

Class: SY BSc

Subject : Introduction to Derivatives and Financial Markets

Chapter: Unit 1 Chapter 1

Chapter Name: Introduction to Derivatives

Today's Agenda

1. Introduction to Derivatives
 1. What are Derivatives
 2. Motivation behind Derivatives
2. Types of Derivative Instruments
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3. Traders in Derivative Market
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1.1 What are Derivatives?



A derivative can be defined as a financial instrument whose value depends on (or derives from) the values of other, more basic, underlying variables.

Very often the variables underlying derivatives are the prices of traded assets. The underlying financial asset can be a security or set of assets (like an index).

1.2 What is the Motivation behind derivatives?



- Why do we need derivative instruments?
- What do you think is the main purpose behind derivative securities?

1.2 Motivation behind Derivatives

Derivatives were created out of the need of financial markets. They can and do serve a wide variety of purposes and that is the reason that they exist.

1.2.A To Hedge

Most companies are in the business of manufacturing, or retailing or wholesaling, or providing a service. They have no particular skills or expertise in predicting variables such as interest rates, exchange rates, and commodity prices. It makes sense for them to hedge the risks associated with these variables as they become aware of them. Derivatives are wonderful instruments to assist in hedging. They provide a way to lock in prices, hedge against unfavourable movements in rates, and mitigate risks—often for a limited cost.

For example, say that Nov. 6, 2019, Company-A buys a futures contract for oil at a price of \$62.22 per barrel that expires Dec. 19, 2019. The company does this because it needs oil in December and is concerned that the price will rise before the company needs to buy. Buying an oil futures contract hedges the company's risk because the seller on the other side of the contract is obligated to deliver oil to Company-A for \$62.22 per barrel once the contract has expired.

1.2 Motivation behind Derivatives

1.2.A To Speculate

The second most common reason behind the usage of derivatives is speculation. Now, this may not seem like a legitimate reason. However, speculators are necessary participants in any market as they provide liquidity. Speculators have no interest in the underlying asset and take part in the contract because they believe that they can make a gain out of the price movements.

For instance, if you believe that the US dollar will depreciate significantly against the Euro in the next month, derivatives contracts enable you to take a position on this in the market. Since derivative contracts are extremely leveraged, speculation in the derivative market is a highly risky business. However, there are people who specialize in doing so.

There are some other reasons as well, to having derivative instruments in the market. However these two remain on top.

2 Types of Derivative Instruments

We will consider the following types of derivatives further:

1. Forwards
2. Futures
3. Options
4. Swaps



2.1 Forwards

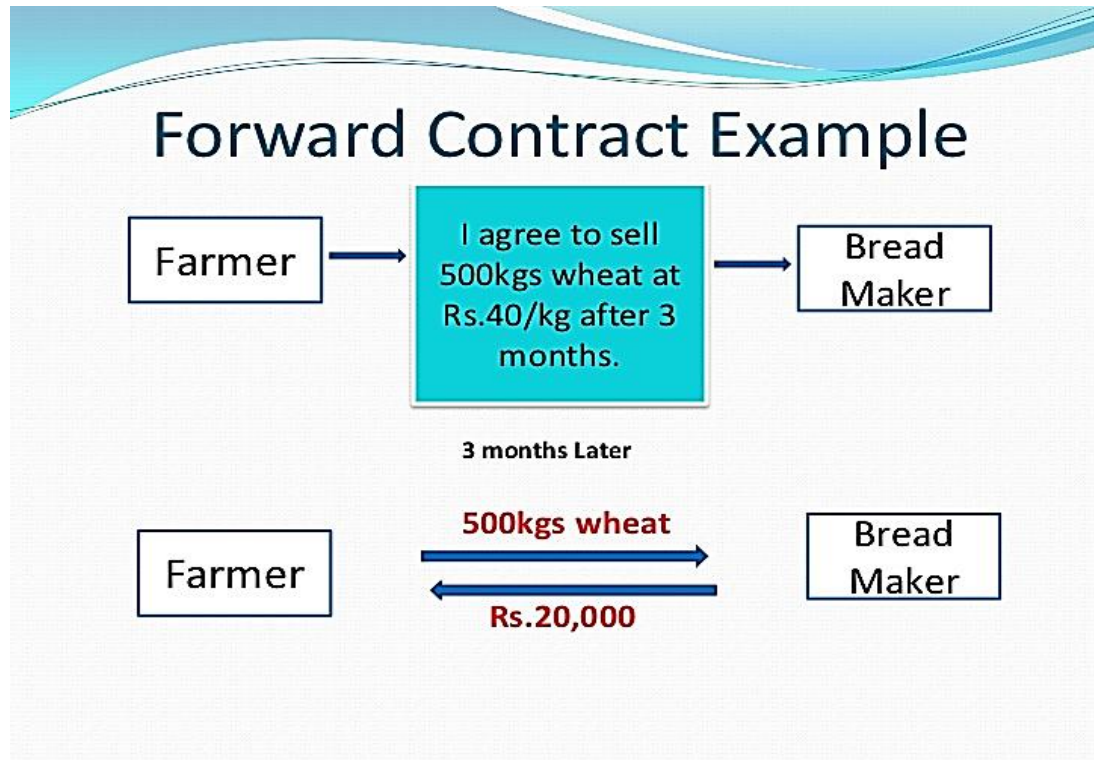


It is an agreement to buy or sell an asset at a certain future time for a certain price. It is a relatively simple derivative.

- One of the parties to a forward contract assumes a long position and agrees to buy the underlying asset on a certain specified future date for a certain specified price.
- The other party assumes a short position and agrees to sell the asset on the same date for the same price.

2.1 Forwards - Example

Let's look at an example of a forward contract.



2.2 Futures



A futures contract is a standardized, exchange-traded agreement between two parties to buy or sell an asset at a certain time in the future for a certain price.

- Futures contracts traded on exchanges. To make trading possible, the exchange specifies certain standardized features of the contract.
- **For example**, if it is a commodity future, say grains, then one has to specify the quality, quantity etc about the commodity in the contract. Like suppose, a future contract to trade 100 kgs of Grade A quality grain for a certain specified price.
- As the two parties to the contract do not necessarily know each other, the exchange also provides a mechanism that gives the two parties a guarantee that the contract will be honoured.

2.3 Options

Options are traded both on exchanges and in the over-the-counter market. There are two types of option.



A call option gives the holder the right to buy the underlying asset by a certain date for a certain price.



A put option gives the holder the right to sell the underlying asset by a certain date for a certain price.



2.3 Options

2.3.A Option Terminology

- The price in the contract is known as the exercise price or strike price.
- The date in the contract is known as the expiration date or maturity.
- People who buy options are called holders – they are said to have a long position in the contract.
- People who sell options are called writers of options – they are said to have a short position in the contract.
- It should be emphasized that an option gives the holder the right to do something. The holder does not necessarily have to exercise this right, he has an option whether or not to exercise. Hence it is termed as an Option contract.
- The holder of the option pays a fee to the writer for gaining this right. It is called Premium.

2.3 Options

2.3.B Participants in Option Market

There are four types of participants in options markets:

1. Buyers of calls
2. Sellers of calls
3. Buyers of puts
4. Sellers of puts.

2.3 Options

2.3.C American and European Options



- American options can be exercised at any time up to the expiration date.
- European options can be exercised only on the expiration date itself.

The distinction between American and European options has nothing to do with geography, only with early exercise.

Because the right to exercise early has some value, an American option typically carries a higher premium than an otherwise identical European option. This is because the early exercise feature is desirable and commands a premium.

2.4 Swaps



A swap is a derivative contract through which two parties exchange the cash flows or liabilities from two different financial instruments.

Most swaps involve cash flows based on a notional principal amount such as a loan or bond, although the instrument can be almost anything. Usually, the principal does not change hands.

The most common kind of swap is an interest rate swap. Swaps do not trade on exchanges, and retail investors do not generally engage in swaps. Rather, swaps are over-the-counter contracts primarily between businesses or financial institutions that are customized to the needs of both parties



3 Traders in Derivative Market

- Derivatives markets have been outstandingly successful. The main reason is that they have attracted many different types of traders and have a great deal of liquidity.
- When an investor wants to take one side of a contract, there is usually no problem in finding someone who is prepared to take the other side.
- Three broad categories of traders can be identified: hedgers, speculators, and arbitrageurs. We look at how these traders use derivative instruments for their trading in detail.

3.1 Hedgers



Hedgers are investors, their objective is to use different markets to minimize or eliminate a particular risk that they face from the potential future movements in the market variables

- **Hedging using Forwards** – Forward contracts are designed to neutralize risk by fixing the price that the hedger will pay or receive for the underlying asset. For example, an airline company will enter into a long position to reduce the risk, related to fluctuation in the price of jet fuel.
- **Hedging using Options** – Options provide insurance. They offer a way for investors to protect themselves against adverse price movements in the future while still allowing them to benefit from favourable price movements. Unlike forwards, options involve the payment of an up-front fee
- Hedgers stand not to make a huge gain but moderately to protect their existing position against the price fluctuations. There is no guarantee that the outcome with hedging will be better than the outcome without hedging.

3.1 Hedgers

3.1.A Hedging using Forwards - Example

ImportCo, a company based in the US, knows that it will have to pay £10 million after 2-months time, to a British supplier. Today the USD-GBP exchange rate is 1.44. ImportCo could hedge its foreign exchange risk by buying pounds (GBP) in the 2-month forward market at current rate. This would have the effect of fixing the price to be paid to the British exporter at \$14,400,000.

Consider ImportCo after 2-months. If the exchange rate is 1.3000 and the company has not hedged, then it has to pay \$13,000,000, less than \$14,400,000. On the other hand, if the exchange rate is 1.5000, the £10 million will cost \$15,000,000—and the company will wish that it had hedged!

3.1 Hedgers

3.1.B Hedging using Options - Example

Consider an investor who in May of a particular year owns 1,000 Microsoft shares @ \$28 per share. The investor is concerned about a possible share price decline in the next 2 months and wants protection.

The investor could buy ten July put option contracts on Microsoft with a strike price of \$27.50. This would give the investor the right to sell a total of 1,000 shares for a price of \$27.50.

If the quoted option price is \$1, then each option contract would cost $100 \times \$1 = \100 and the total cost of the hedging strategy would be $10 \times \$100 = \$1,000$.

If the market price of Microsoft falls below \$27.50, the options will be exercised otherwise not.

3.2 Speculators



Speculators are investors who bet on the future direction of a market variable; either they bet that the price of an asset will go up or down.

- Speculative trading, refers to the act of conducting a financial transaction that has substantial risk of losing value but also holds the expectation of a significant gain or other major value.
- Investors use derivatives to bet on the future price of the asset through speculation.
- Large speculative plays can be executed cheaply because options offer investors the ability to leverage their positions at a fraction of the cost of an underlying asset.
- When a speculator uses futures, the potential loss as well as the potential gain is very large. When options are used, no matter how bad things get, the speculator's loss is limited to the amount paid for the options.

3.2 Speculators

3.2.A Speculation - Example

If a speculator feels the stock price of XYZ Company is expected to fall in the next two days given some upcoming market developments, he would typically short sell these shares in a derivative market without actually buying or owning those shares.

Should the stock then fall as expected, he would rake in a sizeable profit depending on his holding.

However, should the stock buck expectations, he would make a commensurate loss.

3.2 Arbitrageurs



Arbitrageurs are investors who trade in two different markets or exchanges; their aim is locking in a riskless profit by simultaneously entering into transaction in two or more markets

- Arbitrage involves locking in a riskless profit by simultaneously entering into transactions in two or more markets.
- We can say that the very existence of arbitrageurs means that in practice only very small arbitrage opportunities are observed in the prices that are quoted in most financial markets.
- Most arguments concerning futures prices, forward prices, and the values of option contracts are based on the assumption that no arbitrage opportunities exist.

3.2 Arbitrageurs

3.2.A Arbitrageurs - Example

The stock of Company X is trading at \$20 on the New York Stock Exchange (NYSE) while, at the same moment, it is trading for the equivalent of \$20.05 on the London Stock Exchange (LSE).

A trader can buy the stock on the NYSE and immediately sell the same shares on the LSE, earning a total profit of 5 cents per share, less any trading costs.

The trader exploits the arbitrage opportunity until the specialists on the NYSE run out of inventory of Company X's stock, or until the specialists on the NYSE or LSE adjust their prices to wipe out the opportunity.

Quick Recap

- Derivative is a financial instrument whose value is derived from an underlying asset. The most common derivatives are forwards, futures, options and swaps.
- Forward is an agreement to buy or sell an asset at a certain future time for a certain price. A futures contract is similar to a forwards contract except that it is a standardized and exchange-traded agreement.
- Options are traded both on exchanges and in the over-the-counter market. There are two types of option: Call Option & Put Option.
- A swap is a derivative contract through which two parties exchange a series of cash flows.
- Traders in derivatives market include hedgers, speculators and arbitrageurs.

Questions

1. An investor enters into a short forward contract to sell 100,000 British pounds for US dollars at an exchange rate of 1.4000 US dollars per pound. How much does the investor gain or lose if the exchange rate at the end of the contract is (a) 1.3900 and (b) 1.4200?
1. What is the difference between the over-the-counter market and the exchange-traded market? What are the bid and offer quotes of a market maker in the over-the-counter market?
1. A company knows that it is due to receive a certain amount of a foreign currency in 4 months. What type of option contract is appropriate for hedging?
1. “Options and futures are zero-sum games.” What do you think is meant by this?

Solution

1.
 - (a) The investor is obligated to sell pounds for 1.9000 when they are worth 1.8900. The gain is $(1.9000 - 1.8900) \times 100,000 = \$1,000$.
 - (b) The investor is obligated to sell pounds for 1.9000 when they are worth 1.9200. The loss is $(1.9200 - 1.9000) \times 100,000 = \$2,000$.
2. The over-the-counter market is a telephone- and computer-linked network of financial institutions, fund managers, and corporate treasurers where two participants can enter into any mutually acceptable contract. An exchange-traded market is a market organized by an exchange where traders either meet physically or communicate electronically and the contracts that can be traded have been defined by the exchange. When a market maker quotes a bid and an offer, the bid is the price at which the market maker is prepared to buy and the offer is the price at which the market maker is prepared to sell.

Solution

3. A long position in a four-month put option can provide insurance against the exchange rate falling below the strike price. It ensures that the foreign currency can be sold for at least the strike price.
4. The statement means that the gain (loss) to the party with a short position in an option is always equal to the loss (gain) to the party with the long position. The sum of the gains is zero.

Forwards vs Futures – Activity

Try to differentiate between forward and futures contract on the following basis:

Forwards	Basis of Difference	Futures
• .. • ..	• Nature • Trading Place • Liquidity • Counter-party Risk • Settlement • Margin	• .. • ..