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Financial Derivatives

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OPTIONS AND FUTURES

HIGHLIGHTS

- An option is a contract between two investors that provides the buyer the right (but not the obligation) to sell or buy the specified asset from the other investors at the predetermined price within a specified period.
- The call option gives the investor the right to buy (not the obligation) from the option writer at the specified price at any time during the specified period.
- A put option gives the buyer the right to sell a specified number of stocks of a company to the option writer at a specific price at any time during the specified period.
- The values of the call and put options are affected by the prices of the underlying stocks, the striking price of the stock and the option period.
- The Black-Scholes theory says that the option price is determined by the market price of the stock, the exercise price, the life of the option, the risk free rate and the risk of the common stock. The last two factors are assumed to be constant over the option's life.
- The stock index futures are the futures contracts made on the major stock market indices. It is an obligation not an option.

Derivatives such as options and futures, are financial contracts which derive their values from the underlying assets or securities. The Securities Laws Amendment Ordinance, promulgated by the President on 25-1-1995 has amended the Securities Contract Regulation Act 1956 and removed the prohibition on options in the preamble to the Act. The ordinance has paved the way for introduction of options trading on stock exchanges. The National Stock Exchange of India Ltd and other stock exchanges have introduced index based derivatives to facilitate hedging of risk exposures and speculations with high leverage.

MEANING

An option is the right, but not the obligation to buy or sell something on a specified date at a specified price. In the securities market, an option is a contract between two parties to buy or sell specified number of shares at a later date for an agreed price. Three parties are involved in the option trading, the option seller, buyer and the broker.

1. The option seller or writer is a person who grants someone else the option to buy or sell. He receives a premium on its price.
2. The options buyer pays a price to the option writer to introduce him to write the option.

3. The securities broker acts as an agent to find the option buyer and the seller, and receives a commission or free for it.

There are two types of options namely the call option and put option. A call option is a contract giving the right to buy the shares, whereas the put option is contract giving the right to sell the shares. Let us see each option in detail.

Call Options The call option that gives the right to buy in the contract gives the particulars of

- The name of the company whose shares are shares to be bought
- The number of shares to be purchased
- The purchase price or the exercise price or the strike price of the shares to be bought
- The expiration date, the date on which the contract or the option expires

The following example shows how the option works. Let us take 'A' who owns 100 shares of Reliance Industries, which on 10 Dec, 1998 sold for Rs 119 per share. He could give (or sell) to 'B' the right to buy that 100 shares at any time during the next 2 months at a price of Rs 125 per share. The price Rs 125 is called the striking price or exercise price. Now, seller of the option, 'A' is the writer. For providing this option, 'A' charges a price or a premium from 'B'. We can assume that the premium is Rs 3 per share. 'B' has to pay Rs $100 \times 3 = \text{Rs } 300$ to 'A' to make him sign the contract. If the investor sells the option against the stock held in his or her portfolio is said to be 'Covered options'. If the writer sells the options without the stock to back them up, they are called 'naked option'. When the exercise price is greater than or exceeds the current stock price, the option is said to be out of the money. When the exercise price is less than the current price of the underlying stock, the option is in the money. For example Reliance Industry share price is Rs 130 after two months the option is said to be in the money i.e. $\text{Rs } 130 > \text{Rs } 125$. But if the price falls to Rs 120, the option is said to be out of the money i.e. $\text{Rs } 120 < \text{Rs } 125$. The advantage in purchasing call option is that (a) 'B' has to spend only Rs 300 and get more profit if the price rises beyond Rs 125. Thus he could apply high leverage to his portfolio (b) The losses are limited to the amount paid as premium if there is fall in the price.

Put options Put option gives its owner the right to sell (or put) an asset or security to someone else. It is not an obligation but an option. For example if 'A' thinks that Reliance Industry stock price is likely to decline from its current level of Rs 119 per share during the next two months. He could buy a put option to sell the 100 shares at Rs 125 which is the striking price. 'A' being the buyer of the option to sell the shares, has to pay the premium in order to get the writer 'B' to sign the contract and to assume the risk. Like the call option the contract contains

- The name of the company shares to be sold
- The number of shares to be sold
- The selling or the striking price
- The expiration date of the option

Let us take the premium as Rs 5 per share. Now, 'A' has to pay $100 \times \text{Rs } 5 = \text{Rs } 500$ to 'B'. If the price falls to Rs 115, 'A' stands to gain because he can sell it at Rs 125 i.e. $100 \times 125 = 12500$. The gain is $\text{Rs } 12500 - 11500$ (present value) $- 500$ premium = Rs 500. At the same time if the price has increased to Rs 130 per share, 'A' will not exercise the option and his loss is only Rs 500.

FACTORS AFFECTING THE VALUE OF CALL OPTION

1. **The market price of the underlying asset** For a given striking price, higher the stock price, the higher will be the call option price.
2. **The striking price** Higher the striking price, lower is the call option price because the amount of gain is limited.
3. **Option period** Longer the option period, the higher will be the option price. The longer option period gives greater chance for the stock price to increase above the exercise price.
4. **Stock volatility** If the underlying stock price is volatile, there is a probability of rise in price and gain. At the same time, there is a risk of fall in price and incurring loss. These chances affect the owner of the call option to a lesser degree than the owner of the stock because, if there is a rise in price he stands to gain and if there is fall in price his loss is limited. Hence the value of the call option is high.
5. **Interest rates** When the interest rates are higher, the value of the strike price would be lower and at the same time the call price would be higher. The influence of the interest rate depends upon its own variability and its relationship with the stock prices.
6. **Dividends** The call option price is lower at the ex-dividend date compared to the pre-dividend date. The change in stock prices during the ex-dividend period would be lower hence, the call price also would be lower.

Intrinsic value and time value The price of an option has two components – intrinsic value or expiration value and time value.

$$\begin{array}{l} \text{Call option intrinsic value} \\ \text{Or expiration value} \end{array} = \text{Stock price} - \text{Striking price}$$

$$\begin{array}{l} \text{Put option intrinsic value} \\ \text{Or expiration value} \end{array} = \text{Striking price} - \text{Stock price}$$

By convention, intrinsic value cannot be negative or less than zero. If there is no intrinsic value then the option is 'out of the money' and if there is intrinsic value the option is 'in the money'. When the stock price and striking price are equal, the option is 'at the money'.

$$\text{Time Value} = \text{Premium} - \text{Intrinsic Value}$$

Put options A put option resembles the short sales in certain respects. Both of them gain in the bearish market when the price falls, the short seller and put buyer gain. Put buyer has the right to sell the shares at the prefixed price even if the price falls. But there is a difference. When the price increases, the short seller has to pay the whole amount, but the put buyer has to pay the premium alone and his liability is limited to the premium amount he has paid.

Put writer's position The gains of the put buyer are the losses of the put writer. The put writer has to buy at an agreed price even if the market price is lower than the strike price. For example, the strike price of the put option is Rs 50 but the market price is Rs 35, now the put writer has to buy it at Rs 50 and incurs a loss of Rs 15 less premium per share. But if the market price increases the put writer will gain the premium because the put buyer may not be willing to sell the shares at the lower rate i.e. the strike price is lower than the market price.

FUTURES

Futures is a financial contract which derives its value from the underlying asset. For example, sugar cane or wheat or cotton farmers may wish to have contracts to sell their harvest at a future date to eliminate the risk of change in price by that date. Transactions take place through the forward or futures market. There are commodity futures and financial futures. In the financial futures, there are foreign currencies, interest rate and market index futures. Market index futures are directly related with the stock market. This chapter deals only with the market index futures.

FORWARD AND FUTURES

In a forward contract, two parties agree to buy or sell some underlying asset on some future date at a stated price and quantity. The forward contract involves no money transaction at the time of signing the deal. If a farmer enters into the contract, forward contract safeguards and eliminates the price risk at a future date. But the forward market has the problem of (a) lack of centralisation of trading (b) liquidity and (c) counterparty risk. As the contract takes place between two individuals and the contracts are non-tradable, there is no centralization of trade. As there is no third party guarantee or organization involved in the transaction and if one of the two sides chooses to declare bankruptcy, the other suffers.

Futures market are designed to solve the problems of trading, liquidity and counterparty risk. Basically, futures markets resemble the forward market. The three distinct features of the futures markets are

- Standardised Contracts
- Centralised trading
- Settlement through clearing houses to avoid counterparty risk

Index futures Index futures is one of the most successful financial innovation of the financial market. In 1982, the stock index futures was introduced. The stock index futures is the futures contract made on the major stock market index. The stock index futures has the following characteristics:

- (i) It is an obligation and not an option
- (ii) Settlement value depends (a) on the value of stock index and the price at which the original contract is struck and (b) on the specified times the difference between the index value at the last closing day of the contract and the original price of the contract.
- (iii) Basis of the stock index futures is the specified stock market index. No physical delivery of stock is made.

Standard and Poor contract is the most popular stock index futures. Here the obligation is to deliver cash equal to 500 times the difference between stock index value at the close of last trading

day of the contract and the price at which the future contract was struck at the settlement date. For example, if the contract is struck at the S & P stock index level at 400 and the stock index is 410 at the end of the settlement date, then the payment that has to be made is equal to $(410-400) \times 500 = 5000$.

Margin Depending upon the nature of the buyer and seller the margin requirement to be deposited with the stock exchange is fixed. A speculator does not own the underlying stocks but a hedger owns the stock and his aim is to protect himself against the risk caused by the price changes. The margin is fixed as a certain percentage of the contract. The margin is not a down payment, and no margin interest is paid. The contract is affected by the market index price movement. Depending upon the index movement, additional margin is required or released by the authorities.

At the close of the each trading session, each customer's position is estimated according to the new settlement price of the index. In accordance with the price changes each account is credited or debited. If the difference in settlement price brings the margin account below the maintenance level, the dealer has to pay the needed money to bring the margin account to the original level by contract. When the margin amount falls below the maintenance level immediately the customer is informed. In the same way when the value of the margin account exceeds the original marginal level required, the excess amount can be withdrawn by the customer.

This can be explained with the help of S & P 500 contract. The original margin is \$ 20,000 and the maintenance margin is \$ 10,000. Now the contract is struck with the S & P 500 at 400. If the index moves up to 410, the buyer receives \$ 5000 $[(410-400) \times 500]$ from the seller's margin account. If the index falls down to 395, now the buyer owes the seller \$ 2500 $[(400-395) \times 500]$. A margin call is given, when the amount owed exceeds \$ 10,000.

In case of Indian stock market, report of the committee on Derivatives – SEBI has suggested that every trading member should deposit a margin with the Exchange/Clearing House/Clearing corporation as specified by the Exchange/Clearing Corporation. The exchange Clearing Corporation from time to time imposes on any particular member any special or other margin requirement. Since the banks are unable to move funds swiftly initial margins are large enough to cover the one-day loss that can be encountered on the position on 99% of the days. The daily settlement dues should be paid before the next trading day.

Valuation of stock index futures The valuation procedure of the stock index futures is easy to comprehend. Consider a trader who wants to hold NSE Nifty stocks for the next year. He will be entitled to receive the dividend and the principal value as on the disposal date. The price of the shares may fluctuate along with the nifty. If the same trader enters into the index future market and invests the money in the treasury bills which otherwise would be invested in the stocks, would also receive a return, if the index price moves up.

Index arbitrage Index futures indicates the investors' expectation about the future course of the stock market. When investors are optimistic, the futures price is higher than the current level of the market and in times of pessimism, the futures price is lower than the current market level. But the price of the futures contract on an asset will not diverge by more than the cost of carry from the spot price of the asset. When there is a relatively large divergence arbitrageurs make a profit out of it. Arbitrageur is a person who simultaneously purchases and sells the same or essentially similar security in two different markets for advantageously different prices.

The arbitrageurs' actions force the price of the stock index futures contract to remain close to the current level of the underlying index. To illustrate this with a hypothetical example, let us take

a day in July when the NSE Nifty index futures contract is selling for Rs 220 and NSE Nifty index is at 200. Two investment strategies can be followed.

1. Purchase the stocks in the nifty , hold them until December and then sell them on the delivery date of the Dec Nifty futures contract.
2. Purchase a December Nifty futures contract along with the treasury bills that mature in December. Keep the futures contract until the delivery date in December.

Futures versus options Futures and options are different from each other. When the option is out of the money on the expiration date, then the option become worthless and can be left to lapse. But in the case of futures, both the parties have to conclude this at the end of the expiration date. Either they have to reverse the trade or pay and settle it.

Futures in Indian stock market Internationally, the introduction of the derivatives have made substantial improvement in the market quality on the underlying equity market. It was felt that the liquidity and efficiency of the Indian equity market will improve with the introduction of stock market derivatives. Further, foreign investors would be attracted more to the Indian capital market if the hedging vehicle routinely used by them world wide are available to them. The well functioning derivatives market will improve the market efficiency and revive the primary market. It will improve the market's ability to direct resources towards the projects and industries with consistent returns. These factors have encouraged the Indian capital market to think of the strategies to introduce derivatives in the stock exchanges. As a first step Nifty based stock index futures is introduced in the National Stock Exchange. Even though the Indian badla system provide liquidity, it is different from the futures.

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Books Recommended for Reading

1. **Security Analysis and Portfolio Management by Dhanesh Khatri, Macmillan Publishers India Ltd.**
2. **Security Analysis and Portfolio Management by Punithavathy Pandian, Vikas Publishing House Pvt. Ltd., Noida -201301 (UP)**

