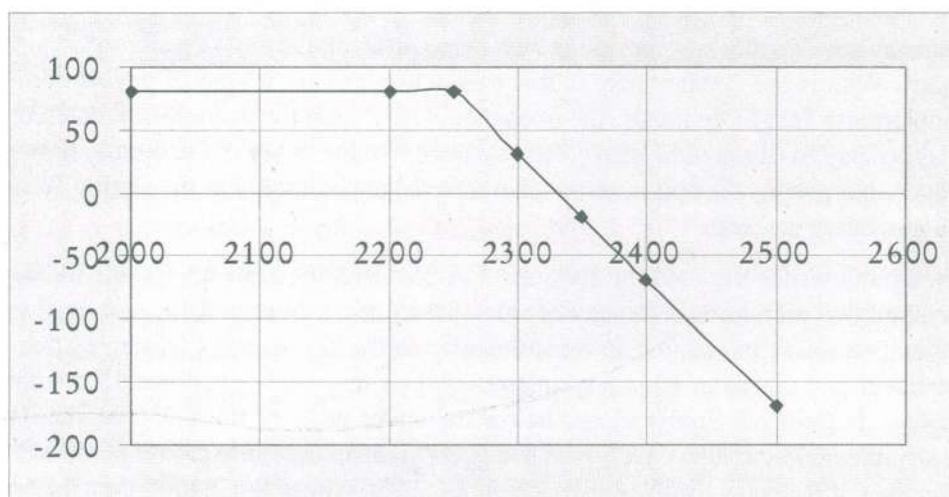


Figure 6.2: Payoff Graph of Writer Option

- 1) As per the Option Market in India what will be Expiry Period for the Contract?

.....
.....
.....

6.3 PUT OPTIONS

We have discussed in the above sections, Call options. As we have understood, Call options provide the buyer with a right to receive appreciation above strike price (in a net settled framework). The view of the Call option buyer (holder) is bullish, that is to say, the buyer expects Reliance Equity prices (in our above example) to rise and hence he buys the Call option.

Put options are designed to help option buyers whose views on an underlying are bearish, i.e., they expect prices of the underlying to fall.

Equity, Futures and Call Positions for Bearish Views

Let us take the example of scrip for this purpose. On May 26, 2009 Bharti Telecom Equity closed at Rs. 771.20 and Bharti Telecom June Futures closed at Rs. 775.60. If you are bearish on Bharti Telecom, you could sell equity shares of Bharti Telecom. However, your ability to sell will be limited to the number of shares that you hold. If you hold only 15 shares, you will be able to sell only 15 shares. If you sell additional shares, you may not be able to deliver the additional shares to the stock exchange.

If you intend to sell further units of Bharti Telecom, you could sell Futures of Bharti Telecom. Suppose you sell 200 units of June Futures at Rs. 775.60, you have taken a short position in this scrip. If the price of Bharti Telecom were to rise to say Rs. 900, the price of Bharti Telecom Futures will also rise (say to Rs. 905). Your short position on Futures will now show a significant loss of Rs. 129.40 (Rs. 905 minus Rs. 775.60).

Thus, taking a short position in Futures involves a high risk, which many traders may not be in a position to assume.

Another possibility is for you to consider selling Call Options on Bharti Telecom. As we have discussed in the above section on Call Options, a short position on Calls is essentially bearish in view. The product: BHARTIAIRTL CA 25JUN2009 800 is quoting at Rs. 56.80 on May 26, 2009. If you sell this Call for Rs. 56.80, you will be obliged to pay appreciation above the strike price of Rs 800 on the day of expiry. Thus, if Bharti Telecom equity were to close at Rs. 900 on the day of expiry, then you will be obliged to pay Rs. 100. As you have received a premium of only Rs. 56.80, you will suffer a net loss of Rs. 43.20.

The above discussion seeks to establish that for a bearish view, there are limitations in using equity, futures and calls. Thus, there is a need for Put options for such views.

Put Option Example

There is put option quoting in the market designed for those traders and investors with bearish views without risk inclination. On Bharti Telecom, a relevant product for this purpose could be: BHARTIARLT PA 25JUN2009 760 which closed at Rs. 37.65. Here, PA stands for Put American and 760 refers to the strike price.

We will discuss the term 'American' later in another Unit of this Block.

If you buy this Put, you will be required to pay the price of Rs. 37.65. Assuming that you continue to hold this Put till the day of expiry (June 25, 2009), you will have the right to receive depreciation in price of Bharti Telecom below the strike price of Rs. 760. For example, if Bharti Telecom equity closes at Rs. 700, you will receive Rs. 60 on the day of expiry (Rs. 760 strike price minus Rs. 700 closing price). After deducting your cost of Rs. 37.65, you will end up with a net profit of Rs. 22.35 (assuming zero transaction costs).

Thus, as Bharti Telecom equity price falls, you will gain. In a worst case scenario from your point of view, if Bharti Telecom equity price were to close above Rs. 760 on the day of expiry, you will receive no payoff from the market. Your maximum loss will thus be restricted to Rs 37.65, the premium you paid for the option on the day you bought the Put option.

The payoff table for various closing price levels of Bharti Telecom on the day of expiry (June 25, 2009) is presented in Table 6.3.

Table 6.3: Price level of Bharti Telecom

<i>Closing Price of Reliance Equity on Expiry</i>	<i>Your Strike Price</i>	<i>Your payoff on Expiry (appreciation above Strike)</i>	<i>Your cost</i>	<i>Net Profit / (Loss)</i>
<i>All in Rs per Unit</i>				
600	760	160	37.65	122.35
650	760	110	37.65	72.35
700	760	60	37.65	22.35
750	760	10	37.65	(27.65)
760	760	0	37.65	(37.65)
800	760	0	37.65	(37.65)
900	760	0	37.65	(37.65)

Net Settlement Framework

The method of settlement of the Option by payment of the ‘depreciation below Strike’ to the buyer of the Option is called ‘net settlement’ or ‘cash settlement’. This is the method of settlement used in Indian Equity Derivative segment at present. In this net settlement framework, equity shares of Bharti Telecom do not change hands. The option buyer merely receives cash difference, which is paid by the option seller (we will discuss the option seller’s payoff in further sections in this Unit).

Another possible settlement framework is “Gross Settlement” or “Physical Settlement”. In this framework, the Put option buyer is expected to deliver the equity shares on the day of expiry and the option buyer will pay the strike price to the seller. The financial impact will be similar to the above computation of gains.

For example, if Bharti Telecom equity closes at Rs. 600 and you have bought a Put option at a strike of Rs. 760, you will deliver one share of Bharti Telecom on the day of expiry and the counterparty will hand over Rs 760 cash to you. Thus, you are getting a price of Rs. 760 even though the market price is much lower at Rs 600. You are enjoying a premium or gain of Rs. 160, the same amount that you generate in the cash settlement alternative directly.

In the Gross Settlement framework, the Put Option is defined as a “right to sell” the underlying at the strike price. Thus, you get the right to sell Bharti Telecom equity at Rs. 760 regardless of the actual closing price. Obviously, if the price is above Rs. 760, you will not exercise the Option (as you can get a higher price in the regular market) and the option will expire worthless.

As a Put option buyer (also called option holder in the derivative market), you have a 'right to receive' depreciation below strike in a net settled framework and a 'right to sell' at strike price in a gross settled framework. You have no obligations in the sense that you are not obliged to make any payments. All your obligations are fulfilled the moment you have paid the option premium, which is paid upfront when you buy the option.

Payoff Graph

The convention in Payoff Graphs is to represent the price of the underlying (Bharti Telecom Equity in our example) on the X Axis and the net gain/loss from the Option on the Y Axis.

The above payoff can be expressed in a graphic format as under:

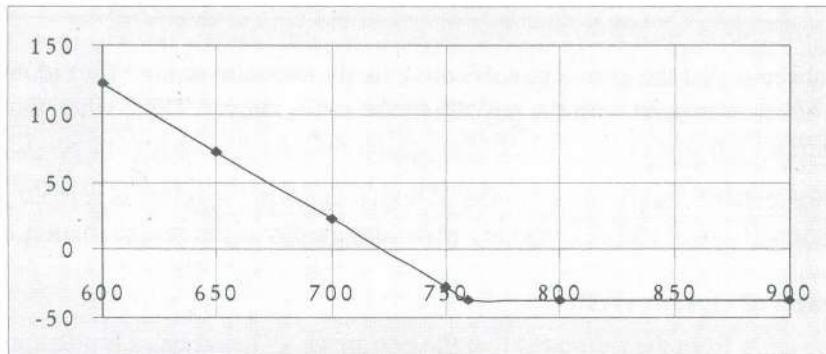


Figure 6.3: Payoff Graph of Bharti Telecom

You can observe the nature of the payoff being unlimited gains and limited losses from the above graphic representation. The maximum loss is restricted to the amount of premium paid Rs. 37.65.

Put Writing

In a manner similar to that of Call writing, the option buyer enjoys this abundance of gains with restricted loss only because the counterparty (the option seller / writer) is comfortable with the rather unhappy profile of limited gains and unlimited losses.

The option writer has sold the Bharti Telecom PA 25JUN2009 760 for Rs. 37.65. He has received this premium on the day of sale of the option. In return, he is obliged to the buyer to pay the depreciation below strike price on the day of expiry (assuming that both the buyer and the seller have not squared up their respective positions till the date of expiry). If Bharti Telecom Equity closes above the strike price of Rs. 760 on the day of expiry, the option writer is overjoyed as he gets to retain the entire premium of Rs. 37.65. However, if Bharti Telecom Equity closes below Rs. 760 (say at Rs. 700), then the option writer is obliged to pay the buyer Rs. 60 (depreciation below strike price). His net loss will work out to Rs. 22.35 (Rs. 60 minus Rs. 37.65).

In a simplistic understanding of option players, it is possible to imagine that Put option buyers are bearish in their view and Put option writers are bullish. It is possible that both players, especially writers, have entered into their positions on the basis of mathematical models and volatility views and not necessarily simple bearishness. We will discuss such complex strategies in later sections.

The payoff profile of the option writer is – limited gains and unlimited losses. The payoff table for the option writer (at various Reliance Equity closing prices on expiry day) can be understood as under:

<i>Closing Price of Reliance Equity on Expiry</i>	<i>Your Strike Price</i>	<i>Your payoff on Expiry (depreciation below Strike)</i>	<i>Your cost inflow of option premium</i>	<i>Net Profit / (Loss)</i>
				<i>All in Rs per Unit</i>
600	760	(160)	37.65	(122.35)
650	760	(110)	37.65	(72.35)
700	760	(60)	37.65	(22.35)
750	760	(10)	37.65	27.65
760	760	0	37.65	37.65
800	760	0	37.65	37.65
900	760	0	37.65	37.65

You will observe that the above payoffs are exactly opposite in sign (but identical in numbers) when compared with the payoffs of the option buyer. Thus, when the option buyer generates a profit of Rs. 122.35, the option writer makes a loss of Rs. 122.35

You must understand that the total profits of both players put together is zero i.e., to say, these products (futures and options) are zero sum games at the macro market level.

Payoff graph of Option Writer

You will observe from the figure 6.4 that the option writer generates a limited premium income (maximum possible gain) but his potential loss is unlimited and would occur if Bharti Telecom Equity were to fall.

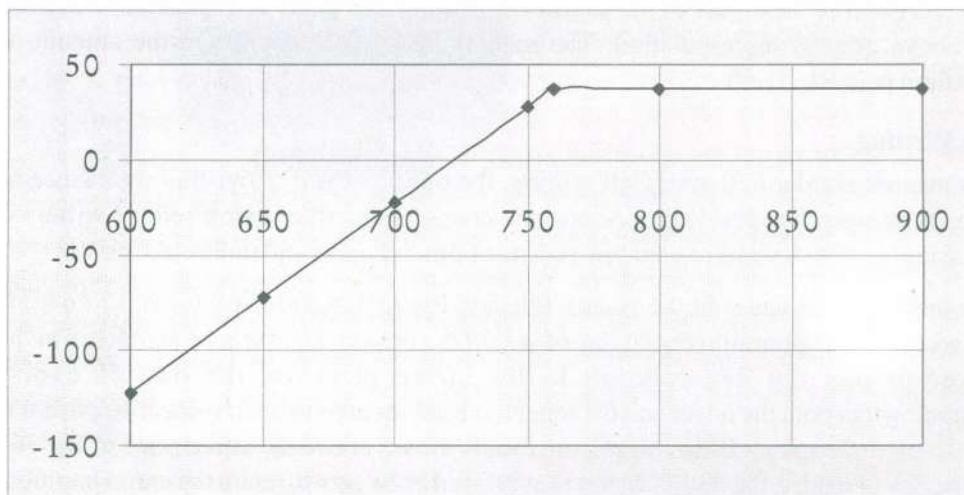


Figure 6.4: Option Written

Activity1

For a Call Options Contract, assume that the option Premium was Rs. 4, the exercise price Rs. 26 and the current market price of the stock is Rs. 24. This data remain the same for all of the following three cases. Each contract stands for 100 shares.

Case1

After Three months assume that the market Price of the Stock Price to Rs. 31. At this point, should investor exercise the option?

Case2

In this case, assume that the Stock price has increased to Rs. 30 Should he Exercise the Option?

Case3

Now assume that the Current stock price is Rs.20 should investor exercise his option now?

6.4 SUMMARY OF CALL AND PUT OPTION PAYOFF AND RISKS

We have discussed four possible positions in the above paragraphs – viz, long calls, short calls, long puts and short puts. Let us summarize the important risk and reward profiles of these positions.

Position	View	Premium	Profit Potential	Loss Potential	Risk Profile
Long Calls	Bullish	Pay	Unlimited	Limited	Low
Short Calls	Bearish	Receive	Limited	Unlimited	High
Long Puts	Bearish	Pay	Unlimited	Limited	Low
Short Puts	Bullish	Receive	Limited	Unlimited	High

You should note that large professional players are not necessarily bullish or bearish when they take the above positions. They may combine several options and futures and equity positions in such a manner that their integrated view may be difficult to discern unless you analyze the overall position carefully. Further, many professional players have mathematical views or volatility views which do not easily lend themselves to bullish or bearish possibilities.

6.5 AMERICAN AND EUROPEAN OPTIONS

We have seen that the Reliance and Bharti Airtel Options above were referred to as CA and PA respectively and we had understood that these terms stand for Call American and Put American. These terms are related to the concepts of ‘exercise’ and ‘assignment’ which are now discussed.

When you buy any product and you want to exit the long position in that product, what is the most common method to exit? The answer is ‘sell that the product’. In the same

manner, most investors and traders who buy Calls and Puts exit their positions by selling these options. However, there may be situations where a simple sale in the regular market is not easy to execute. For example, the market may be illiquid. Some options therefore allow the buyer to ‘exercise’ their options on any trading day before expiry.

Exercise and Assignment

- In an exercise of an option (possible for both Calls and Puts), the buyer of the option inform the stock exchange (through the regular trading terminal) that he wishes to exit his long position. At any point of time, the number of long and short positions in a contract is equal. For example, if there are 5,000 long positions open in our Call Option on Reliance CA 25JUN2009 2250, there would be 5,000 short positions open at the same point in time. Now if you hold 50 long positions and you have opted to ‘exercise’ your options, the exchange needs to identify counterparty that currently holds 50 (or more) short positions in Reliance CA 25JUN2009 2250. It does not matter when that party entered into its short positions or at what price.

The exchange runs a computer based algorithm and based on a random logic, it selects one or more counterparties with short positions equal to the number of options exercised. Let us suppose it selects Mr X whose short position is 50 units. Now, the exchange will compel Mr X to buy your Reliance CA 25JUN2009 2250 units. This process is called ‘assignment’, where the option writer is ‘assigned’ certain positions compulsorily. The writer will be informed by the evening that he is now required to buy 50 units.

Thus, all option writers carry a risk that their derivative strategy might be disrupted for reasons beyond their control if the options they have written are assigned and they are forced to buy these options back.

6.6 STOCK AND INDEX OPTIONS

All options where exercise is possible on all trading days before expiry are referred to as American options. Those options where exercise facility is not available are referred to as European options. In any case, both categories of options recognize the day of expiry as the last day and any open positions are squared up on the last day and payoffs effected as discussed in the earlier in this Block.

It is common practice in India and other markets in the world to design Stock Options (i.e., options on individual scrips) as American style options and to design Index options (i.e., options on indices) as European style. Thus, you will find that Reliance and Bharti Airtel Options are American (CA and PA as we observed), while Sensex and Nifty Options will be designated European and referred to as CE and PE respective for Calls and Puts.

Thus, the modes of exit available for long and short positions in Stock and Index Options can be summarized as under:

<i>Exit Modes</i>	<i>American</i>	<i>European</i>
Long Positions	<ul style="list-style-type: none"> ● Sell ● Exercise ● Wait till expiry 	<ul style="list-style-type: none"> ● Sell ● Wait till expiry
Short Positions	<ul style="list-style-type: none"> ● Buy back ● Get assigned ● Wait till expiry 	<ul style="list-style-type: none"> ● Buy back ● Wait till expiry

6.7 PRICE DETERMINATION FOR EXERCISE / ASSIGNMENT

You can choose to exercise your Option at any point during trading hours and during a small extension period after trading hours. The question is at what price is the Option settled once you have exercised your Put or Call. The arithmetical logic i.e., applied is the same as that on the day of expiry:

Thus, if you hold Reliance CA 25JUN2009 2250 (which you had bought for Rs. 80.50) and on June 8, 2009, you find that Reliance Equity has closed at Rs. 2,400 and you choose to exercise, your payoff will be “appreciation above strike” and you will receive Rs. 150 (Rs. 2,400 closing price minus Rs. 2,250 strike price).

This option will be assigned based on a random computer based algorithm to one of the option writers. The option writer will be compelled to buy this Option back and pay Rs 150 to the exchange (which will come to you from the exchange).

If you hold Bharti Airtel PA 25JUN2009 760 (which you had bought for Rs 37.65) and on June 8, 2009, you find that Bharti Airtel Equity has closed at Rs 700 and you choose to exercise, your payoff will be “appreciation above strike” and you will receive Rs 60 (Rs 760 strike price minus Rs 700 closing price).

This option will be assigned based on a random computer based algorithm to one of the option writers. The option writer will be compelled to buy this Option back and pay Rs 60 to the exchange (which will come to you from the exchange).

6.8 STATISTICS ON EXERCISE AND ASSIGNMENT

You will generally observe that exercise volumes increase towards expiry. Why would this phenomenon happen? The answer is based on arithmetic of pricing. We will discover in the next Unit that you will receive less on ‘exercise’ than the amount you would receive if you ‘sell’. For this purpose, we need to understand implication of Intrinsic and Time value.

A review of the statistics for April 2009 on the National Stock Exchange for the two underlying scrip in our example (Reliance and BhartiAirtel) reveals the following (expiry day was last Thursday, i.e., April 30, 2009).

Security Name	Date	Option type	Assignment
RELIANCE	13-Apr-09	CA	66,600
RELIANCE	23-Apr-09	CA	300
RELIANCE	24-Apr-09	CA	2,700
RELIANCE	27-Apr-09	CA	175,500
RELIANCE	28-Apr-09	CA	106,800
RELIANCE	29-Apr-09	CA	2,854,800
RELIANCE	29-Apr-09	PA	8,400
BHARTIARTL	21-Apr-09	CA	15,000
BHARTIARTL	24-Apr-09	CA	23,000
BHARTIARTL	27-Apr-09	CA	1,500
BHARTIARTL	28-Apr-09	CA	500
BHARTIARTL	29-Apr-09	CA	1,543,500
BHARTIARTL	29-Apr-09	PA	500

Compute from the following table the amount you will receive if you exercise your option (or other blanks). Note that in some cases, the payoff on exercise amount may also be zero.

<i>Stock price</i>	<i>Strike price</i>	<i>Option Type</i>	<i>Payoff on Exercise</i>
802	780	Call	
	780	Put	
2253	780	Call	50
	780	Put	60
2253	2200	Call	
	2200	Put	
2253		Call	253
		Put	247

Activity 2

- 1) Give some of the option Exchanges and the instrument on which option are Traded?

.....

- 2) List down 3 main differences Between American Option and European Option?

.....

6.9 SUMMARY

An option is a contract in which seller of the option grants the buyer the right to purchase from or sell to, the seller a designated instrument or an asset at specific price which is agreed upon at the time entering into the contract.

It's important to note that the option buyer has the right but not an obligation to buy or sell. But, if the buyer decides to exercise his right the seller of the option has an obligation to deliver or take delivery of the underlying asset at the price agreed upon. The Seller of the option is called writer.

An option contract is called a "call option", if the writer gives the buyer of the option the right to purchase from the underlying asset, at a predetermined price at sometime in future.

An option contract is said to be "Put option", if the writer gives the buyer of the option the right to sell the underlying asset, at a predetermined price at sometime in future.

A European option is exercised only on due date while an American Option can be exercised any day prior to the due date.

An option premium is the amount which is paid by buyer of the option to the seller to induce him to undertake the risk associated with such contract.

6.10 SELF ASSESSMENT QUESTIONS

- 1) Define call option and put option?
- 2) What is the importance of strike price and how does it affect your payoff?
- 3) What are the risks and rewards in writing options and in which direction?
- 4) Which are the forms of settlement of options and what is the practice followed in the Indian equity market?
- 5) What is the difference between an American and a European option and which options are available in India?
- 6) What is exercise and what is the difference between exercise and assignment?

6.11 FURTHER READINGS

- John C Hull, 2008, *Options, Futures, and Other Derivatives*, Prentice Hall.
- Philip James Hunt and J.E. Kennedy, 2004, *Financial Derivatives in Theory and Practice*, Wiley.
- Neil A. Chriss and Ira Kawaller, 1996, *Option Pricing Models*, McGraw-Hill.
- Fabrice Douglas Rouah and Gregory Vainberg, 2007, *Option Pricing Models and Volatility Using Excel-VBA*, Wiley.
- Gopinath Kallianpur and Rajeeva L. Karandikar, 1999, *Introduction to Option Pricing Theory*, Birkhäuser Boston.
- Dimitris Chorafas, 2008, *Introduction to Derivative Financial Instruments: Bonds, Swaps, Options and Hedging*, McGraw-Hill.

UNIT 7 TRADING STRATEGIES WITH FUTURES

Objectives

After studying this unit, you should be able to:

- understand the mechanism of hedging, speculation and arbitrage using equity Futures;
- discuss the importance of crafting clear trading strategies while using Futures as a derivative instrument; and
- explain how an investor can minimize risk using equity Futures.

Structure

- 7.1 Introduction
- 7.2 Hedging
- 7.3 Speculation
- 7.4 Arbitrage
- 7.5 Summary
- 7.6 Self Assessment Questions
- 7.7 Further Readings

7.1 INTRODUCTION

Trading strategies have been developed by traders so as lock in a desired asset value or to take advantage of price movements. Investors demand higher returns for the time period they stay invested and the risks they are willing to take. The rationale behind the crafting of trading strategies lies in the need felt by different investors to achieve high returns while at the same time limiting their risk. Derivatives being products which help in risk management, price discovery and other economic purposes have their own risk-return tradeoff mechanisms which are quite different from simple investment products like shares and bonds.

Hedgers, Speculators and Arbitragers who are the major participants of the derivative markets have different investment objectives. Derivatives are considered as one of the most complex instruments known so far to the financial industry hence a deep awareness about their nature and working is essential for an investor willing to add derivatives to his or her portfolio. As a result, market participants have formulated different strategies to help achieve their purpose of entering derivative markets. This section attempts to explain the strategies used by each of the participants along with illustrations for better understanding.

7.2 HEDGING

Derivatives are instruments which derive their value from an underlying asset. This implies that their value would be explained by the value of an asset which may be shares, bonds, currencies, interest rate product etc. These instruments were invented with the basic purpose to manage risk. If the prices moved against a trader then it would be a potential loss to him.

Derivatives are used as risk management tools to hedge price risk. The word 'hedge' is derived from the word 'hecg' (origin from old English) which means a fence to enclose or protect. In finance, a hedge is defined as a trade designed to reduce risk or in other words to protect from risk. Hedging which is commonly used in trader parlance involves taking an offsetting position in the derivatives market to reduce the risk arising from fluctuations in the price of the underlying asset.

For instance, if a trader has invested in a company's stock and he fears that if the price moves against him i.e., if it falls he would end up generating a loss on his investment. To avoid this potential loss, he can sell a stock Futures contract (since the company stock is the underlying asset) to lock in a desired sell price. Now, he has two opposite positions - in the cash market he has bought shares and in the Futures market he has sold Futures. He is now indifferent to price movements. If the stock prices go up, the Futures prices will also move upwards. He will then generate a profit on equity held and a loss on Futures. If stock price moves downwards, he will generate a loss on equity but a profit on Futures.

The profit and loss will offset each other (or almost offset each other) and his overall result will be within acceptable limits.

Futures instruments are exchange traded derivative instruments which can be used by traders for various purposes. There are two positions which a trader can take in Futures markets. These are :

- Long position
- Short position

A *long position* in Futures market denotes that the trader anticipates the price to rise and hence buys a Futures contract to make sure that he buys at a desired price than making a purchase when the price has escalated to higher levels. In Futures markets, this position is referred to as going long by the traders. On the other hand, a *short position* denotes that the trader anticipates the price to fall and hence sells a Futures contract to make sure he sells at a desired price rather than selling when the prices have fallen lower than prevailing levels. In Futures markets, this position is referred to as going short by the traders.

Traders who use Futures or forwards contract to minimize price risk in the underlying asset are termed as Hedgers. Those who go long in Futures to minimize risk in underlying sell position are termed as Long hedgers. While those who go short in Futures to minimize risk in underlying buy position are termed as Short hedgers.

Types of hedges

A hedge may be a perfect hedge, equal hedge or an optimal hedge.

Perfect Hedge: A perfect hedge is a hedge which completely eliminates risk. However, such a perfect hedge is difficult to construct.

Equal Hedge: An equal hedge would be a hedge where the trader matches the exposure or existing position with an equal number of future contracts.

Optimal Hedge: An optimal hedge is a hedge, which uses the hedge ratio to compute the exact number of future contracts a trader should buy or sell to protect him from price risk in the underlying.

Single stock Futures is a future contract which enables one to buy or sell the given share or stocks of the same company at a certain date in future. Index Futures are Futures contracts which enable one to buy or sell a given portfolio of securities or shares at a future date. The single stock future derives its value from the share or stock acting as the underlying asset. Thus, the Futures price and the spot price move more or less in

tandem due to the high correlation between the stock and the stock Futures contract. However, the movement may not be the same each time.

Hedging using equity futures

Equity Futures are instruments used to minimize potential losses which might arise if the prices in the underlying stocks fluctuate or move against one's expectation.

Future contracts on exchange trading systems are denoted by instrument type followed by the symbol of the underlying asset.

Instrument Type	Underlying	Expiry Date	Option Type	Strike Price	High Price	Low Price	Prev Close	Last Price	Number of contracts traded	Turnover in Rs. Lakhs	Underlying Value
FUTSTK	RELIANCE	29OCT2009	-	-	2212.60	2169.05	2184.80	2179.85	25117	82674.74	2179.00
FUTSTK	RELIANCE	26NOV2009	-	-	2216.90	2177.95	2189.85	2186.90	1678	5532.29	2179.00
FUTSTK	RELIANCE	31DEC2009	-	-	2205.00	2199.95	2193.30	2200.00	4	13.21	2179.00

Figure 7.1: Futures of Reliance on National Stock Exchange

In the figure 7.1 the symbol for the instrument type is a 6 letter code, where the first three letters denote the type of derivative contract and the last three letters denote the underlying asset. Since the derivative here is the Futures contract the first three letters would be given as FUT and since the Futures contract has the stock as the underlying asset the rest of the code would be given as STK. Thus, FUTSTK would be the instrument type. If the instrument is an index future contract the code would be FUTIDX and if the instrument is an option contract on a stock it would be OPTSTK. The symbol for the underlying would be the share or index name, which ever is the underlying asset as shown for the share listed on the exchange. The close indicates the closing price while time stamp denotes the date on which the trade has taken place in the respective contract. A number of other parameters are also available for the derivative contract like the open, high, low, open interest etc. on the trading system for the traders.

The following illustration describes the mechanism of hedging with equity Futures.

Suppose an investor bought shares of Reliance on 14th Jan 2009. He purchases 100 shares of Reliance at the prevailing market price of Rs. 3220 per share. His total investment as on 14th Jan 2009 stands at Rs. 3.22 lakhs. Share price falls below to Rs. 2479 on 31st Jan 2009. The loss made by the investor would be -

Loss	= Initial investment – Proceeds on Sale of shares
Investment	= Share price × Number of shares
Initial Investment	= Rs. 3220 × 100
	= Rs. 322,000
Proceeds on sale of shares	= Rs. 2479 × 100
	= Rs. 247,900
Hence,	
Gain/Loss	= Rs. -74,100

Thus, in order to protect his investments from unfavourable price fluctuations he can take a short position (sell position) in the Reliance stock Futures contract. He can choose the tenor of the contract depending upon how long he desires to hold his investment. Here he has chosen to hedge for 15 days.

On 14-Jan-08 the spot of Reliance was 3220. This informed investor takes a sell position in Futures on Reliance at the rate of Rs. 3236 per lot where 1 lot = 100 shares i.e., he sells 1 lot of Futures contracts on shares of Reliance. This helps him to lock a price at which he wishes to sell the shares. At expiry, the share price falls to Rs. 2479 as the

market in general has fallen in the month of January 2008.

Gain	= Proceeds on square-off Futures – Initial investment
Investment	= Futures Price × Lot Size
Initial Investment	= Rs. 3236×100
	= Rs. 323,600
Square-off Futures	= Rs. 2478×100
	= Rs. 247,800
Hence,	
Gain/Loss	= Rs. 75,800

One cannot predict the movement in prices and hence a hedge may prove unsuccessful too. The following table summarizes two scenarios for the above example and the resulting payoffs.

Table 7.1: Net profit Loss with hedging

(Rs)	Without Hedging (Cash Market)	With hedging (Sell Futures 1 lots at expiry)	Net Profit/ Loss
Scenario : Hedge on Reliance	$(3220 - 2479) \times 1000$ = Rs -74,100	$(2478 - 3236) \times 100$ = Rs 75,800	Net Profit of Rs 1,700

Since he has hedged, it would help him cover losses made in the spot market.

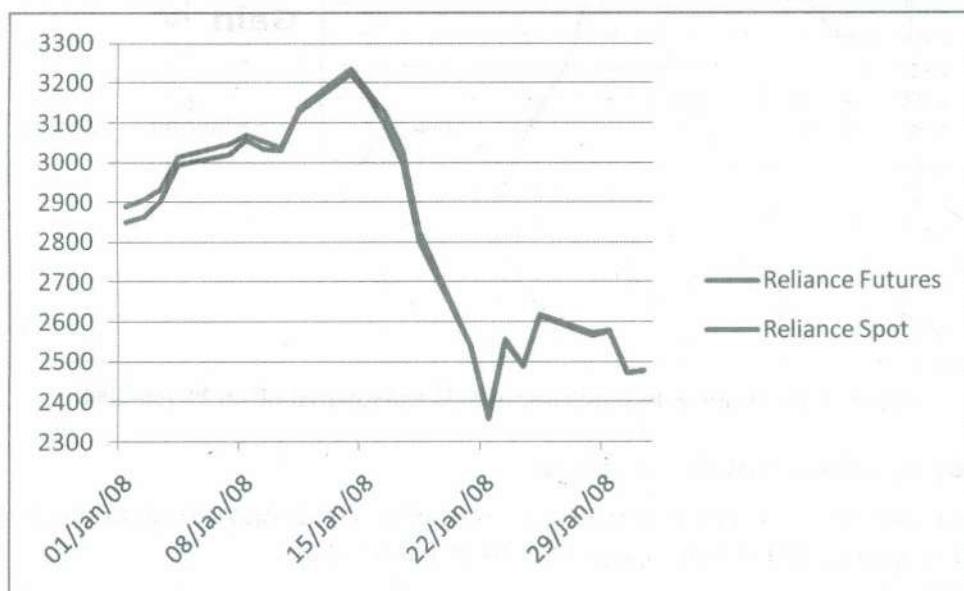


Figure 7.2: 1 month contract expiring on 29-Jan-2008

The Figure 7.3 and Figure 7.4 depicts the profit/loss made when the share price falls below Rs. 3220 and loss made if the share price rises above the Futures price.

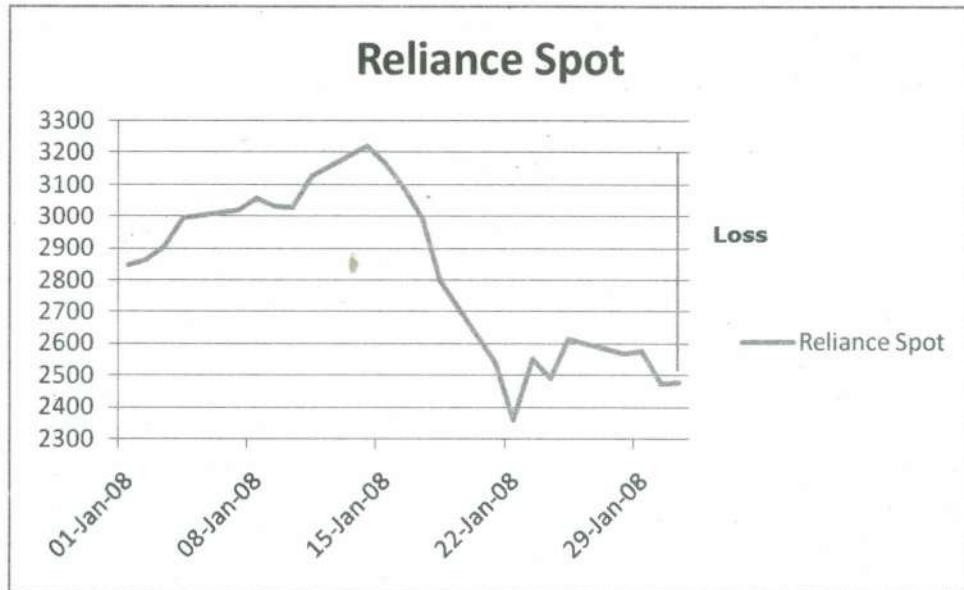


Figure 7.3: In spot he purchased at 3220 and sold on 29-Jan-2008 (expiry)

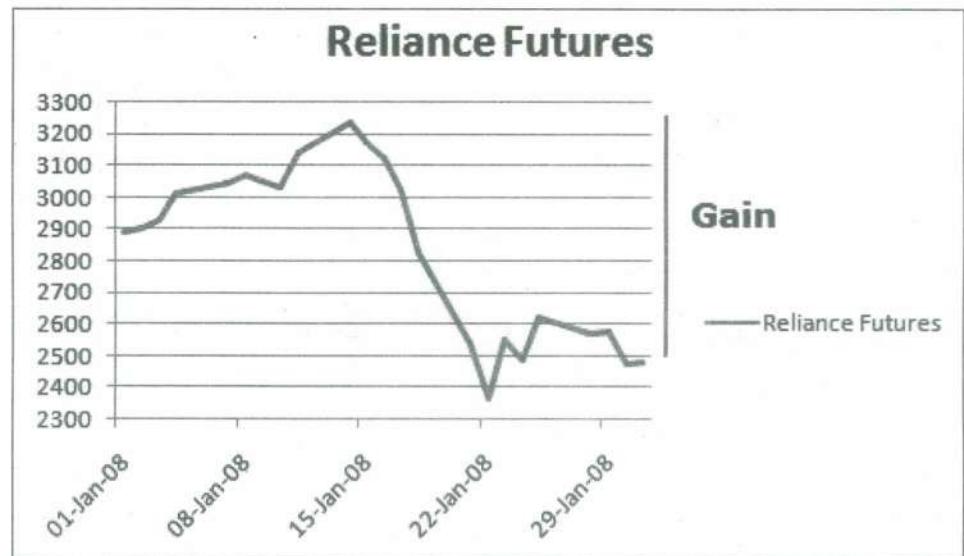


Figure 7.4: In Futures he purchased at 3236 and squared-off on 29-Jan-2008

Hedging using equity index Futures

If you own a portfolio of equity shares or a portfolio of equity oriented mutual funds, it will be appropriate to hedge your position using Index Futures.

An index is a hypothetical collection of securities which derives its value from the changes in the underlying securities in proportion to their weight in the portfolio. An index Futures is a Futures contract on an index. If the index comprises of stocks it is called as an equity index and the Futures contract on this index would be termed as an equity index Futures. The following example explains hedging using equity index Futures.

Suppose an investor 'A' has a portfolio of shares worth Rs. 13 lakhs and expects the shares to make capital gains in future. But due to certain macroeconomic factors the equity markets start falling. Now he stands exposed to price risk and would end up making losses on his initial investment. Hence, Mr. A can hedge against changes in value of the portfolio by using index Futures. Before, we proceed towards understanding the mechanism of hedging we need to know two fundamental concepts:

Optimal Hedge Ratio—

The optimal hedge ratio is given as, $N = \beta \times (P/F)$

Where, N = Number of Futures contracts to be shorted

β = beta of portfolio (from CAPM) P

= Portfolio of underlying securities

F = Value of Futures contract (viz. Futures price x Contract Size)

Beta of a portfolio explains the sensitivity of the portfolio with the market i.e., if β of the portfolio equals 1.0 then it means that the portfolio moves in tandem with the market. If the market gives 5% return, the portfolio also gives 5% return. If $\beta = 0.5$ then it means the portfolio gives half the returns than compared to that of the market. The optimal hedge ratio helps one to compute the number of Futures contracts required to hedge the underlying portfolio.

Some of the index Futures offered by NSE are:

- S&P CNX Nifty
- CNX IT
- BANK Nifty
- Nifty Midcap 50

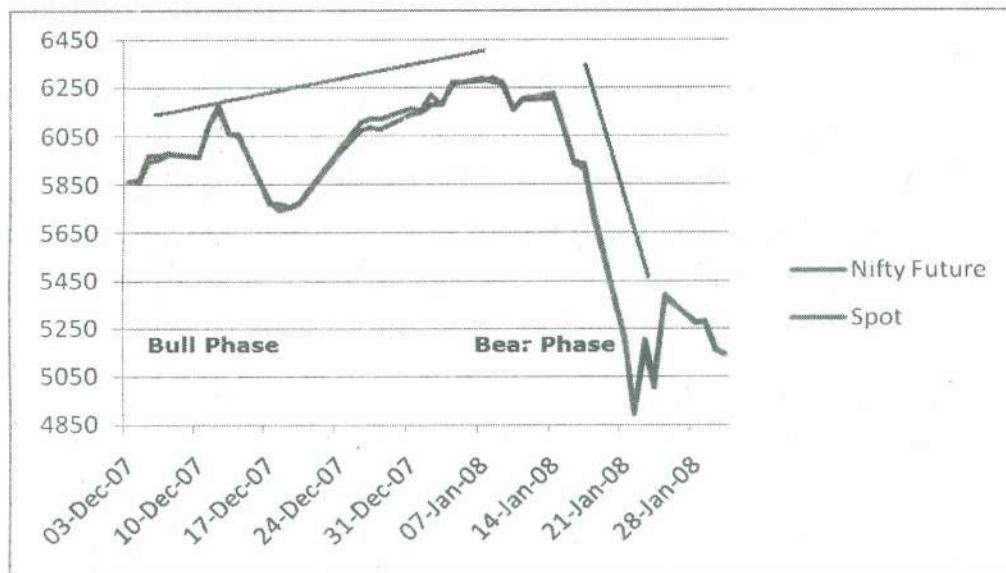


Figure 7.5: Turning of the markets on Jan-2008

Suppose Mr. A is having a Nifty index fund or Nifty ETF as underlying portfolio having value of 13,00,000.

An index fund is a mutual fund scheme having portfolio constructed to match or track the components of a market index, such as the Nifty Index. Some examples of index fund tracking Nifty are:

- Principal Index Fund
- UTI Nifty Index Fund

Exchange Traded Funds are just what their name implies: baskets of securities that are traded, like individual stocks, on an exchange. ETFs can be bought and sold throughout the trading day like any stock. Some examples of ETF tracking Nifty are:

- NIFTY BeES
- UTI SUNDER

He holds this portfolio to make capital gains on appreciation in value of underlying Nifty. But he is exposed to a risk if the price of the constituents of Nifty falls. Hence, he decides to hedge using derivatives.

He can use a Futures contract which helps him to hedge the entire portfolio. He uses Nifty Futures contracts as the portfolio he holds replicates the composition of the Nifty index. Thus, we can say that his decision to hedge his portfolio with the Nifty index Futures contract will help him manage price risk.

Now, Mr. A (from above example) considers taking a hedge on the portfolio. He finds that on 8-Jan-08 the Nifty spot index is at Rs. 6288 (Highest in Nifty's History), Future is 6272 on that date for near month expiry. He knows that the index fund or ETF completely replicates his underlying Nifty. This implies that his portfolio has a beta (β) = 1.0. He can use the optimal hedge ratio to compute the number of contracts he requires to short.

We know optimal hedge ratio,

$$N = \beta \times (P/F)$$

Value of the underlying portfolio (P) = Rs. 13,00,000

Value of Futures contract (F) = Futures Price \times Contract Size

$$= 6272 \times 100$$

$$= \text{Rs. } 627,200$$

Thus, number of Futures contracts = $1.0 \times (13,00,000 / 627,200)$

$$= \text{approx } 2 (2.072 \text{ rounded})$$

Hence, Mr. A will short 2 index Futures contracts to hedge his portfolio.

Loss on Nifty spot (Taking Nifty as proxy of Mr. A's portfolio)

$$= 1300,000 / (6288) * (6288 - 5137) = -237,961$$

$$\text{Gain on Nifty Futures} = 2 * 100 * (6272 - 5137) = 227,000$$

$$\text{Net Loss} = -10,961 \text{ Rs only.}$$

If he had not hedged his position by going short his loss would have been Rs. 237,961.

Above calculations also brings one important point, hedging does not pragmatically be perfect hedge.

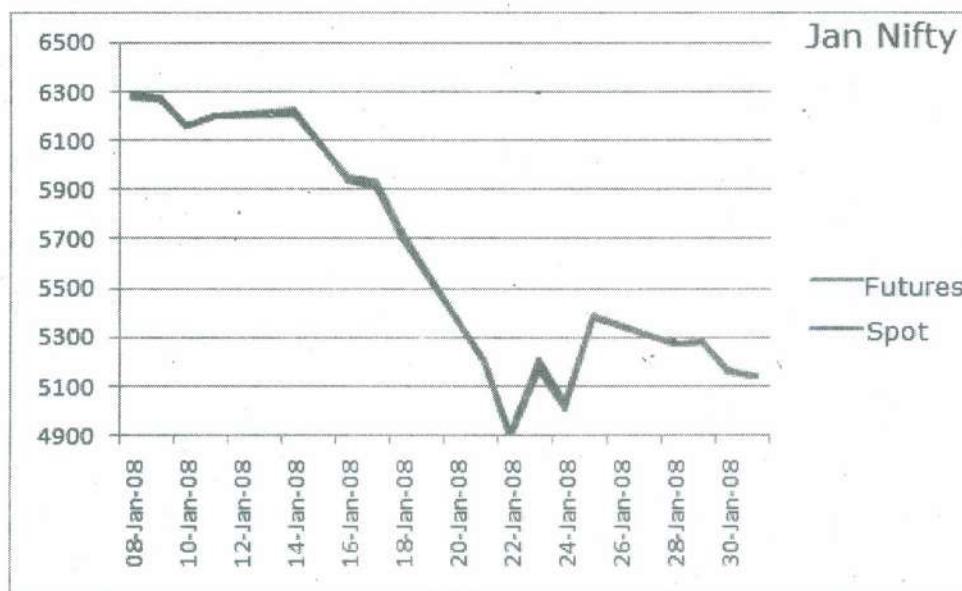


Figure 7.6: Nifty Movement (31 Jan Expiry)

Activity 1

What is optimal hedge ratio?

7.3 SPECULATION

Speculation is strategy adopted by traders who have views about the market. They believe that markets (or specific scrip) will either move upward or downward in the near future. In many cases, such views are formed by intuition, momentum, information flows, tips, rumors, expert opinions and by reading into patterns made by price history (also called technical analysis). Speculation is inherently risky as the trader stands lose if the markets do not follow his expectations.

A speculator needs to be familiar with various factors affecting prices like economic variables, investor sentiments and market forces to make well-informed investment decisions in the derivative markets. Speculation is also associated with short-selling of securities or taking short positions in Futures markets in order to profit from downward movements in equity prices.

Speculation using equity Futures

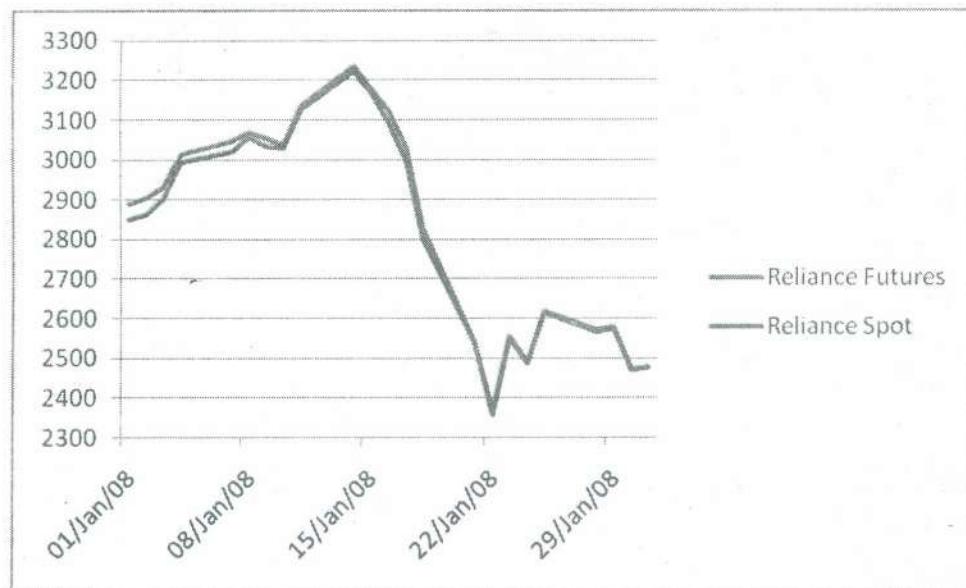


Figure 7.7: Example of shorting the Reliance on Jan 2008 drop

Table 7.2 : Spot and Futures on two dates

Date	Reliance Spot	1 Month Reliance Future (Expiry 31-01-2008)
01-01-2008	2848	2889
31-01-2008	2478	2478

If somebody shorted Reliance on 01-Jan-2009

In Cash Market his profit is

$$(2848 - 2478) * (100) = 37000$$

$$\text{Return on Investment} = 37000 / (2848 * 100) = 37000 / 284800 = 12.99\%$$

In Futures Market his profit is 41100 but

$$\text{Return on Investment} = 41100 / (30 \% \text{ of } 2889 * 100 = 86670) = 47.42\%$$

(Here we have assumed that no other margin other than initial margin of 30% is paid on Reliance).

We also assumed that shorting in Cash Market means selling dearer and latter buying cheap that is the speculator was already having shares of Reliance but he anticipated that Reliance will go down and sold to buy latter.

Speculation using equity index Futures

Here is an example of an informed investor getting the benefit out of Futures market. In the below figure an investor who wants to intelligently speculate can buy a fixed quantity (called lot size) of stock indices at very low upfront money known as initial margin. Example on Sep 2009 lets say we have to pay only 10% of initial margin on NIFTY Futures contract. The lot size at the time was 50.

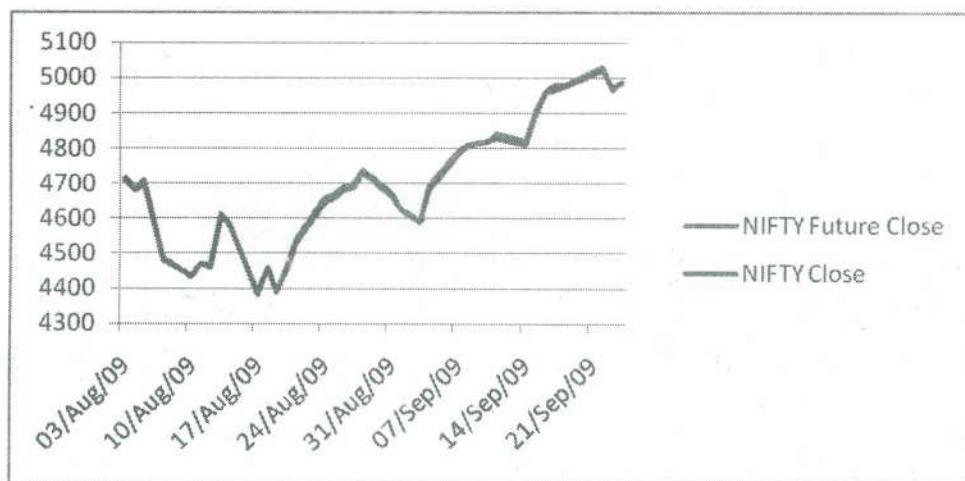


Figure 7.8: Futures and spot for NIFTY

In Cash Market his profit is

$$(5000 - 4700) * (50) = 15000$$

$$\text{Return on Investment} = 15000 / (4700 * 50) = 15000 / 235000$$

= 6.38%

In Futures Market his profit is same 15000 but

$$\text{Return on Investment} = 15000 / (10 \% \text{ of } 4700 * 50)$$

= 63.8%

(Here, we have assumed that no other margin other than initial margin of 10% is paid)

So we can have big reward with little money invested. If the markets are against us we can also loose more in future than cash market.

Similarly, an informed speculator can make money by short selling the Futures.

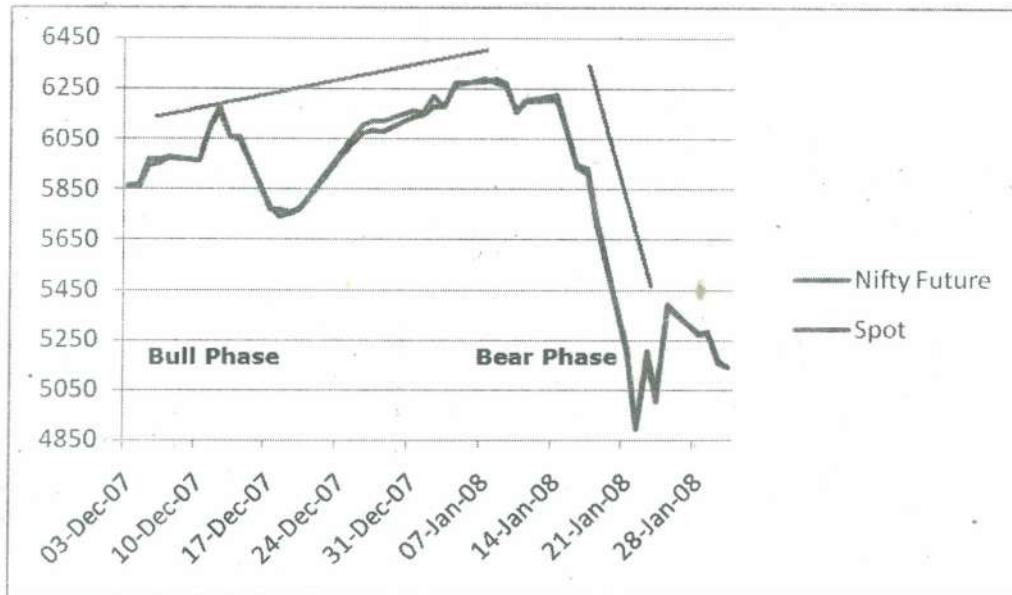


Figure 7.9: After 09-Jan-2008 prices continued to drop significantly providing ample opportunities

Derivative instruments provide leverage facility to the speculators hence serve as an attractive opportunity for them. In other words, it gives a facility of trading at making smaller investments or gives exposure to a huge volume of derivatives by making smaller investments.

7.4 ARBITRAGE

Arbitrage is the phenomenon of simultaneously buying and selling assets in the market to profit from price differences in two markets. If the relation between prices differs significantly, it gives rise to arbitrage opportunities. Difference in the equilibrium prices determined by the demand and supply at two different markets also gives opportunities to arbitrage.

Deterministic Arbitrage is a financial transaction that makes an immediate profit without involving any risk. Technically it consists of purchasing a security in one market for immediate sale in another market (example being price discrepancy between NSE close and BSE close).

Table 7.3: Arbitrage opportunity between NSE and BSE (26 Oct 2009)

Company Name	NSE Close	BSE Close	Diff in Rs.	% Diff
Somany Ceramics	117.00	109.30	7.70	7.04
ECE Industries	238.00	223.80	14.20	6.34
Centum Electron	64.80	61.15	3.65	5.97
Shalimar Paints	255.00	242.50	12.50	5.15

In the above example if delivery is made and the transaction cost are lower then difference in prices between markets an arbitrager can make profit.

Arbitrage is possible between two markets (spot/spot, spot/Futures and Futures / Futures). If arbitrage opportunity arrives between two Futures contracts with same underlying asset and different expiry months it is termed as calendar spread. Arbitrage is also possible using index Futures if a trader is skilled to trade between the portfolios of securities which has high correlation with an index Futures contract simultaneously.

Arbitrage helps maintain prices at market equilibrium as more arbitragers notice the mispricing between markets.

Cash and Carry Arbitrage (Overpriced Futures)

If the Futures price is overvalued than spot price:

- 1) The arbitrageur shorts overvalued Futures; simultaneously he is long in spot.
- 2) On or before expiry date, the arbitrageur square off his Futures and settle spot position.
- 3) The difference between Futures prices and Spot prices on the purchase and settlement date is his gain.

Example:

- 1) The arbitrageur shorted 1 lots (100 underlying shares in 1 lot) of ACC on 02-May-07(See figure).Purchased 100 ACC shares. For simplification we assumed no margins or transaction taxes.
- 2) On 26-Jun-07 he settled by offsetting the Futures position and selling the spot
- 3) The profit is calculated in Table 7.4.

Table 7.4: Net Profit calculation on ACC

Futures Profit	$(763.05 - 599.1) * 100$	16395
Cash Loss	$(599.1 - 753.7) * 100$	-15460
Net Profit	935	

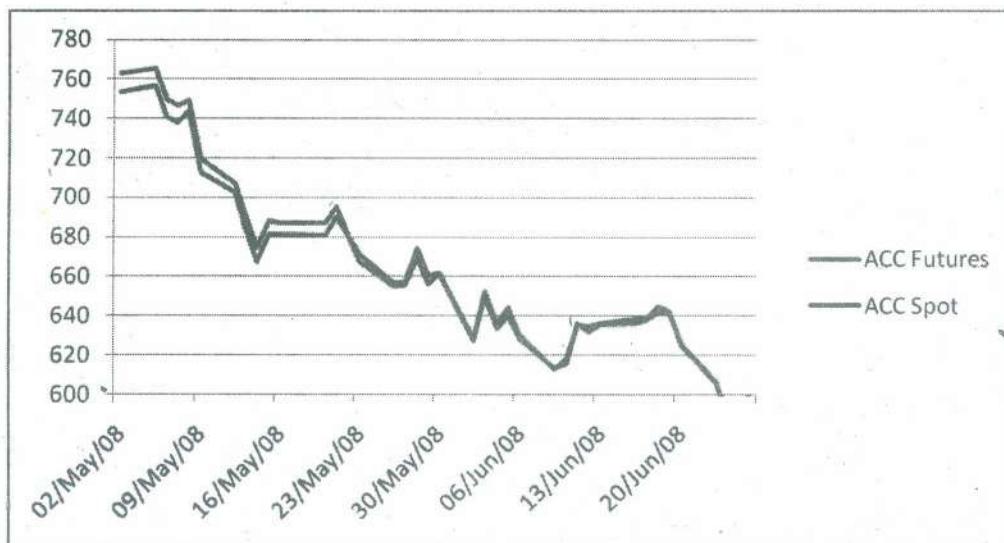


Figure 7.10: Cash and Carry arbitrage on ACC

Table 5: Basis and Cost of Carry calculations for ACC (Expiry 26-Jun-08)

Date	Open Interest	ACC Futures	ACC Spot	Basis	Cost Of Carry
02-May-08	14100	763.05	753.7	9.35	0.1154
05-May-08	15040	765.45	757	8.45	0.1066
06-May-08	18612	749.95	741.4	8.55	0.1131
07-May-08	18988	746.5	738.15	8.35	0.1140
08-May-08	18988	749.1	744.3	4.8	0.0670
09-May-08	42488	719.8	712.9	6.9	0.1034
12-May-08	52452	707.3	702.6	4.7	0.0737

13-May-08	63168	690.95	683.65	7.3	0.1212
14-May-08	86292	674.7	667.45	7.25	0.1272
15-May-08	95692	688	681.65	6.35	0.1128
16-May-08	106408	686.95	681.3	5.65	0.1039
20-May-08	154348	687.25	680.8	6.45	0.1229
21-May-08	172396	694.95	690.35	4.6	0.0898
22-May-08	371864	680.9	680.35	0.55	0.0113
23-May-08	517000	671.5	667.25	4.25	0.0927
26-May-08	756888	657.05	654.9	2.15	0.0498
27-May-08	1069344	657.1	655.85	1.25	0.0302
28-May-08	1420528	674.6	669.5	5.1	0.1259
29-May-08	1963096	660.5	656.2	4.3	0.1135
30-May-08	1958960	661.7	661.3	0.4	0.0110
02-Jun-08	2011976	628.3	627.2	1.1	0.0337
03-Jun-08	2192456	652.3	649.7	2.6	0.0810
04-Jun-08	2186440	635.8	633.25	2.55	0.0863
05-Jun-08	2110864	644.2	639.75	4.45	0.1581
06-Jun-08	2142448	630.3	628.45	1.85	0.0715
09-Jun-08	2008780	612.95	613.7	-0.75	-0.0319
10-Jun-08	1987536	617.8	615.15	2.65	0.1207
11-Jun-08	1974188	635.7	636.15	-0.45	-0.0215
12-Jun-08	2017992	634.65	631.85	2.8	0.1467
13-Jun-08	1962532	636.1	635.5	0.6	0.0344
16-Jun-08	1936964	638.85	635.85	3	0.1909
17-Jun-08	1942980	638.7	637.85	0.85	0.0608
18-Jun-08	1975316	644.65	641.8	2.85	0.2310
19-Jun-08	1908012	642.6	641.2	1.4	0.1327
20-Jun-08	1773404	625	625.25	-0.25	-0.0292
23-Jun-08	1626200	606.25	606	0.25	0.0376
24-Jun-08	1234220	590.95	591.9	-0.95	-0.1954
25-Jun-08	889804	594.8	594	0.8	0.2456
26-Jun-08	213004	599.1	599.1	0	0.0000

Reverse Cash and Carry Arbitrage (Underpriced Futures)

The Futures price is undervalued than spot price:

- 1) The arbitrageur shorts overvalued spot; simultaneously he is long in Futures.
- 2) On or before expiry date, the arbitrageur square off his Futures and settle spot position.
- 3) The difference between Futures prices and Spot prices on the purchase and settlement date is his gain.

Example

- 1) The arbitrageur was long near month DLF Futures on 11-Jun-08(See figure). Shorted 100 DLF stocks. For simplification we assumed no margins or transaction taxes.
- 2) On 26-Jun-08 he settled by offsetting the Futures and the spot.
- 3) The profit calculation is given in Table 7.6.

Table 7.6: Net Profit calculation on DLF

Futures Loss	$(451.8 - 504.75) * 100$	-5295
Cash Profit	$(512.15 - 451.8) * 100$	6035
Net Gain		740

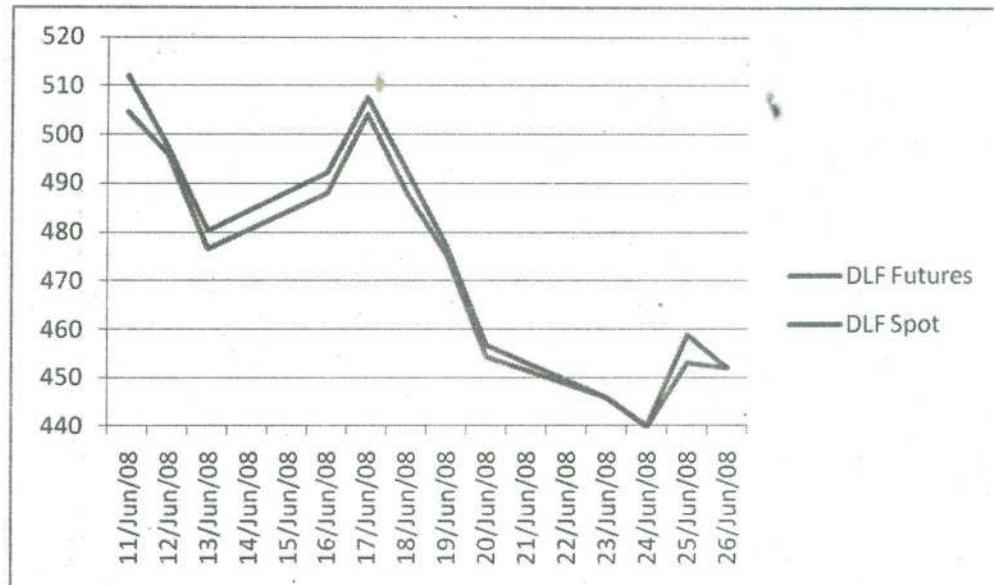


Figure 7.11: Reverse cash and carry arbitrage on DLF

Table 7.7: Basis and Cost of Carry calculations for DLF (Expiry 26-Jun-08)

Date	Open Interest	DLF Futures	DLF Spot	Basis	Cost Of Carry
11-Jun-08	11727200	504.75	512.15	-7.4	-0.4427
12-Jun-08	12184400	495.95	497.45	-1.5	-0.1002
13-Jun-08	12560400	476.65	480.25	-3.6	-0.2746
16-Jun-08	11967200	487.9	492.3	-4.4	-0.3641
17-Jun-08	11541600	504.2	507.65	-3.45	-0.3111
18-Jun-08	11381200	488	492.6	-4.6	-0.4892
19-Jun-08	10376400	475.3	477.2	-1.9	-0.2427
20-Jun-08	9937600	454.25	456.8	-2.55	-0.4087
23-Jun-08	7981600	445.85	445.8	0.05	0.0102
24-Jun-08	6456400	439.6	439.95	-0.35	-0.0968
25-Jun-08	4285200	452.9	458.85	-5.95	-2.3820
26-Jun-08	3113200	451.8	451.8	0	0.0000

Futures Price for an Investment Asset

If Futures Rate > Spot + Cost of Carry,

Arbitragers can buy the asset and short Futures contracts on the asset.

If Futures Rate < Spot + Cost of Carry,

Arbitragers can short the asset and buy Futures contracts on the asset.

Pair trading

Also known as spread trading is a strategy that allows the trader to capture anomalies, relative strength or even fundamental differences on two scrip or indices. Example

certain scrip like TCS and INFOSYS, competitors in the same sector, will be highly correlated in their day-to-day price movements. When the correlation broke down that is one stock traded up while the other traded down, one can sell the outperforming stock and buy the underperforming one, betting that the “spread” between the two would eventually converge.

Example consider the Sep-09 contract. TCS and INFOSYS are having correlation of .89 (which is pretty significant). Anybody interested in Pairs trading can track both Futures and when one deviates from other, go long on underperforming and short on outperforming one.

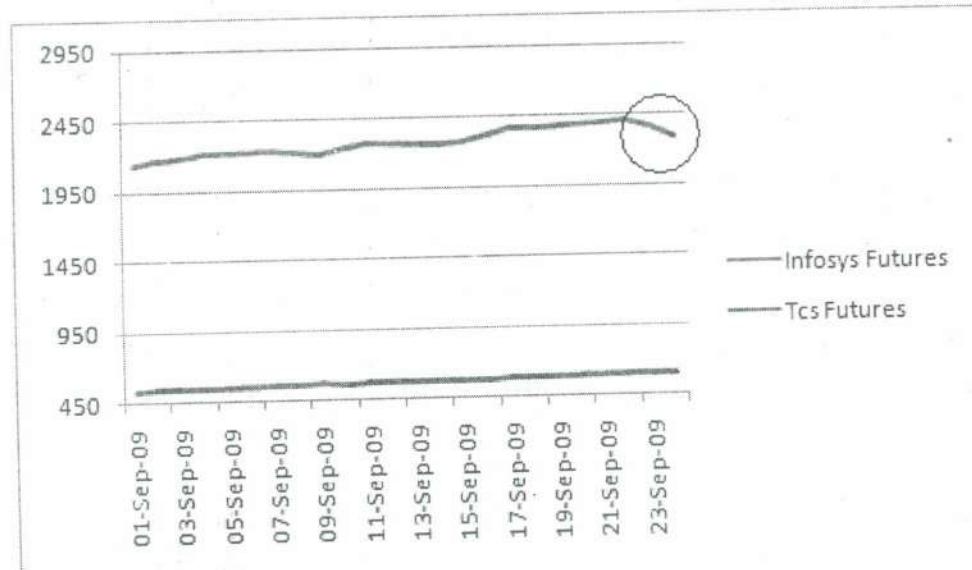


Figure 7.12: Futures for Infyosys and Tcs (24 Sep is interesting day to watch)

Table 7.8: Infosys and Tcs Futures

Date	Infosys Futures	Tcs Futures	Infosys Return	Tcs Return	Net Return (Infosys-Tcs)
01-Sep-09	2142.75	528.25			
02-Sep-09	2163	535.7	0.940609617	1.400464639	-0.459855022
03-Sep-09	2181.5	534.75	0.851656661	-0.177495492	1.029152154
04-Sep-09	2208.6	535.1	1.234611705	0.065429735	1.169181969
07-Sep-09	2234.05	552.6	1.145725114	3.218076717	-2.072351603
08-Sep-09	2209.15	554.8	-1.120825561	0.397327595	-1.518153157
09-Sep-09	2198	560.7	-0.505997018	1.057831469	-1.563828487
10-Sep-09	2241.2	558.15	1.946358073	-0.455825967	2.40218404
11-Sep-09	2273.8	562.35	1.4441004	0.749668839	0.694431561
14-Sep-09	2256.95	561.85	-0.743809642	-0.08895215	-0.654857493
15-Sep-09	2270.85	572.75	0.613986645	1.921441098	-1.307454453
16-Sep-09	2311.35	571	1.767755867	-0.306011168	2.073767035
17-Sep-09	2360.15	582.35	2.089340693	1.968243189	0.121097503
18-Sep-09	2357.35	584.35	-0.118706956	0.342847683	-0.461554639
22-Sep-09	2409.55	602.25	2.19019013	3.017252312	-0.827062182
23-Sep-09	2357.25	590.55	-2.194432271	-1.961833544	-0.232598728
24-Sep-09	2284.45	602.55	-3.137039021	2.011634342	-5.148673362

Here is another example consider the Sep-09 contract. Nifty and Reliance are having correlation of .72 (not pretty significant but Reliance is the most heavyweight scrip on Nifty, so we can ignore the less significant correlation for time being).

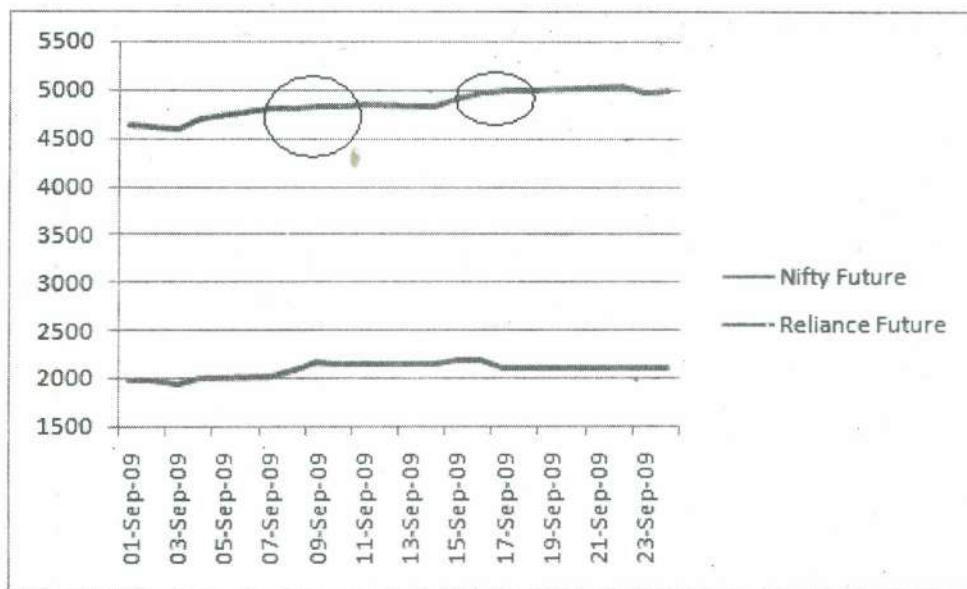


Figure 7.13: Futures for Nifty and Reliance (09 and 17 Sep are interesting days to watch)

Table 7.9: Nifty and Reliance Futures

Date	Nifty Futures	Reliance Futures	Nifty Return	Reliance Return	Net (Nifty- Reliance)
01-Sep-09	4623.35	1983.4			
02-Sep-09	4614.45	1977.8	-0.19268663	-0.282742792	0.090056162
03-Sep-09	4587.45	1937.55	-0.586837012	-2.056082749	1.469245737
04-Sep-09	4695.65	1991.8	2.331223409	2.761446415	-0.430223006
07-Sep-09	4795.8	2008.9	2.110398665	0.854855607	1.255543058
08-Sep-09	4808.45	2075.05	0.263425199	3.239794119	-2.976368921
09-Sep-09	4817.6	2164.05	0.190109188	4.19962163	-4.009512442
10-Sep-09	4818.45	2148.3	0.017642084	-0.730463438	0.748105522
11-Sep-09	4841.8	2150	0.483425283	0.079101044	0.404324239
14-Sep-09	4822	2146.3	-0.409777266	-0.172241273	-0.237535992
15-Sep-09	4899.95	2178.55	1.603622122	1.491408848	0.112213275
16-Sep-09	4961.85	2183.1	1.255365408	0.208636715	1.046728693
17-Sep-09	4978.05	2096.75	0.325959302	-4.035735816	4.361695118
18-Sep-09	4978.2	2103.75	0.003013183	0.333293964	-0.330280781
22-Sep-09	5030.75	2104.3	1.050069845	0.026140374	1.023929471
23-Sep-09	4963	2100.85	-1.355868176	-0.164084552	-1.191783624
24-Sep-09	4986.55	2100.95	0.473389128	0.004759865	0.468629263

UTI Spread Fund (Objective given in Fund Information Document)

'The investment objective of this scheme is to provide capital appreciation and dividend distribution through arbitrage opportunities arising out of price differences between the cash and derivative market by investing predominantly in equity & equity related securities, derivatives and the balance portion in debt securities'.

Religare Arbitrage Fund (Objective given in Fund Information Document)

'Religare Arbitrage Fund is predominantly a "Long Cash – Short Future" fund, which is a relatively risk-free strategy. A normal arbitrage opportunity is described as one where the price of a particular stock in the spot market is lower than the price for the same stock in the Futures market. Under these circumstances, Religare Arbitrage Fund would seek to lock in this differential by buying the stock in the spot market and simultaneously selling its Futures. While this would effectively negate any equity risk immediately, the difference in the two prices, termed as "carry" would be earned by the Fund. This ensures that investors are not exposed to equity market risk, as each position in equity stock is hedged by an equal and opposite position in the relevant derivative instrument.'

Activity 2

Discuss about cash and carry arbitrage.

Activity 3

Discuss about reverse cash and carry arbitrage.

7.5 SUMMARY

The trading strategies used by an investor are constructed depending upon the investment objective which may be hedging, speculation or arbitrage. Derivatives help in minimizing risk but their trading should be carried with necessary caution. Hedging involves taking opposite positions in the Futures market opposite to the position in the underlying asset. Hedging helps one to offset losses made in spot market with profits made in the Futures markets. Hedging is a strategy adopted to minimize price risk and can be done by traders who have an underlying position. Speculation involves betting on prices depending upon the views a trader has over the trends in the market. Arbitrage is a strategy to make riskless profits where traders observe opportunities to benefit from mispricing between two markets.

7.6 SELF ASSESSMENT QUESTIONS

- 1) Hedging can be carried out by –
 - a) Traders with no underlying position
 - b) Traders with underlying position
 - c) Who requires to minimize price risk associated with underlying asset
 - d) Both A & C
- 2) Speculation involves –
 - a) Betting on Price movements
 - b) Taking advantage of price movements
 - c) Minimizing price risk on underlying position
 - d) None of the above
- 3) Long in Futures means –
 - a) Buying and selling Futures
 - b) Buying future contracts
 - c) Selling future contracts
 - d) All of the above
- 4) Suppose an investor makes an investment into a company at Rs. 500 per share and purchases 100 shares. He hedges against price fall to protect from losses. What position he should take to protect him from price risk and what would be the profit or loss made if the contract expires at Rs 480. The Futures price is given as Rs. 510 –
 - a) Short, Profit Rs. 1000/-
 - b) Long, Profit Rs. 1000/-
 - c) Short, Loss Rs. 1000/-
 - d) Long, Loss Rs. 1000/-
- 5) Suppose an investor makes an investment into a company at Rs. 1500 per share and purchases 1000 shares. He hedges against price fall to protect from losses. What position he should take to protect him from price risk and what would be the profit or loss made if the contract expires at Rs. 1475. The Futures price is given as Rs. 510 –
 - a) Short, Loss Rs. 8000/-
 - b) Long, Profit Rs. 8000/-
 - c) Short, Profit Rs. 8000/-
 - d) Long, Loss Rs. 8000/-
- 6) Suppose an investor wishes to purchase 1000 shares of GRD Company after 2 months and fears that if the price rises he would end up paying higher for the shares. He takes a long position in equity Futures market at Rs. 427 when the prevailing spot rate is Rs. 423. After two months, as per his expectation the shares of GRD rise in value to Rs. 450 per share. The Futures contract expires at Rs. 455. What would be the profit or loss made?
 - a) Short, Loss Rs 5000/-
 - b) Long, Profit Rs 5000/-
 - c) Short, Profit Rs 5000/-
 - d) Long, Loss Rs 5000/-

- 7) If a trader has a buy position in the spot market and he fears from rise in prices, what position will he take in Futures markets?
- Short position
 - Long position
 - Both short and long
 - None of the above
- 8) If a trader has an underlying sell position and he fears from fall in prices, what position will he take in Futures markets?
- Short position
 - Long position
 - Both short and long
 - None of the above
- 9) Arbitrage is possible when -
- There is a price difference between two markets
 - There is high volatility in share prices
 - The prices are expected to rise
 - The prices are expected to fall
- 10) Speculators are also termed as -
- Gamblers
 - Arbitragers
 - Risk-taking investors
 - Hedgers
- 11) What is the difference between hedging and speculation?
- 12) How can one hedge their underlying position in Futures market?
- 13) How can one make riskless profit by participating in Futures markets?

7.7 FURTHER READINGS

- John C Hull, Sankarshan Basu, 2009, *Options, Futures, and Other Derivatives*, 7/E, Pearson Education, India.
- Parasuraman, 2008, *Fundamentals of Financial Derivatives*, Wiley, India.
- Francesca Taylor, 2008, *Mastering Derivatives Markets: A Step-By-Step Guide to the Products, Applications and Risks*, 3/E, Pearson Education, India.
- Elton & Grubber, 2008, *Modern Portfolio Theory and Investment Analysis*, 7/E, Wiley, India.
- Aswath Damodaran, 2007, *Corporate Finance Theory and Practice*, 2/E, Wiley, India.

UNIT 8 FACTORS AFFECTING FUTURE PRICES

Objectives

After studying this unit, you should be able to:

- understand impact on prices of Stock Futures and Options when Dividends are declared by the underlying company;
- analyse impact on prices of Stock Futures and Options when the underlying stock is split;
- explain impact on prices of Stock Futures and Options when the underlying company issues additional shares in the form of Rights or Bonus; and
- identify impact on prices of Stock Futures and Options when the underlying company merges with another company or undergoes other forms of corporate restructuring.

Structure

- 8.1 Introduction
- 8.2 Adjustment for Corporate Actions
- 8.3 Dividends
- 8.4 Stock Split
- 8.5 Bonus Issues
- 8.6 Right Issues
- 8.7 Mergers and De-mergers
- 8.8 Summary
- 8.9 Self Assessment Questions
- 8.10 Further Readings

8.1 INTRODUCTION

A corporate action is an event initiated by a public company that affects the securities (equity or debt) issued by the company. Some corporate actions such as a dividend (for equity securities) or coupon payment (for debt securities (bonds)) may have a direct financial impact on the shareholders or bondholders; another example is a call (early redemption) of a debt security. Other corporate actions such as stock split may have an indirect impact, as the increased liquidity of shares may cause the price of the stock to rise. Some corporate actions such as name change have no direct financial impact on the shareholders. Corporate actions are significant because they have a direct impact on a company's share price. Companies go for Corporate Actions for three reasons:

- **To return profits to shareholders.** A public company may declare a cash dividend to be paid on each outstanding share.
- **To influence the share price.** If the price of a stock is too high or too low, the stock's liquidity suffers. Overpriced stocks will not be affordable to all investors, and underpriced stocks may be delisted. Corporate actions such as stock splits or reverse stock splits increase or decrease the number of outstanding shares, resulting in a higher or lower stock price.

- **For corporate restructuring.** A merger is a corporate action in which two competitive or complementary companies join to increase profitability. Other forms of restructuring could be a demerger, a spin off or capital structure changes.

When a company announces a corporate action it brings actual change to its securities either in terms of number of shares in the market or a change to the face value of the security. It is important for an investor to understand the different types of corporate actions and their effects so as to have a clearer picture about a company's financial affairs and how that action will influence the company's share price and performance. Corporate actions are agreed upon by a company's Board of Directors and authorized by the shareholders. We will focus on the following corporate actions in detail:

- Dividends
- Stock splits
- Rights issues
- Bonus issues
- Merger and De-merger

8.2 ADJUSTMENT FOR CORPORATE ACTIONS

The basis for any adjustment for corporate actions shall be such that the value of the position of the market participants, on the cum and ex-dates for the corporation action, shall continue to remain the same as far as possible.

This will facilitate in retaining the relative status of positions viz., in-the-money, at-the-money and out-of-money. This will also address issues related to exercise and assignments.

Corporate actions to be adjusted: Corporate actions may be broadly classified under stock benefits and cash benefits. The various stock benefits declared by the issuer of capital are: bonus, rights, merger/de-merger, amalgamation, splits, consolidations, hive-off, warrants and secured premium notes among others. The cash benefit declared by the issuer of capital is cash dividend.

Time of adjustment: Any adjustment for corporate actions is carried out on the last day on which a security is traded on a cum basis in the underlying equities market, after the close of trading hours.

Adjustment: Adjustments may entail modifications to positions and/or contract specifications as listed below, such that the basic premise of adjustment laid down is satisfied: strike price, position, market lot/multiplier.

The adjustments are carried out on any or all of the above, based on the nature of the corporate action. In case of options, these adjustments will apply to all open, exercised as well as assigned positions.

Methodology for adjustment: The methodologies to be followed for adjustment of various corporate actions to be carried out are as follows: bonus, stock splits and consolidations.

Strike Price: The new strike price is arrived at by dividing the old strike price by the adjustment factor as under.

Market lot/multiplier: The new market lot/multiplier is arrived at by multiplying the old market lot by the adjustment factor as under.

Position: The new position is arrived at by multiplying the old position by the adjustment factor as under.

8.3 DIVIDENDS

An investor receives returns from equities in two forms: a) increase in the market price of the share, and b) dividends. Dividend is distribution of part of a company's earnings to shareholders, usually twice a year in the form of a final dividend and an interim dividend. Normally, the dividend is expressed on a 'per share' basis, for instance – Rs. 3 per share. This makes it easy to see how much of the company's profits are being paid out, and how much are being retained by the company to plough back into the business. So a company that has earnings per share in the year of Rs. 6 and pays out Rs. 3 per share as a dividend is passing half of its profits on to shareholders and retaining the other half. Directors of a company have discretion as to how much of a dividend to declare or whether they should pay any dividend at all.

Calculation of Stock price when dividend is paid out

There are five important dates that need to be taken care off while adjusting the stock prices. These are described in detail below:

The **declaration date** is the day the Board of Directors announces its intention to pay a dividend. On this day, a liability is created and the company records that liability on its books; it now owes the money to the stockholders. When the declaration of dividend takes place, the investor's expectation of dividend gets added into the stock price. Therefore there is an increase in the prices of stock because the investor embeds the expectation of dividend receipt into the stock price.

The **in-dividend date or cum-dividend date** is the last day, which is one trading day before the ex-dividend date, where the stock is said to be cum dividend ('with [including] dividend'). In other words, existing holders of the stock and anyone who buys it on this day will receive the dividend, whereas any holders selling the stock lose their right to the dividend.

The **ex-dividend date** is the day on which all shares bought and sold no longer come attached with the right to be paid the most recently declared dividend. This is an important date as it makes reconciliation of who is to be paid the dividend. Existing holders of the stock will receive the dividend even if they now sell the stock, whereas anyone who now buys the stock will not receive the dividend. It is relatively common for a stock's price to decrease on the ex-dividend date by an amount roughly equal to the dividend paid. This reflects the decrease in the company's assets resulting from the declaration of the dividend. The company does not take any explicit action to adjust its stock price, buyers and sellers will automatically price this in.

The **record date** is the day on which company check its records to see who its shareholders are and only those shareholders who are listed as a holder of shares in its records are entitle to get dividend from the company.

The **payment date** is the day when the dividend checks will actually be mailed to the shareholders of a company or credited to brokerage accounts.

The **Dividend Yield** is A financial ratio that shows how much a company pays out in dividends each year relative to its share price. In the absence of any capital gains, the dividend yield is the return on investment for a stock. Dividend yield is calculated as follows:

$$\text{Dividend Yield} = \frac{\text{Annual Dividends Per Share}}{\text{Price Per Share}}$$

Historically, Dividend Yield of Index NIFTY has remained between 0.8% to 2.5% over the period 2004 to 2008.

Example: Colgate Palmolive Ltd. has announced a dividend of Rs.8 per share (Face value of Rs.1) on July 17th 2009. Closing price on the announcement date is Rs. 644.15.

As we mentioned there are five major dates in the process of a company paying dividends. In this case:

Declaration date: July 17th 2009

Record date: August 21st 2009

Ex-dividend date (Ex. Date): August 20th 2009

In-dividend date: July 17th 2009 to August 19th 2009

It means, if you buy share from July 17th to August 19th 2009, you will get the dividend of Rs. 8 from the company. But if you buy on the ex-dividend date, you are not entitled to receive Rs. 8.

In this example dividend yield is:

$$\text{Dividend yield} = 8/644.15$$

$$= 1.24\%$$

Adjustment of derivative contract when company announced dividends

Dividends, which are below 10 per cent of the market value of the underlying stock, would be deemed to be ordinary dividends and no adjustment in the strike price would be made for ordinary dividends. For extra-ordinary dividends, above 10 per cent of the market value of the underlying security, the strike price would be adjusted.

To decide whether the dividend is “extra-ordinary” (i.e., over 10 per cent of the market price of the underlying stock), the market price would mean the closing price of the scrip on the day previous to the date on which the announcement of the dividend is made by the company after the meeting of the board of directors.

However, in cases where announcement of dividend is made after the close of market hours, the same day's closing price would be taken as the market price.

Further, if shareholders of the company in the AGM change the rate of dividend declared by the board of directors, then to decide whether the dividend is extra-ordinary or not would be based on the rate of dividend communicated to the exchange after AGM and the closing price of the scrip on the day previous to the date of the AGM.

In case of declaration of “extra-ordinary” dividend by any company, the total dividend amount (special and/or ordinary) would be reduced from all the strike prices of the option contracts on that stock.

The revised strike prices would be applicable from the ex-dividend date specified by the exchange.

Example: Shipping Corporation of India Ltd. (SCL) has announced a dividend of Rs.17 per share (Face value of Rs.10) in the month of September 2003 (assume September 5, 2003). Closing price on the announcement date is Rs.101.60.

In this case, SCI announced an extraordinary dividend because it is more than 10% of that day closing price. Therefore, it will affect both option strike price and future price of stock.

Record date: October 10, 2003

Ex date: October 9, 2003

Adjustment for Future contract

The full value of dividend i.e., Rs.17 would be deducted from all the cum-dividend future prices on the ex-dividend date. As you know, Daily at the end of the day exchange provides settlement price of the relevant future contract. One day before of ex-dividend date (October 8, 2003), the closing price of SCI October future contract (expiry date is October 30, 2003) is Rs.138.30. The full dividend amount of Rs. 17 would be deducted from the closing price and corresponding new base future price will be available for trading from October 9, 2003.

<i>Expiry date</i>	<i>Settlement price (October 8, 2003)</i>	<i>Base price (October 9, 2003)</i>
30-Oct-03	138.30	121.30
27-Nov-03	138	121
24-Dec-03	141	124

Source: NSE

Adjustment for Option contract

The full value of dividend i.e., Rs. 17/- would be deducted from all the cum-dividend strike prices on the ex-dividend date in the underlying market. The details of the old and corresponding new options contracts that shall be available for trading from October 9, 2003 would be notified on October 8, 2003.

<i>Expiry date</i>	<i>Option type</i>	<i>Old strike price</i>	<i>New strike price</i>
30-Oct-03	CA	155	138
30-Oct-03	CA	150	133
27-Nov-03	CA	120	103
27-Nov-03	CA	125	108
30-Oct-03	PA	70	53
30-Oct-03	PA	90	73
27-Nov-03	PA	85	68
27-Nov-03	PA	135	118

Source: NSE

Stock Split

A stock split is a corporate action which splits the existing shares of a particular face value into smaller denominations so that the number of shares increase, however, the market capitalization or the value of shares held by the investors post split remains the same as that before the split, e.g., if a company has issued 5,00,000 shares with a face value of Rs.10 and the current market price being Rs. 20, a 2-for-1 stock split would reduce the face value of the shares to 5 (10/2:1) and increase the number of the company's outstanding shares to 10,00,000 ($5,00,000 \times 2:1$). Consequently, the share price would also halve to Rs.10 so that the market capitalization or the value shares held by an investor remains unchanged.

There are basically two motives behind doing a stock split: 1) Splitting the stock brings the share price down to a more "attractive" level thereby luring investors to buy more shares. 2) Splitting a stock may lead to increase in the stock's *liquidity*, since more number of small investors are able to afford the share.

Calculation of Stock price when Stock Split is done

Factors Affecting Future Prices

We take an example of ABB Limited. On February 16, ABB Limited announced a stock split in the ratio of 5:1. It means a share of face value of Rs.10 will be split into five shares of face value of Rs.2.

Record Date	Ex Date	No delivery start date	No delivery end date
July 6, 2007	June 28, 2007	June 28, 2007	July 5, 2007

Record Date: If you own shares on the record date, it means you will be entitled to receive a share after stock splitting.

Ex Date: This is the date when ABB Limited shares will trade on NSE at the new split adjusted price.

No delivery start and end date: When company mentioned No delivery period, it means during this period only trading has been taken place in securities but settlement happens only after no delivery period. Therefore, in this case if anyone buys shares between June 28, 2007 to July 5, 2007, he/she will not be entitled for stock split.

ABB Limited announces a 5-for-1 (5:1) stock split. Shareholders will receive an additional 4 share for each share he/she holds. On June 27, 2007 (One day before stock split) closing price of ABB stock is Rs.4766.80. Therefore, price after stock split will be Rs.953.36 (Prices are rounded off to nearest tick size and price become 953.35).

Let A:B = 5:1

P_{ad} = Adjustment factor

P_{bss} = Price before stock split

P_{ass} = Price after stock split

$P_{ad} = B/A$

$$= 1/5 = 0.2$$

$P_{ass} = P_{bss} * P_{ad}$

$$= 4766.80 * 0.2$$

$$= \text{Rs.}953.35 \text{ (approx)}$$

Hence, the base price after stock split is Rs.953.35.

Date	5-for-1 Splot	Pre-split (Closing price)	Post-Split
June 27, 2007	Share Price(Rs.)	4766.80	-
June 27, 2007	No. of shares	211908375	-
June 28, 2007	Share Price(Rs.)	-	953.35
June 28, 2007	No. of shares	-	42381675

Source: NSE

Adjustment for derivative contract when company announced stock split

On June 27, 2007 (before stock split), the strike price on a near month (July contract - expiry date is July 26, 2007) ABB call option is Rs.3950. and lot size is 100. So now, we have to see what would be the strike price and lot size after stock split.

Adjustment for strike price

The exercise price or strike price of the option is multiplied by adjustment ratio.

$$E_{ass} = E_{bss} * P_{ad}$$

Where

$$\begin{aligned} E_{ass} &= \text{Strike price after stock split} \\ E_{bss} &= \text{Strike price before stock split} \\ E_{ass} &= 3950 * 0.2 \\ &= \text{Rs.790} \end{aligned}$$

Adjustment for lot size

The lot size of the contract is divided by adjustment ratio

$$L_{ass} = L_{bss}/P_{ad}$$

Where

$$\begin{aligned} L_{ass} &= \text{Lot size after stock split} \\ L_{bss} &= \text{Lot size before stock split} \\ &= 100/0.2 \\ &= 500 \end{aligned}$$

Summary Table

<i>Option specification</i>	<i>Before Adjustment</i>	<i>After Adjustment</i>
Strike price	Rs. 3950	Rs. 790
Lot size	100	500

Adjustment for Future Contracts

On June 27, 2007 (before stock split), the closing price of ABB July future contract (expiry date is July 26, 2007) is Rs. 4806.30. and lot size is 100. So now, we have to see what would be the corresponding new future price and lot size after stock split.

Adjustment for future price

The adjusted futures price shall be arrived at by multiplying the old futures price by the adjustment factor.

$$F_{ass} = F_{bss} * P_{ad}$$

Where

$$\begin{aligned} F_{ass} &= \text{Future price after stock split} \\ F_{bss} &= \text{Future price before stock split} \\ F_{ass} &= 4806.30 * 0.2 \\ &= \text{Rs.961.26} \end{aligned}$$

Adjustment for lot size

The adjusted market lot shall be arrived at by dividing the old market lot by the adjustment factor.

$$L_{ass} = L_{bss}/P_{ad}$$

Where

$$\begin{aligned} L_{ass} &= \text{Lot size after stock split} \\ L_{bss} &= \text{Lot size before stock split} \\ &= 100/0.2 \\ &= 500 \end{aligned}$$

<i>Future contract</i>	<i>Before Adjustment</i>	<i>After Adjustment</i>
Future price	Rs. 4806.30	Rs. 961.25
Lot size	100	500

Note: The revised strike/futures prices and the lot size on account of adjustment would appear in decimal places. The strike/futures prices are rounded off to the nearest tick size and lot size is rounded off to the nearest integer.

8.5 BONUS ISSUES

Bonus issues are shares issued free of charge to shareholders. The size of the issue reflects the improved value of the company's assets. They may sometimes be issued instead of dividends.

These shares are issued in a certain proportion to the existing holdings. So, a 2 for 1 bonus would mean you get two additional shares – free of cost – for the one share you hold in the company.

If you hold 100 shares of a company and a 2:1 bonus offer is declared, you get 200 shares free. That means your total holding of shares in that company will now be 300 instead of 100 at no cost to you.

Bonus shares are issued by converting the free reserves of a company into capital. A company builds up its reserves by retaining part of its profit over the years (the part that is not paid out as dividend). After a while, these free reserves increase, and the company wanting to issue bonus shares converts part of the reserves into capital. So the existing shareholder does not have to pay; and the company's profits are not impacted.

The main advantage of bonus issues is that the stock becomes more liquid as there will be many more shares to buy and sell.

Once a bonus is issued, the price of the shares is likely to drop as the value of the company's assets is now spread over a larger number of shares. Bonus shares dilute the market price of the shares in direct proportion to the increase in the total number of shares on issue.

This price adjustment occurs on the ex-bonus date. An investor who buys the existing shares on or after the date is not entitled to the bonus shares – they belong to the previous owner of the shares. The ex-bonus date falls on the fifth trading day prior to and including the closing date for the issue. The closing date is the date on which the company closes its books to determine which shareholders are registered to receive the bonus.

Calculation of Stock price when Bonus issues take place:

When the bonus issue is made the stock price decreases in proportion to the ratio of bonus issue.

Example: Tata Consultancy Services (TCS), India largest software exporter announced a bonus issue of shares at 1:1 ratio.

Record date: June 17, 2009

Ex date: June 16, 2009

Note: Record date and Ex date is already discussed in stock split section.

TCS declares a bonus issue of 1:1. Shareholders will receive an additional 1 share for every 1 share they held and receive 2 stocks. The stock price of TCS is Rs.778 (Closing

price) on June 15, 2009, which is one day before the Ex-date. Therefore, the ideal TCS price on June 16, 2009 (when actually bonus issues take place) would be Rs. 389.

Let A:B = 1:1

P_{bbi} = Price before bonus issue

P_{abi} = Price after bonus issue

N_{bbi} = Total number of share before bonus issue

Method I

$$P_{abi} = \frac{P_{bbi} * N_{bbi}}{A+B}$$

$$= \frac{778 * 1}{1+1}$$

$$= \text{Rs. } 389$$

Method II

First calculate adjustment factor.

Let P_{ad} = Adjustment factor

$$P_{ad} = \frac{B}{A+B}$$

$$= \frac{1}{2}$$

$$= 0.5$$

$$P_{abi} = P_{bbi} * P_{ad}$$

$$= 778 * 0.5$$

$$= \text{Rs. } 389$$

Date	1-for-1 Bonus issue	Pre-Bonus issue	Post-Bonus issue
June 15, 2009	Share Price (Rs.)	778	-
June 15, 2009	No. of shares	978610498	-
June 16, 2009	Share Price (Rs.)	-	389
June 16, 2009	No. of shares	-	1957220996

Source: NSE

Difference between Stock Split and Bonus Issue

Although the net worth of the company remains same in case of Stock Split and Bonus issue, however, there is vital difference between the two. In stock split, the paid-up capital of the company remains the same. But a 1:1 bonus issue has the effect of doubling the paid-up capital of a company.

Adjustment for Option contract

On June 15, 2009 (One day before the Ex-date) the strike price of TCS June month (expiry date is June 25, 2009) call option contract is Rs.800 and the lot size is 500.

Adjustment for strike price

The adjusted strike price shall be arrived at by multiplying the old strike price by the adjustment factor.

$$E_{abi} = E_{bbi} * P_{ad}$$

Where

E_{abi} = Strike price after bonus issue

E_{bbi} = Strike price before bonus issue

$$E_{abi} = 800 * 0.5$$

$$= \text{Rs.}400$$

Adjustment for lot size

The adjusted market lot shall be arrived at by dividing the old market lot by the adjustment factor.

$$L_{abi} = L_{bbi} / P_{ad}$$

Where

L_{abi} = Lot size before bonus issue

L_{bbi} = Lot size after bonus issue

$$L_{abi} = L_{bbi} * P_{ad}$$

$$= 500 / 0.5$$

$$= 1000$$

Summary Table

Option specification	Before Adjustment	After Adjustment
Strike price	Rs. 800	Rs. 400
Lot size	500	1000

Adjustment for future contract

On June 15, 2009 (One day before the Ex-date) the closing price of TCS June month future contract (expiry date is June 25, 2009) is Rs. 775.60 and the lot size is 500. Now we calculate what would be corresponding new future price and market lot.

Adjustment for future price

The adjusted future price shall be arrived at by multiplying the old strike price by the adjustment factor.

$$F_{abi} = F_{bbi} * P_{ad}$$

Where

F_{abi} = Future price after bonus issue

$$F_{bbi} = \text{Future price before bonus issue}$$

$$F_{abi} = 775.60 * 0.5$$

$$= \text{Rs. } 387.80$$

Adjustment for lot size

The adjusted market lot shall be arrived at by dividing the old market lot by the adjustment factor.

$$L_{abi} = L_{bbi} / P_{ad}$$

Where

$$L_{abi} = \text{Lot size before bonus issue}$$

$$L_{bbi} = \text{Lot size after bonus issue}$$

$$L_{abi} = L_{bbi} * P_{ad}$$

$$= 500 / 0.5$$

$$= 1000$$

Summary Table

Future contract	Before Adjustment	After Adjustment
Strike price	Rs. 775.60	Rs. 387.50
Lot size	500	1000

8.6 RIGHT ISSUES

A rights issue entitles existing shareholders to take up additional shares in the company, usually at a below-market price and without having to pay brokerage. Rights issues enable the company to raise additional funds from shareholders, perhaps for expansion or to repay debt. Shares are offered on a predetermined pro-rata basis, for example, 1 for 4. This means that for every four shares you own, you can purchase an additional share at the discounted price.

A rights issue may be renounceable or non-renounceable. Renounceable means shareholders are entitled to sell their rights to other investors on the share market if they do not wish to take up the additional shares themselves. Non-renounceable means only existing shareholders can participate and you must either take up the shares or forfeit the rights. If you are not an existing shareholder then one can purchase any available rights through a stock broking firm. Once rights have been taken up, they are converted to ordinary shares at the discounted price.

Calculation of Stock price after right issues

When the right issue is offered to the existing share holders, it is offered to them at a lower price than the existing price of the stock at the stock market. But that does not mean that the shareholders can make huge profit from this price difference. This is because after the right issue is offered price of that particular stock falls in the stock market. It happens because the number of stock of that company increases in the market.

Here, we take two examples: First one is hypothetical example and second is real example.

Example 1: Hypothetical Example

Consider there is a company "C" having 100 million outstanding shares. The share price currently quoted on the stock exchange is Rs. 500 thus the market capitalization of the stock would be Rs. 50 billion (outstanding shares times share price).

Assuming a 1:1 rights issue at an offer price of Rs. 200 and if all the shareholders of the company choose to exercise their stock option, the company's outstanding shares would increase to 200 million. The market capitalization of the stock would increase to Rs. 70 billion (previous market capitalization + cash received from owners of rights converting their rights to shares), implying a share price of Rs. 350 (Rs. 70 billion / 200 million shares). Thus, the stock price of the company will fall to around Rs. 350 per share.

Example 2: Real Example

Television Eighteen Indian Ltd. (TV-18) has announced a right issue of 1:2. It means each equity shareholder holding 2 equity shares of Rs. 5/- as on the Record date is entitled to one equity share of face value of Rs. 5/- each. Company offered right issue at Rs. 84 per equity share.

Rights ratio: 1:2

Record date: September 22, 2009

Ex-date: September 18, 2009

The closing price of TV-18 stock on the last cum date (September 17, 2009) is Rs.105.65 and the issue price is Rs.84. Each shareholder who are holding 2 share get 1 more share and finally they receive 3 shares and new stock of TV-18 stock is:

$$\text{New Price} = \frac{105.65*2 + 84*1}{3}$$

$$= \text{Rs.}98.43$$

There is also another method by which we can calculate new stock price. In this method, first we calculate the adjustment factor and then multiplying this adjustment factor to old market price to get new price.

Number of Existing shares = 2

Rights Entitlement = 1

Total Entitlement = 3

Let P = Closing price on the last cum date

S = Issue price

Benefit per Right Entitlement

$$= (P-S) * \text{Rights Entitlement}$$

$$= (105.65 - 84)*1$$

$$= \text{Rs.}21.65$$

Benefit per share (E)

$$= (\text{Benefit per Right Entitlement}) / (\text{Total Entitlement})$$

$$= 21.65/3$$

$$= \text{Rs.}7.21667$$

Adjustment factor

$$= (P-E)/P$$

$$= (105.65 - 7.21667)/105.65$$

$$= 0.931693$$

Hence, new stock price is

$$= P * \text{Adjustment factor}$$

$$= 105.65 * 0.931693$$

$$= \text{Rs.}98.43 \text{ (It is rounded off to the nearest tick size, hence price is Rs.}88.45\text{)}$$

Adjustment for derivatives contract when company announced right issue

Adjustment for option contract

On September 17, 2009 (One day before the Ex-date) the strike price of TV-18 September month (expiry date is September 24, 2009) call option contract is Rs.70 and the lot size is 1700.

Note: The revised strike/futures prices and the lot size on account of adjustment would appear in decimal places. The strike/futures prices are rounded off to the nearest tick size and the lot size is rounded off to the nearest integer.

Adjustment for strike price

The adjusted strike price shall be arrived at by multiplying the old strike price by the adjustment factor.

$$\begin{aligned}\text{New strike price} &= \text{Old strike price} * \text{Adjustment factor} \\ &= 70 * 0.931693 \\ &= \text{Rs.}65.20\end{aligned}$$

Adjustment for lot size

The adjusted market lot shall be arrived at by dividing the old market lot by the adjustment factor.

$$\begin{aligned}\text{New Market lot} &= (\text{Old market lot}) / \text{Adjustment factor} \\ &= 1700 / 0.931693 \\ &= 1825\end{aligned}$$

Summary Table:

<i>Option specification</i>	<i>Before Adjustment</i>	<i>After Adjustment</i>
Strike price	Rs. 70	Rs. 65.20
Lot size	1700	1825

Adjustment for future contract

On September 17, 2009 (One day before the Ex-date) the closing price of TV-18 September future month (expiry date is September 24, 2009) is Rs.105.50 and the lot size is 1700.

Adjustment for future price

The adjusted future price shall be arrived at by multiplying the old strike price by the adjustment factor.

$$\begin{aligned}\text{New strike price} &= \text{Old future price} * \text{Adjustment factor} \\ &= 105.50 * 0.931693 \\ &= \text{Rs.}98.30\end{aligned}$$

Adjustment for lot size

The adjusted market lot shall be arrived at by dividing the old market lot by the adjustment factor.

$$\begin{aligned}\text{New Market lot} &= (\text{Old market lot}) / \text{Adjustment factor} \\ &= 1700 / 0.931693 \\ &= 1825\end{aligned}$$

Summary Table

Factors Affecting
Future Prices

Future Contract	Before Adjustment	After Adjustment
Strike price	Rs. 105.50	Rs. 65.20
Lot size	1700	1825

8.7 MERGERS AND DE-MERGERS

A merger occurs when two or more companies combine to form a single one. In a typical merger, shareholders of the target company exchange their shares for those of the acquiring firm, after a shareholder vote approving the merger. There are different types of mergers such as:

- **Horizontal mergers:** It refers to the merger of two companies that are in direct competition. They are in same market and sell the same product.
- **Vertical mergers:** It refers to the merger where a product manufacturer merges with the supplier of inputs or raw materials.
- **Conglomerate mergers:** In this type of mergers the two companies who merged are involved into different business.

Whenever merger takes place between two companies, it should be either financed only by the issue of stock or financed by a mix of cash and stock. Here, we analyse only one aspect: what happens when merger is being financed only by issue of stock.

Suppose there are two companies: X and Y, which merges with each other. In the merger, Y merged with X, in other words we can also say that company X will buy company Y. Therefore, in this process, X is the merged company and Y is the merging company. Generally, larger firm will be the merged company and comparatively small company will be merging company.

	Company 'X'	Company 'Y'
Number of securities	1000	500
Price per share	100	50

In this case there are two things happens:

- a) The shareholder of company X receives Y and for this, they will swap certain number of shares.
- b) The shareholder of company Y completely swaps their ownership over Y and gets an ownership over new entity X+Y.

As mentioned earlier, the entire merger is executed using stock swaps in this example. Therefore, both firm have to decide what would be the swap ratio. Suppose both firm decided the swap ratio of 1:2, it means shareholder of company Y will receive one stock of X for every two stock of Y.

Hence, the total number of securities for a new entity X+Y would be 1250 (1000 stock for X and 250 stock for Y) and price per share is Rs.100.

N_1 = total number of securities of company X

N_2 = total number of securities of company Y

P_1 = company X stock price

P_2 = company Y stock Price

s = swap ratio

P_{12} = stock price of new entity X+Y

$$P_{12} = \frac{N1*P1 + N2*P2}{N1 + s*N2}$$

All the data are given in the above-mentioned table except s and $s = 1/2 = 0.5$.

$$\begin{aligned} P_{12} &= \frac{1000*100 + 500*50}{1000 + 0.5*500} \\ &= \frac{125000}{1250} \\ &= \text{Rs.}100 \end{aligned}$$

Actually the price of $X+Y$ may or may not be equal to Rs.100. It may be either more than Rs.100 or less than Rs.100. Whenever any merger taken place, the one of the important purpose of both the firm would be to create more value or at least keep the value same. If we analyse from company X point of view, the shareholders of company X will agree to go for the merger only if the stock price of X increases due to merger activities. It means shareholder of company X will accept merger if $P12 \geq P1$ or price of new entity will be greater than or equal to Rs.100,

$$\frac{N1*P1 + N2*P2}{N1 + s*N2} \geq P1$$

If we analyse company Y point of view, the shareholders of company Y will agree to go for the merger only if the each stock price they get in new entity will be more than Y stock price. It means shareholder of company Y will accept merger if $P12*s \geq P2$ or $P12*s$ will be greater than or equal to Rs. 50.

$$\frac{N1*P1 + N2*P2}{N1 + s*N2} * s \geq P1$$

Example 1: Centurion Bank of Punjab merged with HDFC Bank in June, 2008. In this merger, the shareholder of Centurion Bank of Punjab got 1 share of HDFC Bank for every 29 shares of Centurion Bank of Punjab. The name of the merged entity would remain as HDFC Bank.

	HDFC Bank	Centurion Bank of Punjab
Number of securities before merger	354432920	1906586483
Number of securities after merger	424616776	0

The boards of HDFC Bank and Centurion Bank of Punjab announced this merger in February, 2008. After this announcement, the HDFC Bank stock price is approximately 29 times more than Centurion Bank of Punjab (CBoP), till the CBoP stock is traded. Centurion Bank of Punjab stock is traded till June 6, 2008.

Here, Table 8.1 takes the closing price of CBoP and HDFC for a period of one month. During this period, if you observe that HDFC price is above 29 times than CBoP price then there is arbitrage opportunity. Let say, on March 18, 2008 you observe that HDFC price is 31.08 times more than CBoP price. The moment you see this kind of opportunity, you can do two things:

- Buy 29 CBoP stocks at a price of Rs.39.6. So, your total outflow = $\text{Rs.}39.6 * 29 = \text{Rs.}1148.4$.

- b) Take a short position in HDFC. When you take short position you will receive Rs.1230.95
- When merger has actually taken place then you will receive 1 HDFC stock because you bought 29 CBoP stocks. You will give this one HDFC stock to the person from whom you borrow. In this whole activity, you make a risk less profit of Rs.82.55 (Rs.1230.95 - Rs.1148.40). Here we do not consider brokerage cost or transaction cost. If you add that cost then your profit will reduced.

Table 8.1: Closing Price of CBoP and HDFC

Date	CBoP	HDFC	Ratio
25-Feb-08	48.35	1421.75	29.41
26-Feb-08	48.8	1454.9	29.81
27-Feb-08	48.6	1452.3	29.88
28-Feb-08	48.95	1472.55	30.08
29-Feb-08	49.15	1456.75	29.64
3-Mar-08	46.5	1389.9	29.89
4-Mar-08	44.55	1351.75	30.34
5-Mar-08	44.4	1332.75	30.02
7-Mar-08	41.65	1282.25	30.79
10-Mar-08	42.6	1311.5	30.79
11-Mar-08	43.55	1333.2	30.61
12-Mar-08	44.65	1370.55	30.70
13-Mar-08	41.6	1299.15	31.23
14-Mar-08	42.5	1315.45	30.95
17-Mar-08	39.5	1226	31.04
18-Mar-08	39.6	1230.95	31.08
19-Mar-08	40.45	1272.6	31.46
24-Mar-08	42.25	1341.9	31.76
25-Mar-08	45.8	1414	30.87
26-Mar-08	46.75	1439.2	30.79

Example 2: Reliance Petroleum Ltd. (RPL) merged with Reliance Industries Ltd.(RIL) in September, 2009. In this merger the shareholder of RPL got 1 share of RIL for every 16 shares of RPL. The name of the merged entity would remain as RIL.

	RIL	RPL
Number of securities before merger	1573869406	4500000000
Number of securities after merger	1855119406	0

The boards of RIL & RPL announced this merger in March, 2009. After announcement, the RIL stock price is approximately 16 times more than RPL. RPL was traded till September 24th 2009.

Adjustment for derivative contract due to merger activity

On the announcement of the record date for the merger, the exact date of expiration (last cum-date) would be informed to the members. After the announcement of the record date, no fresh contracts on Futures and Options would be introduced on the underlying, that will cease to exist subsequent to the merger. Un-expired contracts outstanding as on the last cum-date would be compulsorily settled at the settlement price.

The settlement price shall be the closing price of the underlying on the last cum-date. GTC/GTD orders for the Futures & Options contracts on the underlying, outstanding at the close of business on the last cum-date would be cancelled by the exchange.

The relevant authority may, on a case-by-case basis, carry out adjustments for other corporate actions in conformity with the above guidelines, including compulsory closing out, where it deems necessary.

Example: Reliance Petroleum Ltd (RELPETRO) announced its merger with Reliance Industries Ltd. (RELIANCE). The book closure date is October 19, 2002 to October 21, 2002 (both days inclusive) and Ex-date is October 10, 2002.

After this announcement the following adjustments shall be carried out on the Futures and Options contracts on Reliance Petroleum Ltd.

- 1) No fresh month futures and options contracts will be introduced for trading in the security RELPETRO. Consequently, no fresh month contracts will be introduced for the expiry month December, 2002 on the expiry of September, 2002 contract on September 26, 2002.
- 2) All existing contracts i.e contracts with expiry dates October 31, 2002 and November 28, 2002 will expire on October 09, 2002. Accordingly, no futures and options contracts will be available in the underlying RELPETRO for trading from October 10, 2002 onwards.

GTC/ GTD orders for the Futures & Options contracts on the security RELPETRO, outstanding at the close of trading hours on October 09, 2002, shall automatically stand cancelled.

Adjustment for derivative contract due to de-merger activity

Larsen & Tourbo Ltd. has announced demerger of its cement business and informed the exchange that the scheme of arrangement for demerger of cement business undertaking sanctioned by Hon'ble court of Bombay has been declared effective as of May 14, 2004. In terms of the sanctioned scheme of arrangement, the equity shareholders of the company on the Record Date will be issued:

- a) One equity share of the demerged company of the face value of Rs. 2/- each for every two equity shares held.
- b) Two equity shares of the face value of the Rs.10/- each in UltraTech CemCo Limited for every five equity shares of the face value of Rs.10/- each held.

The company has further informed the Exchange that the Record Date for reckoning the shareholders entitled to receive the new equity shares of the company in the restructured capital as also the equity shares of UltraTech CemCo Limited in terms of the scheme of arrangement has been fixed as May 27, 2004. The demerged entity will undergo a reduction of share capital from Rs.10/- per equity shares to Rs.1/- per equity shares and further the reduced face value of Rs.1/- each will be consolidated into equity shares of Rs. 2/- each.

The following adjustments shall be carried out on the Futures and Options contracts on L&T:

- 1) No fresh month contracts would be introduced for expiry month August, 2004 on the expiration of May 2004 contracts i.e., on May 27, 2004.
- 2) All existing contracts i.e., contracts with expiry dates May 27, 2004, June 24, 2004 and July 29, 2004 will expire on May 27, 2004. Accordingly, no futures and options contracts will be available in the underlying L&T for trading from May 28, 2004 onwards.

8.8 SUMMARY

This unit covered in details about impact of corporate action in Future and Option contract. A corporate action is an event initiated by a public company that affects the securities (equity or debt) issued by the company. Corporate actions are significant because they have a direct impact on a company's share price. Companies go for Corporate Actions for three reasons: (a) To return profit to share holders, (b) To influence share price, and (c) For corporate restructuring.

The basis for any adjustment for corporate actions shall be such that the value of the position of the market participants, on the cum and ex-dates for the corporation action, shall continue to remain the same as far as possible. In this entire unit, we focused on some specific corporate action such as Dividends, Stock splits, Right Issues, Bonus Issues and Merger & De-merger.

8.9 SELF ASSESSMENT QUESTIONS

- 1) What do you mean by Ex-dividend and Cum-dividend date?
- 2) What do you mean by Dividend Yield?
- 3) What is the difference between stock split and bonus issue?
- 4) How is future price adjusted when company announced bonus issue?
- 5) How is option strike price adjusted when company announced stock split?
- 6) How is market lot size adjusted when company announced right issue?

8.10 FURTHER READINGS

- Michael Simmons ,Elaine Dalgleish,2006, *Corporate Action: A guide to securities Event management*, John Wiley & Sons Ltd.
- Francis Groves, 2008, *Corporate Action: A Concise Guide*, Harriman House.
- www.nseindia.com
- www.bseindia.com

SEBI CIRCULAR ON CORPORATE ACTION FOR DERIVATIVE MARKET

SECURITIES AND EXCHANGE BOARD OF INDIA
SECONDARY MARKET DEPARTMENT
Mittal Court, B Wing, First Floor,
224, Nariman Point, Mumbai 400 021

SMDRP/DC/CIR- 8/01
June 21, 2001

To,

**The Chief Executive Officer/ Managing Director
of Derivative Segment of NSE & BSE
and their Clearing House / Corporation.**

Dear Sir,

Sub: Adjustment of Corporate Actions for Stock Option

The 'Technical Group' headed by Prof. J.R Varma, set up to prescribe risk containment measures for new derivative products, has recommended the risk containment measure for Exchange traded Stock Option Contracts. The Technical Group had set up a sub group comprising officials of BSE & NSE to determine a common methodology for adjusting corporate actions on Stock Options. Based on the recommendation of the sub-group, the Technical Group decided that since options on common stock would be trading on both NSE & BSE the corporate adjustment for the Option on the same underlying should be uniform across markets. While a uniform adjustment methodology could be adopted for certain corporate action, it would be difficult to specify any uniform policy for all corporate actions at this stage. For this purpose, it has been decided to constitute a group comprising NSE, BSE and other knowledgeable persons, which would decide a uniform course of action for adjusting stock option contracts on corporate actions, taking into account best practices followed internationally, where a uniform criterion cannot be laid down at present. However, certain adjustments for Corporate Actions for Stock Options would be as follows:

- 1) The basic for any adjustment for corporate action shall be such that the value of the position of the market participants on cum and ex-date for corporate action shall continue to remain the same as far as possible. This will facilitate in retaining the relative status of positions viz. in-the-money, at-the-money and out-of-money. This will also address issues related to exercise and assignments.
- 2) Any adjustment for corporate actions shall be carried out on the last day on which a security is traded on a cum basis in the underlying cash market.
- 3) Adjustments shall mean modifications to positions and / or contract specifications as listed below such that the basic premise of adjustment laid down under 1 above is satisfied :
 - a) Strike Price
 - b) Position
 - c) Market Lot / Multiplier

The adjustments shall be carried out on any or all of the above based on the nature of the corporate action. The adjustments for corporate actions shall be carried out on all open, exercised as well as assigned positions.

- 1) The corporate actions may be broadly classified under stock benefits and cash benefits. The various stock benefits declared by the issuer of capital are :

- Bonus
- Rights
- Merger / De-merger
- Amalgamation
- Splits
- Consolidations
- Hive-off
- Warrants, and
- Secured Premium Notes (SPNs) among others.
- Extraordinary dividends

- 2) The methodology proposed to be followed for adjustment of various corporate actions to be carried out are as follows :

Bonus, Stock Splits and Consolidations

Strike Price : The new strike price shall be arrived at by dividing the old strike price by the adjustment factor as under.

Market Lot / Multiplier : The new market lot / multiplier shall be arrived at by multiplying the old market lot by the adjustment factor as under.

Position : The new position shall be arrived at by multiplying the old position by the adjustment factor as under.

The adjustment factor for Bonus, Stock Splits and Consolidations is arrived at as follows:

Bonus

Ratio - A : B Adjustment factor : $(A+B)/B$

Stock Splits and Consolidations

Ratio - A : B Adjustment factor : A/B

Right

Ratio - A : B Premium - C Face Value - D Existing Strike Price : X

New Strike Price : $((B * X) + A * (C + D))/(A+B)$

Existing Market Lot / Multiplier / Position : Y

New issue size : $Y * (A+B)/B$

The above methodology may result in fractions due to the corporate action e.g. a bonus ratio of 3:7. With a view to minimizing fraction settlements, the following methodology is proposed to be adopted :

- 1) Compute value of the position before adjustment
- 2) Compute value of the position taking into account the exact adjustment factor
- 3) Carry out rounding off for the Strike Price and Market Lot
- 4) Compute value of the position based on the revised strike price and market lot.

The difference between 1 and 4 above, if any, shall be decided in the manner laid down by the group by adjusting Strike Price or Market Lot, so that no forced closure of open position is mandated.

- 1) Dividends which are below 10% of the market value of the underlying stock, would be deemed to be ordinary dividends and no adjustment in the Strike Price would be made for ordinary dividends. For extra-ordinary dividends, above 10% of the market value of the underlying stock, the Strike Price would be adjusted.
- 2) The Exchange may on a case to case basis carry out adjustments for other corporate actions as decided by the group in conformity with the above guidelines.

Yours sincerely,

(N.PARAKH)
CHIEF GENERAL MANAGER
DERIVATIVE CELL

B

NOTES

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