Patna University

Department of Applied Economics & Commerce

MBA Semester : 4 (Session : 2018-2020)

Subject : MBFC – 44 (Financial Derivatives)

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<u>Unit – III</u>

<u>**Option Markets**</u>

Option Market – Where buying and selling of options take place.

Option – A type of derivative in which contract buyer of the option has all the rights without any obligations whereas the seller of the option has only the obligation without any right to execute the contract. The buyer of the option makes a payment of premium to the seller of the option to obtain the rights.

The option market can be divided into two distinct parts:

1) Exchange traded market

2) Over - the - counter (OTC) market

1) **Exchange traded market**

- These are regular exchanges i.e. either exclusive derivatives exchange or as a separate market segment namely 'futures-and-options' of stock exchanges.

- In India, stock options and stock futures were introduced in the year 2001 on BSE and NSE.

- For exchange traded options / derivatives, counterparty default risk is negligible because of the rules of exchange.

- Exchange traded options/ derivatives contracts are standardised in terms of the following:
    - (i) Underlying assets
    - (ii) Lot size
    - (iii) Strike Prices
    - (iv) Expiration dates
    - (v) Nature of exercise (American/ European)
    - (vi) Settlement of transaction

- The standardization of option contract is at the discretion of the exchange and may vary from exchange to exchange.

2) **Over - the - Counter Market**

- It offers the flexibility of making strike prices and maturity dates available as per the needs of the users.
- Forwards and swaps are traded over-the-counter (OTC). These transactions are customised and not standardised.
- Due to tremendous flexibility in OTC products, the proportion of exchange-traded option is small. Exchange-traded option may not meet the exact requirements of users.

Unit – IV

Objective of risk management

Risk Management is an integrated process of delineating specific risk, developing a comprehensive plan, integrating the plan and conducting ongoing evaluation.

It's objectives are:

- To optimize the risk – reward trade- off and plan and find the business accordingly.
- To measure risk in order to monitor and control them.

Risk in Credit Derivatives

In a banking industry, the risk of a loan portfolio is due to:

(a) Default risk (b) Market risk.

Default Risk

(1) Risk on account of non-payment of loan amount and the non-payment of interest by the borrowers.
(2) It may happen due to poor profitability of the borrower, liquidity problem or circular effect of debt trap etc.

Market risk

- It arises on account of business conditions like changes in yield or interest rate. To cover these types of risks, banks use credit derivatives.

Credit derivative

- It is a derivative that transfers default / market risk from one party to another party.
- The buyer of the derivative (Bank or money lender) is required to pay a premium to the seller (insurer or guarantor) as a percentage of the loan amount.
- The premium is negotiated between the buyer and seller of the derivative.
- The buyer of the derivative is compensated by the seller of the derivative only in case the specific/ identified credit risk or default risk event takes place.
- If the credit or default risk event does not take place, then the buyer of the derivative gets nothing from seller of the derivative.
- These derivatives cover up risks like :
  - (a) Change in credit rating of the borrower
  - (b) Change in spread
  - (c) Default risk
  - (d) Risk on account of short payment.
  - (e) Risk due to low returns
  - (f) Moratorium
  - (g) Bankruptcy
  - (h) Decline in collateral value.

Option on stock index

- The option contract in which the underlying asset is stock index, is known as option on **stock index.**
- In India, about 6 indices and 250 stocks are available as underlying assets for futures and options on BSE and NSE.
- Stock index option transactions are executed at the derivative segment of the regular stock exchanges through the intervention of brokers of this segment.
- It is an order-driven market in which orders are entered in the centralized automatic trading system by the brokers.
- The orders are matched on price and time priority basis.

Black and Scholes Model for Option Price Calculation

- The price of an option contract is the premium, which is acceptable to the seller of the option.

- The premium for option calculated by using this model is called **theoretical premium**. In practice, this price should prevail in the market. If not, the arbitrage process will force the premium to be maintained.

Assumptions for the Model

(1) The call option for which value is being calculated is of European Style.

(2) The price of the underlying share change continuously.

(3) The share price has a log normal distribution.

(4) Transaction costs and taxes do not exist.

(5) No restriction on short selling.

(6) Funds can be borrowed at risk free rate of return to create risk neutral portfolio.

(7) During the time period of maturity of the call option dividend is not declared by the company.

Steps to calculate the price of the Option

Step1 : Calculation of 'd$_1$'

$$d_1 = \frac{\ln(So/E) + (r + 0.5 \times \sigma^2) \times t}{\sigma\sqrt{t}}$$

Where, ln = log normal

S_0= Spot price of the underlying share

E = Exercise price of the underlying share for option contract

r= Risk free rate of interest

σ = Standard Deviation of the return of the underlying share representing risk.

t = Time period till expiration in year, 6 months equals to 0.5 year.

Step II : Calculation of 'd$_2$'

$$d_2 = d_1 - \sigma\sqrt{t}$$

Step III : Estimation of the value of N (d$_1$) and N(d$_2$) from the normal distribution table for d$_1$ and d$_2$

Step IV : Value/Price i.e. Premium of a Call Option

C$_0$ = S$_0$ x N(d$_1$) – E x e^{-rt} x N(d$_2$)

where,

C$_0$ = Premium of call option

S$_0$ = Spot price of the underlying share

E = Exercise price of the option contract on underlying share

e= 2.71828

r = Risk free rate of interest

t = time period till expiration in year, 6 months equal to 0.5 year

Value/Price, i.e. Premium of a Put Option

P$_0$ = C$_0$ – S$_0$ + E x e^{-rt}

where,

P$_0$ = Premium of Put option

e = 2.71828