Security Analysis & Portfolio Management
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Lecture 04
Introduction (Derivatives-II)

Welcome back. So, before the break, I started talking about derivatives and introduced derivatives as financial instruments, which derive their value from the value or price of another financial instrument.

We also discussed how mathematically we can represent the price of a derivative at any particular instant as the discounted value or the present value of the expected future cash flows arising from the derivative at the maturity of the contract, that expected value having been calculated with respect to a special set of probabilities, which we call risk neutral probabilities. We will talk about all this in a lot of detail when we come to the derivatives segment of this course. We now take up applications of derivatives.

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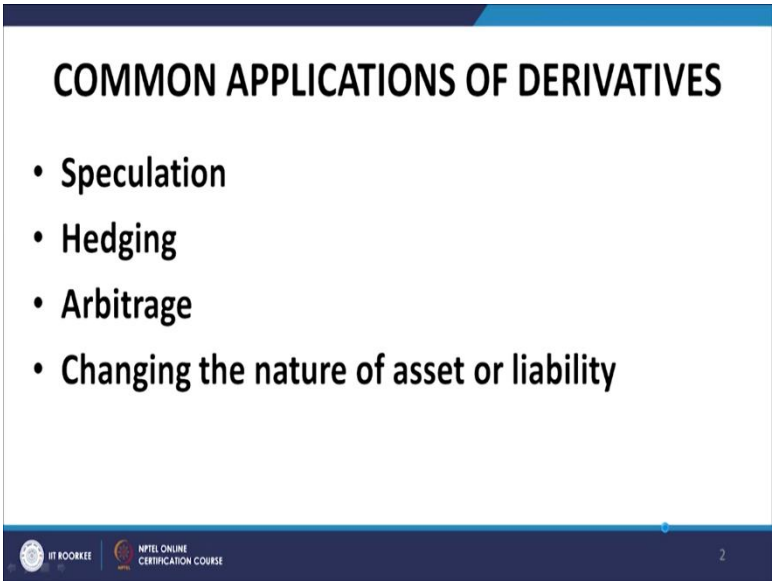

The fundamental applications of derivatives are listed on the screen.

Speculation: In speculation, you take an open position in the derivative and you try to beat the market. Depending on what your perception is compared to what the market perception is about the future of an asset's price or value, you decide to take a position in the asset which is contrary to the market expectations. If you turn out to be correct, and the market turns out to be wrong, you tend to make a windfall profit. This is called speculation.

It is the taking of risk by an individual who is a risk taker. He takes an open position in an instrument and depending on the future behaviour of the value/price of the instrument, (if the behaviour of the instrument is compatible with the perception that he had when he took up the investment), he could gain by beating the market. So, this is speculation. It is obviously a risk-taking process.

Hedging: Hedging is the converse of speculation. In essence, in hedging, you already have an open position in an asset. I will give you an example in a minute. You have an open position in an asset and because you have that open position, you are exposed to the future price changes of the asset. If the price change happen to be adverse to your open position, then you could lose out due to your holding of that open position.

You are not happy with taking the risk arising out of future price changes of the asset that you are holding. You want to protect yourself against any detriment/damage/financial loss that may arise to you because of the future price changes of the asset that you are holding. So, you want to create insulation (by taking a derivative position) for that open position such that the stimulus that would affect the future price change of that position is neutralized by price changes of the derivative position. Thus, the stimulus that would act on the open position and cause value changes in the open position will not cause changes in the value of the combination of the open position and the derivative. In other words, the value changes in the open position due to the stimulus will be neutralized by the value changes in the derivative due to the same stimulus. Thus, the stimulus that causes the price change does not change the value of your combined position (combination of the asset and the derivative protection that you have taken up).

That protection (derivative position) is known as the hedge and the whole process of taking up an appropriate position in the hedging asset (derivative) is called hedging. So, hedging, in essence, means a process whereby, given an open position, you take some kind of a position in a derivative, by virtue of which you get insulated, you get protected from a price change. The value of your hedged position does not change, does not get affected by the market stimulus.

So, that is hedging. Let me now take a concrete example to illustrate this. Let us take the example of a student who gets admission in a US University. For that purpose, he has been asked to deposit a certain amount of fees, say USD 2000 at the end of 3 months from now. Now it is June, let us say sometime in October.

He is required to pay USD 2000 in the first week of October to confirm his admission in the US University. So, one possibility that he can buy the US dollars right away and keep them with him and then remit the US dollars in the first week of October when the need arises. But in that case, he loses out on the interest on his INR outflow for the 3-month period (assuming that he ddoes not invest the USD). So he loses on account of interest, either explicitly or in terms of opportunity cost, if he buys the US dollars today.

Now, if he does not buy the US dollars today, he gets exposed to the exchange rate risk. Suppose the US dollar price appreciates in the next 3 months. Then obviously, his outflow in terms of Indian rupees would increase as per the increase in the exchange rate of US dollars with the Indian rupees. So, there he is exposed to the exchange rate risk.

So, what he does is, he goes to his bankers, he explains the entire position to the bankers and he says that," I want to buy the US dollars, but I want to buy the US dollars in such a way that I receive the US dollars from the bank at the end of 3 months, whence I can immediately remit those US dollars to the US University."

Now, if he does this, then, obviously, he is protected against exchange rate risk. The bank and the student agree upon the rate. The banker says, " I will charge a small premium of say 1% on the current rate of US dollars". On that basis, the banker agrees, undertakes to deliver to the student USD 2000 at the current rate plus 1% premium. The student also agrees. So, this agreement eliminates the risk that the student was facing due to the exchange rate fluctuation of the US dollar.

This is, in fact, a typical example of a forward contract which is probably the simplest form of derivative. This process is called hedging. Another typical example would be the case of corn for a bread manufacturer. A bread manufacturer requires corn or wheat in order to make flour and then prepare bread. So, he may feel that at the end of 3 months from now, he needs a certain quantity, say 100 quintals of wheat or corn. He may like to protect himself against any price escalation of that requirement of corn at the end of 3 months. So, he takes up a long position in the futures market for the future requirement. I will explain them later, he takes up long position in the futures market. If there is an increase in price of corn, it will be compensated by an increase in price of the futures contracts. Thus, the risk on account of the increase in price of wheat or corn, as the case may be, gets mitigated by taking a counter position in a derivative contract. So, these are typical examples where derivative contracts

enable the protection of the investors interest, the protection of the investors exposure to stimuli that could operate on that exposure and result in value erosion.

Arbitrage: arbitrage is a very interesting process. Again, I will take it up in detail very soon. But arbitrage is a process where the same commodity is being priced differently. There exists differential pricing in two different markets. One could buy in the cheaper market and sell it in the in the dearer market and thereby make an instantaneous risk-free profit.

But the important thing in arbitrage which is usually ignore is that, when we talk about arbitrage, we need to ensure that both the transactions that constitute the arbitrage process, the buying and the selling process do not change the risk level of the person is undertaking the arbitrage.

Let me explain this with an example. Suppose, a particular share, say XYZ company that is traded on both the BSE and the NSE. Let us say that at a particular point in time, the trading price on the BSE is say 110 and on the NSE it is 100. So, what would you do? You would immediately buy that share on the NSE and at the same time sell it on the BSE markets. This process prime-facie qualifies to be an arbitrage. Let us ignore transaction costs for the moment. Let us ignore brokerage and let us ignore the borrowing lending spread also. Let us ignore all transaction costs. So, you buy the share immediately in the NSE market and spontaneously you sell the share in the BSE market and thereby you make a handsome profit depending on the number of shares in which you take up this transaction.

This is a typical example of arbitrage, but this would be arbitrage only if there is absolute guarantee that you would receive the share at settlement on the NSE and again, you will receive your money when you deliver the shares at BSE. Suppose, there is some element of default, some possibility of default, a small possibility of default; whereas, the NSE transaction is absolutely secured, absolutely riskless; the BSE has 1% possibility of default in the receipt of payment against shares on settlement, then this would not qualify as arbitrage. The pair of transactions constating arbitrage is not totally risk free, because on the one hand, your getting the share is absolutely certain, but your getting the payment is not absolutely certain.

So, when we talk about arbitrage, this point has to be kept in mind. That the transactions that constitute the arbitrage should not affect the risk level of the arbitrager.

Swaps: Swaps are certain types of derivative instruments which help you in changing the nature of an asset or a liability. For example, suppose you require a certain amount of fixed rate funding for financing your fixed assets. But when you approach the market for funding, you find that the market does not view your reputation, your credit worthiness very well. As a result of this, the fixed rate funding is at a high cost. However, if you consider the raising of money at a floating rate, because the floating rate is a short-term rate usually rolled over, so the market could give you slightly more favourable terms in terms of your borrowings. So, in that case, what you could do is, you could enter into an agreement with another party who requires the converse process (requires floating rate funding), but in whose case, the fixed rate funding is at a reasonably cheap rate, for example, a creditworthy institution, in which the investors perceive that there is no risk of default, at least for the next 5 years.

So, in that case, you could raise floating rate funds at reasonable rates, the other party could raise fixed rate funds at the cheaper rates, and then you could enter into a swap transaction (agreement) whereby you get your fixed rate funding and the other party gets the floating rate funding. A certain amount of saving is achieved for both the parties which can be shared by both the parties in a negotiated proportion. That is called a swap. And so, we shall be talking more about these instruments later on in this course.

A brief introduction to these four basic types of instruments.

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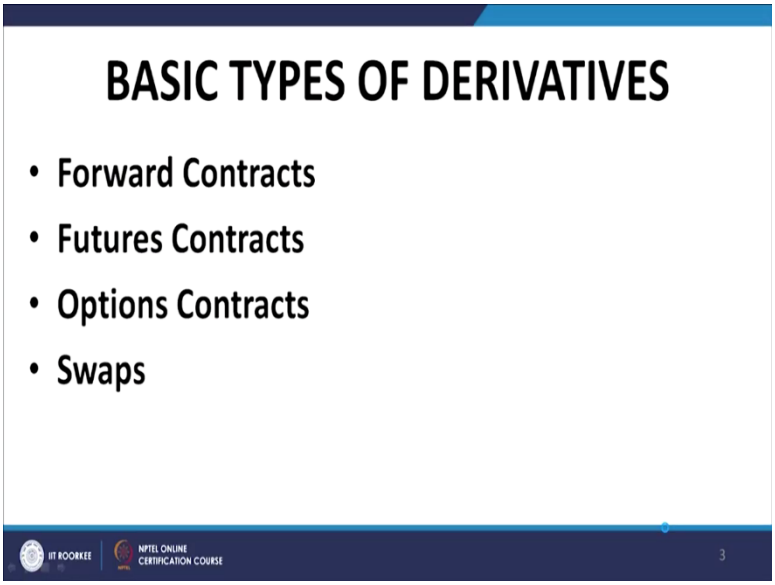

The forward contract, the futures contract, option contract and the swap.

Forward Contracts: The example that I gave just now illustrates a forward contract. A forward contract is a contract (obviously, it is a contract, so it needs to satisfy all the requirements that are contained in the Contract Act) between two parties whereby the two parties agree upon the terms of delivery of an underlying asset (terms of delivery mean all relevant terms that enable an unambiguous settlement of the contract) at a given point in time but the actual delivery of the agreed underlying asset and payment of agreed price (forward price) takes place at a later agreed date (maturity of the contract). Thus, in the context of a forward contract, there are two relevant dates:

(a) The date on which the contract is negotiated i.e. the terms of the contract are agreed upon including the price, quality & quantity of underlying asset that is to be delivered, the mode & place of delivery etc.

(b) The date on which the contract is settled i.e. the contract is executed ny actual delivery of the underlying asset and the payment of price. Settlement means delivery of the underlying asset and payment of the price therefor.

So, the price of the underlying asset, the amount, the quality and the mode of delivery and all the relevant conditions that are required to facilitate an unambiguous settlement are agreed upon at t=0, but the actual transfer of the underlying asset, the actual settlement of the contract, the transfer of the underlying asset as well as the transfer of payment, both the legs

of the transaction are executed at a future date, which is called the maturity of the forward contract. Note that the maturity date is also predetermined at t=0.

So, in the case of a forward contract, we have a point in time t=0 when the contract is negotiated and another point in time, let us call it t=T at which the contract is finally settled by transfer of the underlying asset and transfer of payment simultaneously.

So, now to understand this more thoroughly, you need to contrast it with a spot transaction, you go to the market and you buy an asset, what do you do? You locate the asset, you implicitly agree that this is the price of the asset, you pay the price and you receive the asset simultaneously. All this is done at a single point in time. And therefore, these are called spot transactions, the price is called the spot price or the cash price, because that is the price at which you are getting the asset immediately.

The same process operates in the case of a forward contract. The only difference is that while the price, maturity and other terms are agreed at t=0, the actual execution of the contract, the actual settlement of the contract is at a future date. So, the dynamics are absolutely similar to what the dynamics are of a cash market, except for the fact that the delivery and the execution of the contract occurs at a future date. This is what is a forward contract.

Forward contracts are tailor made. In other words, they are not standardised. As I mentioned, if you get admission in a US University and you want to pay USD 2000, you can go to your bank, and you and your bankers will agree upon a rate at which the banker would be willing to pay you the US dollars at a future date. And you will have to pay the INR amount also at that future date. So that is a forward contract. The important thing here is that both the cash flow and the asset-flow occurs at a future date.

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There is no cash flow at t=0 except possibly for margin. If, for example, you go to your banker in respect of the example that I just gave you and the banker says, "please deposit a FDR covering 10% of the value of the contract as security", then this is a cash flow that is on margin account. Other than this, there is no cash flow at t=0 in relation to the contract. The price of the underlying asset is going to be paid on the date of maturity of the contract and the underlying would also be transferred to you on the same date.

Now, because these are private contracts, there are rwo important things:

(a) Being private contracts, being tailor made contracts, there is an element of risk of default on either party. Either party could possibly end up defaulting on the contract. This is one particular drawback in forward, contracts.

(b) The second issue is that to remedy what I have just said. If A and B enter into a forward contract at t=0, both A and B have adequate opportunity to assess the creditworthiness of the other and thereby take appropriate remedial measures to protect themselves against default risk on the part of other party and embed that into the terms of the forward contract.

A forward is a totally private contract between A and B. The world is, obviously, not involved in this contract. So, forward being a private contract, on the one hand, the parties to tt get exposed to the default risk on account of the other party. On the other hand, the parties also get the opportunity to assess the creditworthiness of the other party because it knows the other party.

There are only two parties, you know the other party and the other party knows you. So both of you can sit and do your homework and assess the creditworthiness of the other party and on that basis develop a strategy to provide you adequate protection against the possibility of default by the other party. This is very important, why we will come back to it.

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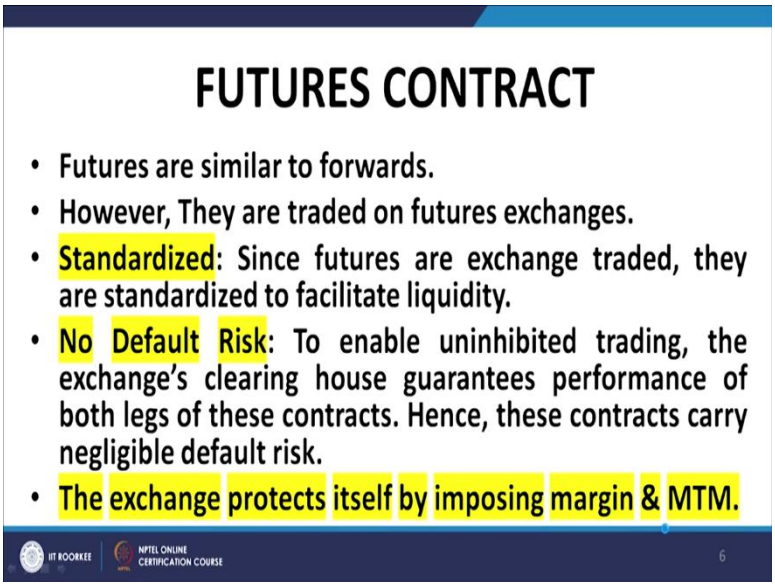

Futures: Now, let us talk about futures contracts. Futures contracts are absolutely analogous to forward contracts. So, what are future contracts? Futures contracts also give you a right to buy or sell. It is an agreement rather to buy or sell an asset to another party at a price and on a maturity date which is agreed upon at t=0 i.e. at the inception of the futures contract. Other terms in relation to the delivery, the mode of delivery and the entire execution of the contract whatever the case may be, the mode of settlement, whether it is cash settlement or physical settlement are all agreed upon at t=0. So, to that extent, it absolutely mirrors the forward contract, absolutely parallel, but there is a fundamental difference.

As I mentioned, a forward contract is a private contract i.e. is a contract between A and B and nobody else is involved in it. Nobody else is interested in it. However, when we talk about futures contracts, there is a significant difference. Futures contracts are tradable. They are tradable like shares, commodities etc. Futures contracts trade on appropriate exchanges just like other instruments like equity shares, commodities like gold, silver etc.

So, futures contracts are tradable but forwards are not tradable. Futures are tradable while forwards are private. Of course, one can assign a forward contract in terms of the law of contract of the land. However, in the case of futures, they are freely tradable, as per the

electronic trading system, in most cases, in the exchanges, which are created especially for the trading of futures in most countries.

So, that is the fundamental difference. Now, how does this fundamental difference necessitate the induction of certain salient properties into futures contracts, which are different from forwards. The first thing is that, in order that there be adequate liquidity of these futures contracts in the market i.e. people be willing to buy and sell these contracts, these contracts need to be standardised. They need to be standardized in terms of the underlying value or the value of the underlying asset that they cover. Because if such contracts were not standardized, then it would be difficult to find a counterparties for trading. For example, let us say your US dollar exposure is USD 2982. Do you think it is going to be possible to find a counterparty who would be willing to take up the counter position in this contract i.e.where you will buy the US dollars and you will pay Indian rupees? it would be very difficult.

So, unless the contracts are standardised, just like currency, the contract would not be tradable very easily. Finding counterparties for trading would be difficult thereby impacting liquidity adversely. When we talk about forward contracts, we are confining it to twoparties which have already agreed upon, that is the end of the story. However, in future contracts, every minute, every day every second day, there could be a change in the parties to the two legs of the contract.

Today A and B have entered into a futures contract, tomorrow A sells his leg to C and B sells his leg to D. Now we have a new ownership between C and D. So, clearly, to find the counterparties who are willing to take positions or are willing to take up your interest in a futures contract, the contracts have to be standardised. Only if the contracts are standardised, there would be adequate liquidity in the market and finding counterparties to take up your positions in the futures contracts would be possible.

So that is one thing, the contract must be standardised just like currency notes. Now, I mentioned while talking about forward contracts just a few minutes ago that if A and B enter into a forward contract then A and B have adequate opportunity to assess the creditworthiness of each other and thereby take adequate remedial actions, adequate precautions against the possibility of default by the other party. But, in the case of futures contracts, if A and B enter into a futures contract, then the next moment B transfers his leg of the contract to another party C. A may transfer his leg of the contract to another party D. Now, we have a contract

between D and C. Clearly D and C have had no opportunity of assessing the creditworthiness of each other.

So, if the contracts were embedded with some sort of default risk, finding counterparties would again be very difficult, because the other party would not be knowing the status the standing of the counterparty. B would have assessed the worth of the other party A, but the party C would not have an opportunity to assess the creditworthiness of A and therefore, C would be reluctant to take up B's position in the contract.

This is also remedied by the exchange. The clearing house of the exchange guarantees the performance of both legs of the contract. So, because the clearing house of the exchange is a hugely credit worthy party, the guarantee afforded by the clearing house of the exchange enables the transfer of contracts, the trading of the contract, without any inhibition, without any restriction.

In other words, for all practical purposes, these futures contracts are traded default free. They are contracts without any risk of default; as far as investors, market players are concerned to take positions in the futures contract.

However, now the question arises, if some party defaults, what happens? Well, the default is to be borne by the clearing house because the clearing house has guaranteed the performance of the contract. So, the clearinghouse must protect its own interests against the possibility of default by the parties. And this it does by the process of margining and marking to market. These two processes, margining and marking to market, operating in tandem ensure that even the risk of the clearing house is completely mitigated, but we will talk about it later. So here, let us quickly recap the differences between forwards and futures contracts.

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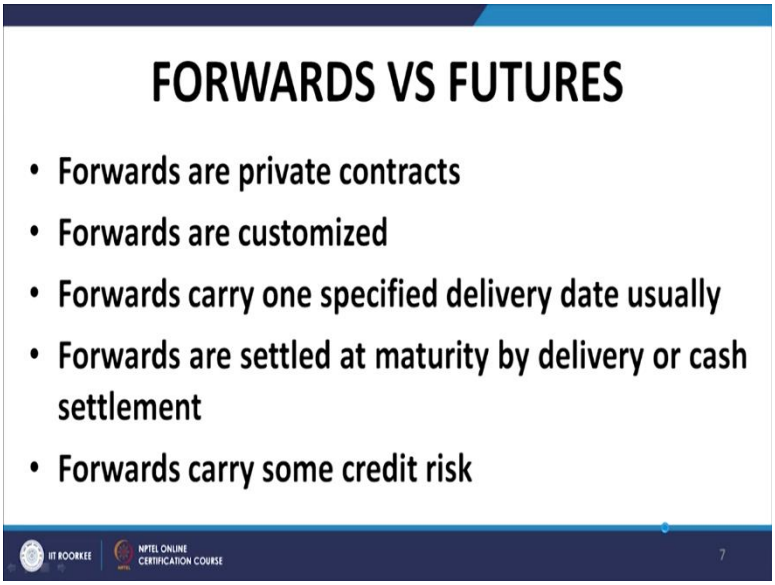

Forwards are private contracts, forwards are customised, forwards carry one specified delivery date. In most cases, forwards are settled at maturity by delivery and forwards carry some default risk.

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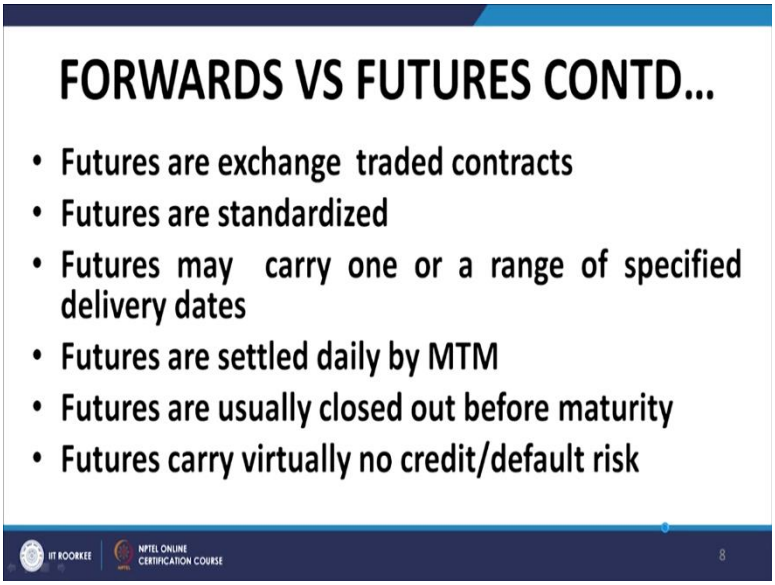

In contrast to this, futures are exchange traded contracts, futures are standardised to facilitate liquidity, futures may carry one or more specified delivery dates (that depends on the nature of the contract). Futures are settled by marking to market on a daily basis and they also have some kind of margining by which, as I mentioned, the clearing house protects itself against the possibility of default by any party. Futures are usually closed out before delivery.

Now, in the case of forwards, it is a contract between A and B where A already, in most cases, has an exposure, which it wants to cover i.e. which wants to hedge by entering into a

forward contract. Hence, it is usually the case that forwards are settled by actual delivery of the underlying asset. However, in the case of futures, that is not so. In general futures positions are closed out before the maturity of the contract.

Of course, closing out means taking a reverse position in the contract of the same maturity and the same underlying. As I mentioned before, the futures contracts are guaranteed for performance by the clearing house and as a result of this, the parties who take the positions in the futures contract do not face any default risk as far as the counterparty is concerned.

The clearing house operates as an intermediary. So, in effect, you see, a futures contract is broken up into two parts; a contract between A and the clearing house and a contract between B and the clearing house. In both cases, the clearing house guarantees the performance of the contract. So, neither A nor B face the possibility of default by the counterparty.

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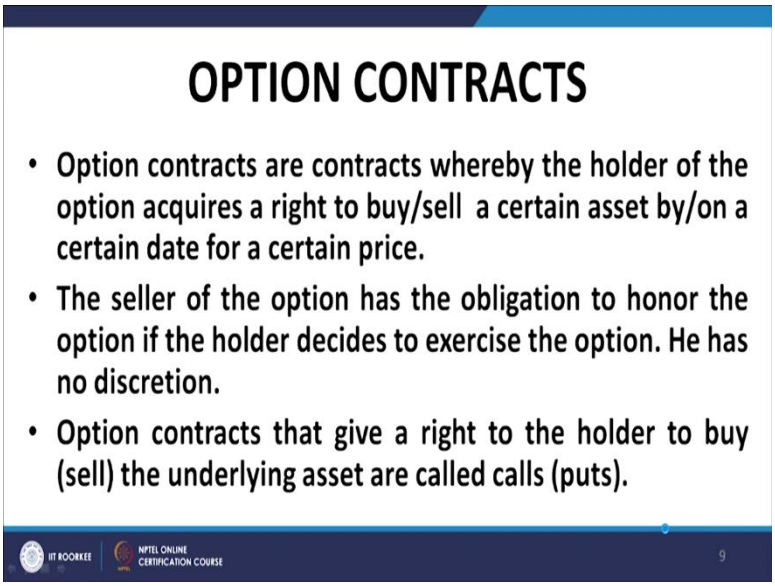

Now, we talk about option contracts. Option contracts are slightly different from forwards and futures. As the name signifies, option contracts embed an option, a choice. As in the case of forwards and futures, the commonality is that there are two parties to the contract, parties A & B. One of the two parties buys the option contract and the other party to the contract sells the option contract.

So, what is an option contract? An option contract is a contract whereby the party who buys the option contract (the technical term is long), enjoys the right under that contract, whereby he can either buy (call option) or sell (put option) an asset (which is called the underlying asset), on terms (including price, date of settlement/delivery, mode of settlement, quality of

underlying etc which are agreed upon at the initiation of the contract) at a future date (which is called the exercise date).

So, at t=0, if you buy an option contract, you get a right to buy the underlying asset at a future date at a price which are all already agreed upon at t=0. Again, the terms are agreed upon a t=0, as in the case of forwards, futures. All the terms are agreed upon at t=0.

But the only thing is, the only difference is that the party who bought the option contract enjoys the right to exercise the option. Exercising the option means that he will be entitled to buy/sell the asset from the party who has sold the option contract as per contract terms. If A has bought the option contract from B, then B must have sold the option contract.

So, party A who has bought the option contract has the right to buy the asset at a price which is agreed upon at t=0, which is called the strike price, or the exercise price on a date, which is called the maturity date of the option. Of course, it can be before that date as well (American options), there are different types of options. Let us keep it simple for the moment,though. So, an option contract contains a right. But if one party has the right, naturally, the other party has the obligation.

In futures and forward contracts, both parties A and B that enter into the contract have obligations, A must deliver Indian rupees to B & B must deliver US dollars to A. So both of the parties have obligations to honour their legs of the contract. In the case of an option contract, it is slightly different. Consider the call option. The party was bought the contract has the right. That means he can either buy the asset at the strike price on the maturity date, or at its discretion he can also allow the option to lapse unexercised. The choice whether to exercise the option and buy the asset, or to let the option lapse vests with the party who bought the option. But if the party who has bought the option decides to exercise the option, then party B who has sold the option must necessarily deliver the asset to A.

The party B who has sold the option has no right. He has the obligation. The party A who has bought the option has a right (i) either to exercise the option or (b) to not exercise the option i.e. let the option lapse. Now, party A has a right, party B has an obligation. Thus, party A is at a superior pedestal. Therefore, he must pay some money to party B to compensate for this superiority. This is called the option premium which party A pays to party B in order that he gets that right, he purchases that right, under the option contract. So, when you buy an option contract, you have to make a payment upfront, which is called the option premium.

Thus, when you pay the option premium, you get the right, while B, because he receives the option premium, he becomes obliged, mandated that he must honour his leg of the contract should you decide to exercise the option. Now, there are various varieties of options, which we will cover later on. The right to buy is called a call option. If there is an option with the right to sell, then it is called a put option.

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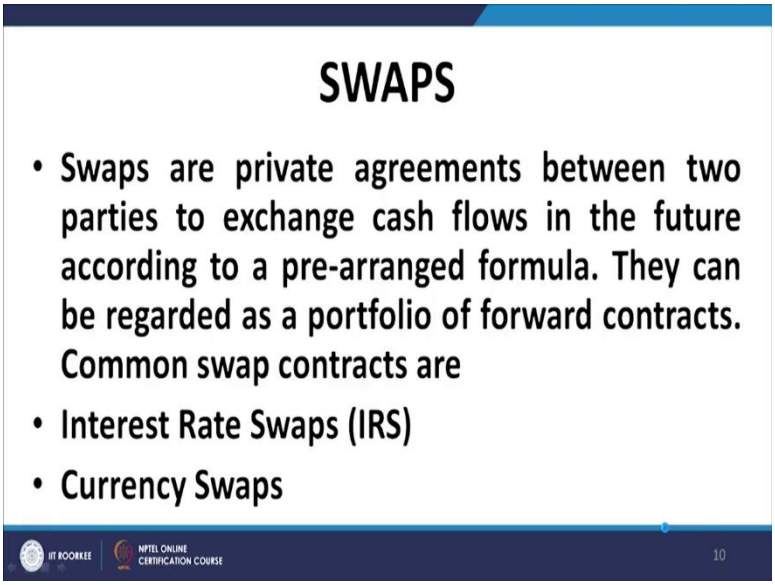

Finally, the fourth type of derivative that I will briefly discuss is swaps. A swap involves (I gave an example of a fixed rate, floating rate transaction that was a typical example of an interest rate swap) an exchange of cash flows between two parties. It can be considered as a series of forward contracts or a sequence of forward contracts. It involves exchange of cash flows between two parties A and B.

Usually, what happens is, one of the cash flows are determined or the computation of one of the cash flows is tagged to a particular variable, which varies in reference to some economic conditions and the other leg of the contract is independent of that particular variable. For example, we had this floating rate leg in the illustration that I gave to you just now. So, that is briefly all about derivatives. In the next lecture I will talk briefly about hybrid instruments and then money market instruments. Thank you.