Note: This document is a part of the lectures given during the Jan-May 2020 Semester.

Options:

An option is a security that gives its owner the right to buy or sell another, underlying security, simply called the underlying, on or before a future predetermined date for a predetermined price.

The difference between options and forwards/futures is that the owner of the option does not have to buy or sell if she/he chooses not to, which is why it is called an option.

The option that provides the owner the right to buy the underlying is called a call option.

The option that provides the owner the right to sell the underlying is called a put option.

If the owner of the option can buy or sell the underlying only a given date, then the option is called an European option.

If the option gives the owner the right to buy or sell the underlying up to (and including) given date, then the option is called an American option.

If the owner decides to buy or sell the underlying, we say that the owner exercises the option.

The date on which the option can be exercised (or the last date on which it can be exercised for American options) is called the maturity or the expiration date.

The predetermined price at which the option can be exercised is called the strike price or the exercise price.

The decision to exercise an American option before maturity is called early exercise.

In addition there are path dependent options which depend on the history of the asset price and not just on its' value on exercise.

Some examples of path dependent options are:

1. Barrier option: Comes into existence or becomes worthless if the underlying reaches some prescribed value before expiry.
2. Asian options: Depends on some average value of the underlying.
3. Lookback option: Depends on maximum or minimum value of the underlying.

Calls and Puts:

Consider a European call option with maturity date T, providing the right to buy a security S at maturity T for the strike price K. Denote by $S(t)$-the spot price of the underlying security at time t. The option will have two parties, the person who owns the option (buyer or holder) and the person who sells the option (seller or writer). If the market price $S(T)$ of the underlying asset at maturity is larger than the strike price K, then the holder will exercise the call option because the holder will pay K and buy the asset and then sell it for a higher price of $S(T)$. On the other hand if $S(T)$ is less than the strike price K, the holder will not exercise the call option, since the underlying can be purchased at a lower price in the market.

In order to accept an obligation, the writer will request a payment (premium) usually called the option price. The person who writes the option has a short position in the option. The holder of the option on the other has a long position in the option.

The various payoffs for a European option are:

1. Call option (Long position): $\max\{S(T) - K, 0\}$.
2. Call option (Short position): $\min\{K - S(T), 0\}$.

3. Put option (Long position): $\max\{K - S(T), 0\}$.

4. Put option (Short position): $\min\{S(T) - K, 0\}$.

A call option is:

1. In-the-money if $S(T) > K$.

2. At-the-money if $S(T) = K$.

3. Out-of-the-money if $S(T) < K$.

A put option is:

1. In-the-money if $S(T) < K$.

2. At-the-money if $S(T) = K$.

3. Out-of-the-money if $S(T) > K$.

Swaps:
A swap is a contract by which two parties agree to exchange cash flows with different features. A swap can be thought of as exchanging interest rates on two different types of bonds. Usually, only the interest rate payments are exchanged and not the principal. The principal amount is the same for both the parties and is called the notional principal. In the most frequent type of swap, one party pays the other a fixed interest rate (on the notional principal) and receives in exchange a floating interest rate (on the notional principal). Very often the interest rates correspond to bonds denominated in different currencies. The swaps where only the interest rate is exchanged are called interest-rate swaps and they are called currency swaps if the currency is also exchanged. The side that will receive the floating rate buys the swap and the side that will pay the floating rate sells the swap.
Organization of Financial Markets:
We will focus primarily on financial markets in United States of America.
Some securities and financial contracts can be purchased, or entered into, in markets with a physical location. These markets are called exchanges. However, some securities and contracts are sold through sources without a physical location. We say that these financial instruments are traded over the counter or on an OTC market.

1. In the United States, there are two national exchanges, namely the New York Stock Exchange or NYSE (for stocks of most of the largest companies) and the American Exchange or AMEX (which trades stocks of smaller companies). In addition, there are several regional exchanges. Stocks can also be bought OTC, without the need to go to any of those exchanges. There is also an organized OTC market that has become very important. NASDAQ-National Association of Security Dealers Automated Quotation is basically a network of computers with some strict rules about the way to perform trades.

2. Treasury bond can only be traded in an organized OTC market.

3. The largest option exchange is the Chicago Board of Options Exchange or CBOE followed by AMEX. AMEX started as a stock exchange but now generates a large part of its business through options trading. Exotic options are not traded on exchanges. Rather, they are traded actively OTC by investment banks. The most important futures exchanges are the Chicago Board of Trade or CBOT and the Chicago Mercantile Exchange or CME.

There are two federal oversight agencies, namely, Securities and Exchange Commission or SEC (which oversees the securities markets, stocks and options) and the Commodities and Futures Trading Commission or CFTC (in charge of futures markets).