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# 2025

Supplementary book for

**NISM Series I**

# CURRENCY DERIVATIVES

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# FOREWORD

This guide is designed to help candidates prepare for the NISM Series-I: Currency Derivatives Certification Examination. The rapidly growing Indian financial industry, set to expand at 15% annually for the next five years, presents lucrative opportunities. Educational qualifications, especially NISM certifications, are crucial for securing roles in financial services. These certifications serve as prerequisites for various positions, assuring companies of a candidate's knowledge of the stock market. NISM certifications set a common knowledge benchmark, fostering quality market professionals and enhancing investor participation. They also offer structured career paths, allowing individuals to become traders, investors, analysts, advisors, or mutual fund distributors by clearing accredited NISM exams.

# Syllabus Overview

| Chapter No. | Chapter Name |
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| Chapter 1 | Introduction to Currency Markets |
| Chapter 2 | Foreign Exchange Derivatives |
| Chapter 3 | Exchange Traded Currency Futures |
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# CHAPTER 1
# INTRODUCTION TO CURRENCY MARKETS

## Brief History of Foreign Exchange Markets

Due to globalization, countries started trading across borders as they realized that everything cannot be produced in each country or cost of production of certain goods is cheaper in certain countries than others. The growth in international trade resulted in evolution of foreign exchange (FX) i.e., value of one currency of one country versus value of currency of other country. Each country has its own "brand" alongside its flag. When money is branded, it is called "currency". Whenever there is a cross-border trade, there is need to change one brand of money for another, and this exchange of two currencies is called "foreign exchange" or simply "forex" (FX).

## Major Currencies and Currency Pairs

- **Currency Pairs:** A currency pair is the dynamic quotation of the relative value of a currency unit against the unit of another currency in the foreign exchange market. The most traded currency pairs in the world are called the Majors. The list includes the following currencies: Euro (EUR), US Dollar (USD), Japanese Yen (JPY), Pound Sterling (GBP), Australian Dollar (AUD), Canadian Dollar (CAD), and Swiss Franc (CHF).

- These currencies follow a free-floating method of valuation. Amongst these currencies, the most active currency pairs are EURUSD, USDJPY, GBPUSD, AUDUSD, USDCAD, USDCNY and USDCHF.

| Currency | Share (%) |
|---|---|
| EUR/USD 2 | 24.0 |
| USD/JPY | 13.2 |
| GBP/USD | 9.6 |
| AUD/USD | 5.4 |
| USD/CAD | 4.4 |
| USD/CNY | 4.1 |
| USD/CHF | 3.5 |
| USD/HKD | 3.3 |
| USD/INR | 1.7 |
| USD/others | 19.1 |
| Others/others | 11.7 |
| Total | 100 |

## Major Currencies

- **US Dollar (USD):** The U.S. dollar (USD) is the home denomination of the world's largest economy, the United States. U.S. banknotes are issued in the form of Federal

Reserve Notes, are popularly called greenbacks due to their predominantly green color. The US Dollar is by far the most widely traded currency. In part, the widespread use of the US Dollar reflects its substantial international role as “investment” currency in many capital markets, “reserve” currency held by many central banks, “transaction” currency in many international commodity markets, “invoice” currency in many contracts, and “intervention” currency employed by monetary authorities in market operations to influence their exchange rates. In addition, the widespread trading of the US Dollar reflects its use as a “vehicle” currency in foreign exchange transactions, a use that reinforces its international role in trade and finance.

- **Euro (EUR):** Euro is the currency of 19 European Union and over 343 million Europeans as of 2019. Like the US Dollar, the Euro has a strong international presence and second-largest and second-most traded currency in the international markets for the related different types of transactions after the United States dollar. The euro is managed and administered by the Frankfurt-based European Central Bank (ECB) and the Euro system (composed of the central banks of the eurozone countries).

- **Japanese Yen (JPY):** The Japanese Yen is the third most traded currency in the world. It has a much smaller international presence than the US Dollar or the Euro. The Yen is very liquid around the world, practically around the clock. It is also widely used as a third reserve currency after the US dollar and the Euro.

- **British Pound/Pound Sterling (GBP):** Sterling is the fourth most traded currency in the foreign exchange market, after the United States Dollar, the Euro, and the Japanese Yen. The currency is heavily traded against the Euro and the US Dollar but has less presence against other currencies. It is also the fourth most-held reserve currency in global reserves.

- **Swiss Franc (CHF):** The Swiss Franc is the currency of Switzerland and is represented with the symbol CHF. The Swiss franc is considered a safe-haven currency. Given the stability of the Swiss government and its financial system, the Swiss franc usually faces strong upward pressure stemming from increased foreign demand.

- **Indian Rupee (INR):** The issuance of the currency is controlled by the Reserve Bank of India. The Reserve Bank manages currency in India and derives its role in currency management based on the Reserve Bank of India Act, 1934.

## Risks faced by participants in Derivatives

The international currency market is a market in which participants from around the world buy and sell different currencies. Participants include banks, corporations, central banks, investment management firms, hedge funds, retail forex brokers, and investors. The international currency market is important because it helps to facilitate global transactions, including loans, investments, corporate acquisitions, and global trade. Foreign Exchange Market (Forex) is an interbank market that took shape in 1971 when global trade shifted from fixed

exchange rates to floating rate regimes. Forex transactions are a set of transactions among forex market agents involving the exchange of specified sums of money in a currency unit of any given nation for currency of another nation at an agreed rate as of any specified date. During exchange, the exchange rate of one currency to another currency is determined by supply and demand. The Forex market is a worldwide decentralized over-the-counter financial market for the trading of currencies.

The scope of transactions in the global currency market is constantly growing, with the development of international trade and the abolition of currency restrictions in many nations. With access to all of the foreign exchange markets generally open to participants from all countries, and with vast amounts of market information transmitted simultaneously and almost instantly to dealers throughout the world, there is an enormous amount of cross-border foreign exchange trading among dealers as well as between dealers and their customers.



## Basics of Currency Markets and Peculiarities in India

- **Currency pair:** Unlike any other traded asset class, the most significant part of the currency market is the concept of currency pairs. In the currency market, while initiating a trade you buy one currency and sell another currency.

  Therefore, the same currency will have a very different value than every other currency. For example, the same USD is valued at say 83 against INR and say 142 against JPY.

- **Base Currency / Quotation Currency:**

The **Base Currency** is the currency that is priced, and its amount is fixed generally at one unit.

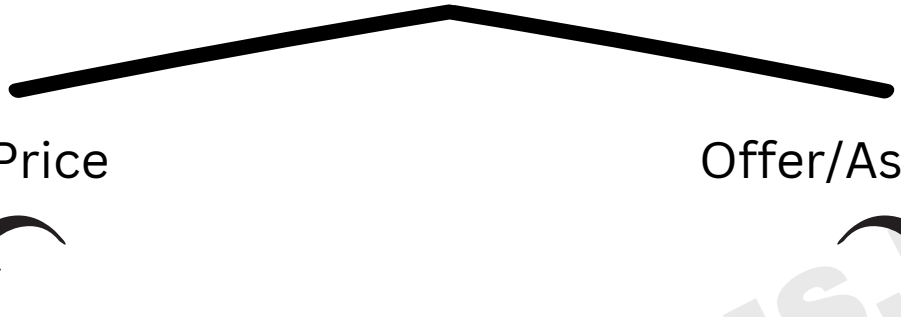
The **Quoted Currency** prices the Base Currency and its amount varies as the price of Base Currency varies in the market.

- **Forex Market:** Forex trading in India typically takes place over-the-counter (including Electronic trading platform) for spot, forward, and swaps (major trading venues for the interbank spot market are Refinitiv D2 and FX Clear while forex swaps are largely transacted outside platform on a bilateral basis), futures are traded on exchanges, i.e., National Stock Exchange (NSE), Bombay Stock Exchange (BSE) and Metropolitan Stock Exchange of India Ltd. (MSEI). Options are traded both OTC as well as on Exchanges. Generally, there are two distinct segments of the OTC foreign exchange market.

1. Interbank Market: The participants in the interbank segment are banks holding Authorised Dealer (AD) licenses under the Foreign Exchange Management Act (FEMA), 1999. Transactions in this segment are conducted through trading platforms provided by Clearing Corporation of India Limited, Refinitiv, etc. before being settled by CCIL (for Cash, Tom, Spot, and Forward USD-INR transactions) through a process of multilateral netting.
2. Merchant/Retail Market: The retail forex market has a large number of traders. The trading volume is, however, less than the interbank market as the value per transaction is low. In

majority of the "merchant" market, merchants are price takers and banks are price givers.

- **Two way quotes:** In the interbank market, currency prices are quoted with two way price.




These prices are always from the perspective of the market maker and not from the perspective of the price taker. Let us understand it with an example. Suppose a bank quotes USDINR spot price as 75.0550/75.0600 to a merchant. In this quote, 75.0550 is the bid price and 75.0600 is the offer price or ask price.

- **Appreciation/ Depreciation:** Whenever the base currency buys more of the quotation currency, the base currency has strengthened/appreciated, and the quotation currency has weakened/depreciated.
- **Market Timing:** In India, the OTC market is open from 9:00 AM to 5:00 PM. However, for merchants, the market is open from 9:00 AM to 4:30 PM and the last half hour is meant only for interbank dealings for banks to square off excess positions.
- **Forex Rates:** The base rate is the rate derived from the ongoing market rate, based on which buying / selling rates

are quoted for merchant transactions. The interbank rates are normally for spot deliveries and are considered as base rates. Hence, for quoting rates for merchant transactions on a cash basis (i.e. value Today), the base rate will be adjusted to the extent of cash/spot differences.

- **Price discovery:** The interbank price discovery happens on Major trading venues for the interbank spot market such as Refinitiv D2 and FX Clear. These platforms offer order matching as well as negotiated mode.

- **FBIL Reference Rate:** The reference rates for USD/INR and other major currencies are computed and disseminated by the Financial Benchmarks India Private Limited (FBIL). FBIL is recognized by the Reserve bank of India as an independent Benchmark administrator and has assumed the responsibility of computation and dissemination of reference rates for USD/INR, GBP/INR, EUR/INR and JPY /INR.

## Economic Indicators

Key economic indicators and their impact on currency price/currency market.

- **Gross Domestic Product (GDP):** GDP represents the total market value of all final goods and services produced in a country during a given year. A GDP growth rate higher than expected may mean a relative strengthening of the currency of that country, assuming everything else remains the same.

- **Industrial Production:** The Index of Industrial Production (IIP) shows the changes in the production in the industrial sector of an economy in a given period, in comparison with a fixed reference point in the past. In India, the fixed reference point is 2011-12. A healthy IIP number indicates industrial growth, which could result in the relative strengthening of the currency of that country.

- **Consumer Price Index (CPI):** CPI is a statistical time-series measure of a weighted average of prices of a specified set of goods and services purchased by consumers. The indicator measures the level of inflation in the economy for the basket of goods and services that are generally brought by the people. A rising CPI means rising prices for goods and services and is an early indicator of inflation. Assessing the impact of CPI on the value of currency is difficult. If rising CPI means likely increase in interest rate by the central bank, the currency may strengthen in the short term but may start weakening in the long run as rising inflation and rising interest may start hurting the growth of the economy.

- **The Real Interest Rate in the Economy:** The understanding of the real rate of interest in the economy is an extension of the inflation concept. For example, if the 10-year G-Sec has a yield of 6.5% and if the inflation is at an average of 2% then the real interest rate is 4.5%. Normally, there is a positive relationship between the real interest rates and the INR value. That is why it is seen that whenever the RBI hikes rates, the INR sees an appreciation in value because the higher rate

of interest would have increased the real rates of interest proportionately. There is also another portfolio angle to this. When real interest rates are high, we see more flows into debt from Foreign Portfolio Investors (FPIs). As more dollars flow in, the additional supply of dollars in the market tends to make the INR stronger.

- **Current Account and Trade Deficit:** The excess of imports over exports i.e. trade deficit, is a key factor to track as it influences the direction in which the currency trades. In general, narrowing the trade deficit is a positive for the domestic currency.

- **Non-farm payrolls (NFP):** Non-farm payrolls represent the number of jobs added or lost in the economy over the last month, not including jobs relating to the farming industry, government jobs, household jobs, and employees of non-profit organizations that assist individuals. A rising and positive number means that the economy is adding jobs and is good for the currency.

- **Retail Sales:** It is a coincident indicator and shows how strong is consumer spending. A retail sales number higher than expected may mean a relative strengthening of the currency of that country. The report is amongst the top economic indicators tracked by FX dealers to assess the direction of USD.

- **Central Bank Actions:** The Market also tracks minutes of the

central bank meetings and key policy decisions. Some of the important announcements from central bank meetings are their interest rate decisions, and CRR (cash reserve ratio). The market also actively looks forward to the central bank's perspective on the state of the economy.

# CHAPTER 2
# FOREIGN EXCHANGE DERIVATIVES

## Derivatives

Derivative is something that is derived from another called the underlying. The underlying is independent, and the derivative is dependent on and derived from the underlying. The derivative cannot exist without the underlying. Derivative products initially emerged as hedging devices against fluctuations in commodity prices, and commodity linked derivatives remained the sole form of such products for almost three hundred years. Derivatives are tools to manage price risk. How you manage risk depends on your approach to risk.

| Approach | Explanation |
|---|---|
| Speculation | Taking risk (more formally called “trading”) It results in the possibility of positive return (i.e. profit) or negative return (i.e. loss) in future |
| Hedging | You are already exposed to risk and hedging eliminates that risk and locks in the future return at a known level |
| Insurance | You are already exposed to risk and insurance selectively eliminates the negative return but retains the positive return. It has an explicit upfront cost, unlike speculation and hedging, which do not have any cost. It requires a particular derivative called option to implement it |
| Diversification | It reduces both return and risk but in such a way that risk is reduced more than return so that risk is minimized per unit return (or, alternately, return is maximized per unit risk). |

## Key Economic Functions of Derivatives

- Hedging risk exposure
- Price discovery
- Market efficiency
- Access to unavailable assets or markets
- Price Stability
- Derivatives, due to their inherent nature, are linked to the underlying cash markets
- Speculation
- Derivatives market helps shift speculative trades from an unorganized market to organized market

## Derivative Products

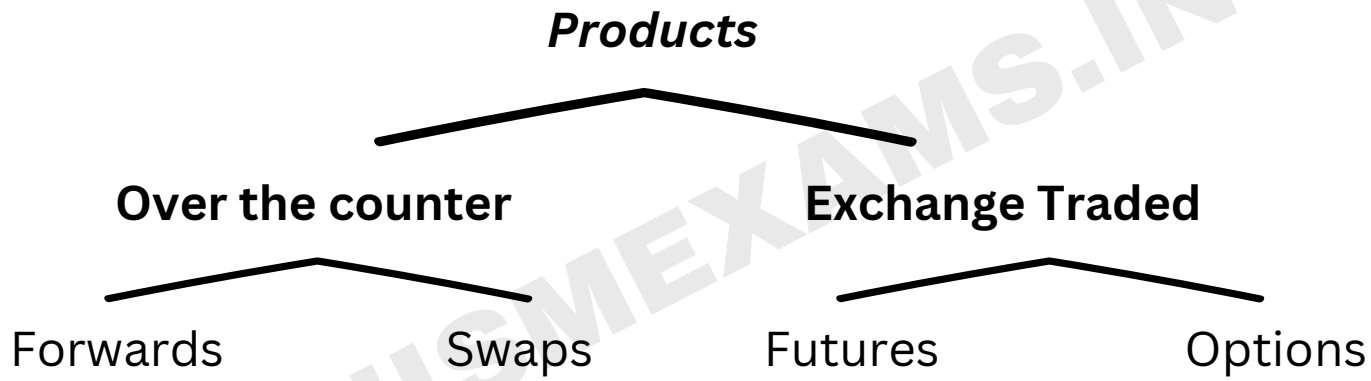
- **Forwards:** It is a contract between two parties to buy/sell an underlying asset at a certain future date for a price that is pre-decided on the date of the contract. Both parties are obliged to honor the transaction irrespective of the price of the underlying asset at the time of delivery.

- **Futures:** A futures contract is similar to a forward, except that the deal is made through an organized and regulated exchange rather than being negotiated directly between two parties. Indeed, we may say futures are exchange-traded forward contracts.

- **Options:** It is a contract that gives the right, but not the obligation, to buy or sell the underlying at a stated date and price. The buyer of the option pays the premium for the right, and the seller of the option receives the premium with the

obligation to sell/ buy the underlying if the buyer exercises his right.

- **Swaps:** A swap is an agreement made between two parties to exchange cash flows in the future according to a prearranged formula. Swaps help market participants manage risk associated with volatile interest rates, currency exchange rates and commodity prices.



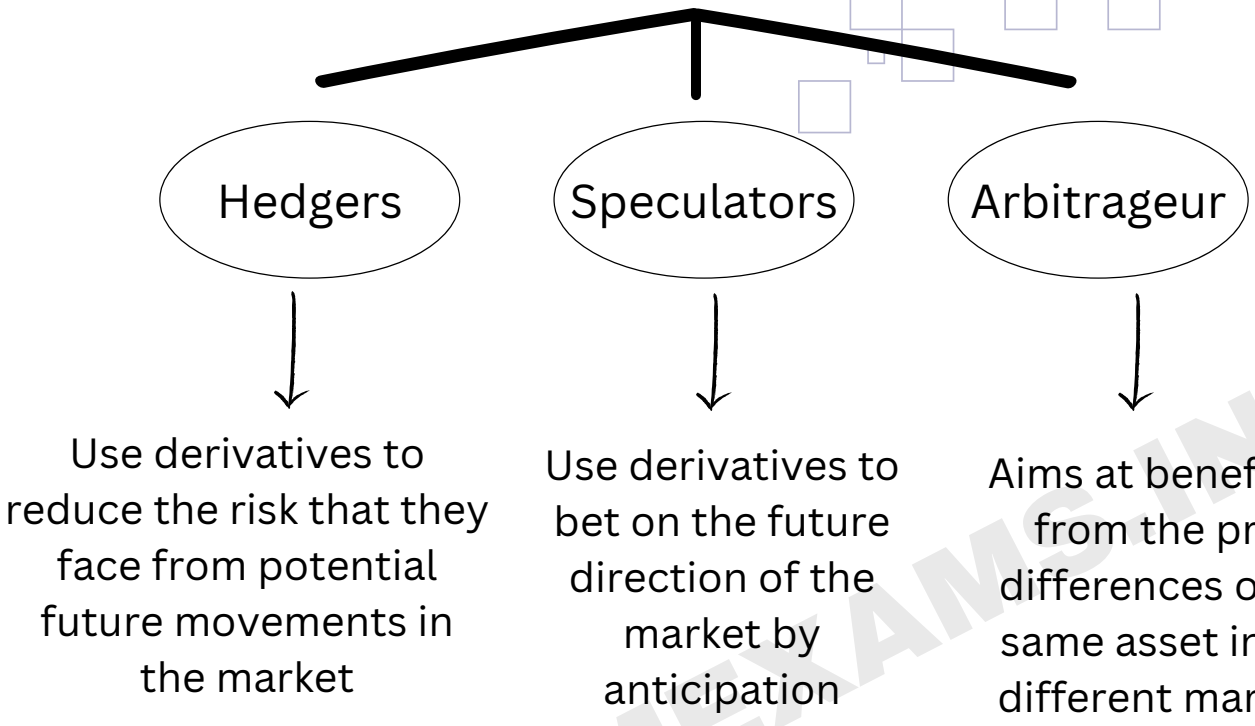

## Growth Drivers of Derivatives

- High volatility in financial markets.
- Integration of financial markets globally.
- The use of the latest technology in communications has helped in the reduction of transaction costs.
- Higher understanding of market participants on sophisticated risk management tools.
- Regular innovations in the derivatives market and newer applications of products.

## Market Participants in the Currency Derivatives Market

Market participants may play different roles in different market circumstances.

***Market Participants in the Currency Derivatives Market***




## Exchange-Traded Derivatives vs. OTC Derivatives

| BASIS FOR COMPARISON | OTC (OVER THE COUNTER) | EXCHANGE |
|---|---|---|
| Meaning | Over the Counter or OTC is a decentralized dealer market wherein brokers and dealers transact directly via computer networks and phone. | Exchange is an organized and regulated market, wherein trading of derivative takes place between buyers and sellers in a safe, transparent and systematic manner. |
| Market maker | Dealer | Exchange itself |
| Physical Location | No | Yes |

| | | |
|---|---|---|
| Trading hours | 24×7 | Exchange hours |
| Transparency | Low | Comparatively high |
| Contracts | Customized | Standardized |
| Riskiness | High | Less Risky |

## Rationale for Introducing Exchange Traded Currency Derivatives in India

**The rationale for establishing the currency futures market is manifold.**

- Both residents and non-residents purchase domestic currency assets. If the exchange rate remains unchanged from the time of purchase of the asset to its sale, no gains and losses are made out of currency exposures. But if domestic currency depreciates (appreciates) against foreign currency, the exposure will result in gain (loss) for residents purchasing foreign assets and loss (gain) for non-residents purchasing domestic assets.

- There is a strong need to hedge currency risk and this need has grown manifold with fast growth in cross-border trade and investment flows.

- Currency futures are expected to bring about better price discovery and also possibly lower transaction costs. Apart

from pure hedgers, currency futures also invite arbitragers, speculators, and those traders who may take a bet on exchange rate movements without an underlying or an economic exposure as a motivation for trading.

# CHAPTER 3
# EXCHANGE TRADED CURRENCY FUTURES

## Currency Futures

Futures markets were innovated to overcome the limitations of forwards. A futures contract is an agreement made through an organized exchange to buy or sell a fixed amount of a commodity or a financial asset on a future date at an agreed price. Simply futures are standardized forward contracts that are traded on an exchange.

*Its features are as follows:*

- Contract between two parties through Exchange
- Centralized trading platform i.e. Exchange
- Price discovery through the free interaction of buyers and sellers
- Margins are payable by both parties
- Expiry date decided today (standardized)
- Quantity decided today (standardized lot size

## Futures Terminologies

- **Underlying Asset:** An original asset on which a derivative instrument is based or gets its value from. Underlying can be the exchange rate in Indian Rupees for US Dollars, Euro, Pound Sterling, and Japanese Yen. Further for cross-currency futures the underlying can be the exchange rate in US Dollars for Euro and Pound Sterling and the exchange rate in Japanese Yen for US Dollars.

- **Contract cycle:** It is a period over which a contract trades. The

currency futures contracts on the SEBI-recognized exchanges can be weekly, monthly, and quarterly. In the case of a monthly contract, a contract maturing in an immediate month is called near month contract, a contract expiring in the next month is called a mid-month contract, and a subsequent month contract is called far month contract. These contracts can extend up to one year. There can be different contract cycles based on underlying. E.g. INR INR-based currency futures have weekly and monthly contracts and cross-currency futures may have only monthly contracts.

- **Expiry day:** The day on which a futures contract ceases to exist. It is the last trading day of that contract, after which settlement takes place. (For all monthly currency futures contract expiry date is two working days before the last business day of the expiry month at 12:30 PM. On the expiry date, the trading in the contract ceases at 12:30 pm and not on the regular trading time of 5:00 pm or 7:30 pm

- **Lot size:** Lot size is the contract size specifying the number of units of the underlying asset in a contract. It is the minimum quantity of underlying assets that need to be traded in a futures contract.

- **Contract Value:** Futures contracts are traded in lots and to arrive at the contract value we have to multiply the price with lot size.

- **Spot Price:** The price at which an underlying asset trades in the

cash market. It is the original price quoted on exchanges. For example- the per-share value of Reliance on May 16, 2023, is quoted at 2470.

- **Tick size:** It is the minimum move allowed in the price quotations. Exchanges decide the tick sizes on traded contracts as part of contract specifications. For example, if the tick size for USDINR futures is Rs. 0.0025, the price entered by buyer and seller can be 74.9975, 75.0000, 75.0025 in multiple of Rs.0.0025.

- **Trading Hours:** The time during which trading is allowed on the Exchange trading platform. Exchanges currently have different market timings for contracts involving the Indian rupee and contracts not involving the Indian rupee. Further, on contract expiry day, the specific currency futures and options contracts stop trading earlier than normal trading hours i.e. 12:30 pm.

- **Base Price:** Base price generally acts as a reference price for trading at the start of the day. Generally, on the first day of trading (i.e. on introduction) of the contract, it would be the theoretical futures price. The base price of the contracts on subsequent trading days would be the daily settlement price of the futures contracts as computed by Clearing Corporation

- **Marking to market:** In the futures market, while contracts have a maturity of several months, profits and losses are settled on a day-to-day basis – called mark to market (MTM) settlement.

- **Daily Settlement Price (DSP):** It is required mainly for MTM settlement. The settlement price is the weighted average futures price (VWAP) of the trades generally in the last 30 minutes of trading (i.e. close price), if the close price is not available then the theoretical price is.

- **Final Settlement Price (FSP):** All open positions on the last trading day of the currency futures contract shall be marked to the final settlement price for the relevant futures contract and shall be settled on the final settlement day. The final settlement price/rate is mainly derived from the underlying/spot market.

- **Settlement type:** All exchange-traded currency futures and option contracts are cash settled in Indian rupee.

- **Open Interest and volumes traded:** An open interest is the total number of contracts outstanding (yet to be settled) for an underlying asset.

- **Price Band:** It is the maximum price range within which a contract is permitted to trade during a day.

## Positions in derivatives market

- **Long Position:** Initiating a buying position in a contract is called a “Long Position”.

- **Short Position:** Initiating a selling position in a contract is called a “Short Position”.

- **Open Position:** Outstanding either long (buy) or short (sell) positions in various derivative contracts is called "Open Position".

- **Opening a position:** Opening a position means initiating a trade by either buying or selling a contract, which increases the client's open position.

- **Closing a position:** Closing a position means squaring off by either buying or selling a contract, which essentially results in reduction of client's open position (long or short).

## Pay-off charts

The payoff on a position is the likely profit/ loss that would accrue to a market participant with a change in the price of the underlying asset at expiry. The payoff diagram is a graphical representation showing the price of the underlying asset on the X-axis and profits/ losses on the Y-axis. In the case of futures contracts, long as well as short position has unlimited profit or loss potential. This results in linear payoffs for futures contracts.

## Advantages and Limitations of Future Contracts in Comparison to Forward

- Advantages: They eliminate counterparty risk and offer more liquidity and price transparency.
- Limitations: The benefit of standardization, though improves liquidity in futures, leads to imperfect hedges since the amount and settlement dates cannot be customized. While margining and daily settlement is a prudent risk management

policy, some clients may prefer not to incur this cost in favor of OTC forwards, where collateral is usually not demanded.

## Interest Rate Parity and Pricing of Currency Futures

**Concept of interest rate parity:** This concept of difference between future exchange rate and spot exchange rate being approximately equal to the difference in domestic and foreign interest rate is called the “Interest rate parity”. Alternative way to explain, interest rate parity says that the spot price and futures price of a currency pair incorporates any interest rate differentials between the two currencies assuming there are no transaction costs or taxes.

***Please go through the explanation video to get a better understanding of the concept***

# CHAPTER 4
# EXCHANGE TRADED CURRENCY OPTIONS

## Basics of Options

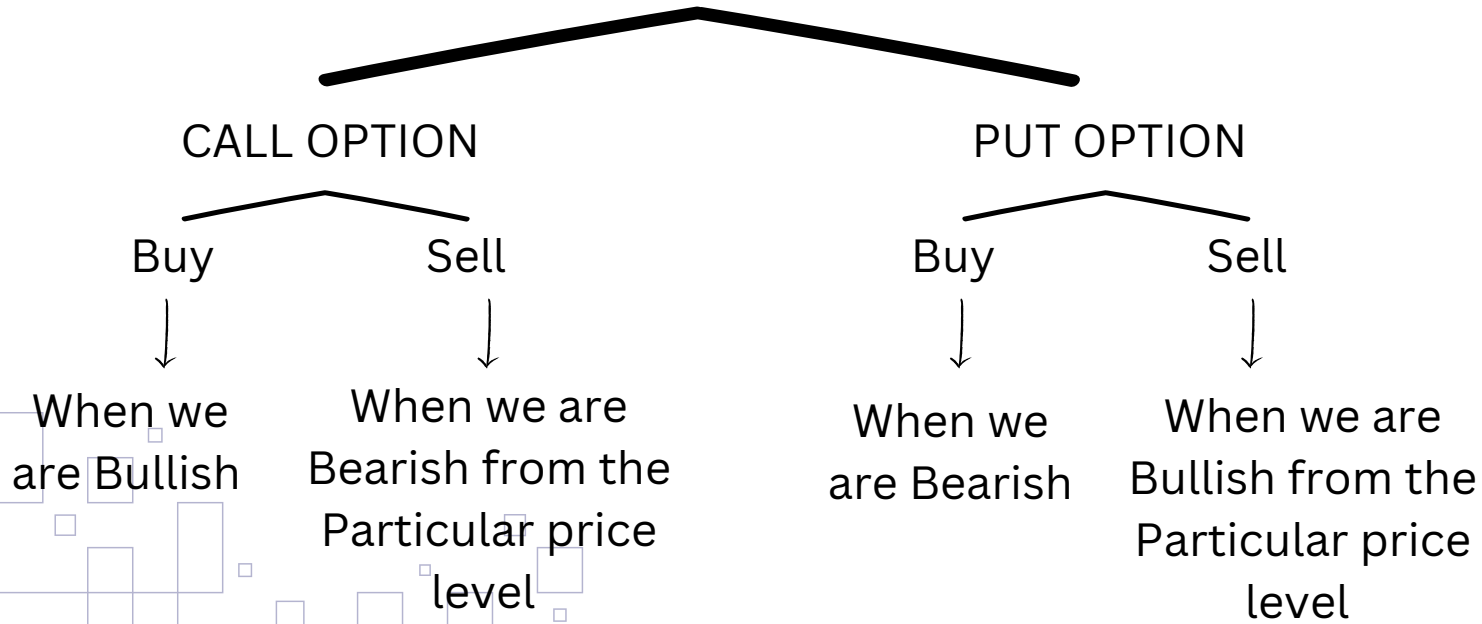
An Option is a contract that gives the right, but not an obligation, to buy or sell the underlying asset on or before a stated date/day, at a pre-determined price. For acquiring right option buyer pay certain price/premium to option seller. The party taking a long position i.e. buying the option is called buyer/ holder of the option and the party taking a short position i.e. selling the option is called the seller/ writer of the option.

## Call Option

A Call option is a contract that gives the holder a right but not an obligation to buy underlying asset on a specified date at a pre-determined price.

## Put Option

A Put option is a contract that gives the holder a right but not an obligation to sell the underlying asset on a specified date at a pre-determined price.



## Style of Options

In options trading, "to exercise" means to put into effect the right to buy or sell the underlying security that is specified in the options contract. Before exercising an option, it is important to consider what type of option you have and whether you can exercise it. An option contract gives the buyer a privilege to exercise his right to buy (in case of call option) or sell (in case of put option) the underlying asset on or before expiry. Here, buyer will ask seller to transact in underlying assets as defined by the option contract.

| American Option | European Option |
| --- | --- |
| The buyer of such an option can exercise at any time on or before the expiry day of the contract. | The buyer of such an option can exercise his right only on the expiry day of the Contract. India follows European style of option contract. |



## Moneyness of an Option

Moneyness of an option indicates whether the contract would result in a positive cash flow, negative cash flow, or zero cash flow for the option buyer at the time of exercising it. Based on these scenarios, the moneyness of the option can be classified into three types:

- **In the money (ITM) Option:** This option would give the holder a positive cash flow if it were exercised immediately. These are the price levels that the market has already breached. A call

option is said to be ITM when the spot price is higher than the strike price. And, a put option is said to be ITM when the spot price is lower than the strike price. In our chart, the shaded strikes are ITM option strikes.

- **At the money (ATM) option:** The money option would lead to zero cash flow if it were exercised immediately. Therefore, for both call and put ATM options, the strike price is equal to the spot price.

- **Out of the money (OTM) option:** Out of the money option is one which is yet to be breached by the underlying asset. In other words, this option would give the holder a negative cash flow if it were exercised immediately. A call option is said to be OTM when the spot price is lower than the strike price. A put option is said to be OTM when the spot price is higher than the strike price. In our chart, the non-shaded strikes are OTM option strikes.

| Strike | Call Option | Put Option |
|---|---|---|
| In-the-money | Strike price < Spot price of underlying asset | Strike price > Spot price of underlying asset |
| At-the-money | Strike price = Spot price of underlying asset | Strike price = Spot price of underlying asset |
| Out-of-the-money | Strike price > Spot price of underlying asset | Strike price < Spot price of underlying asset |

## Basics of Option Pricing and Options Greeks

Option Value: The option value/option premium can be broken in two parts

| Intrinsic Value | Extrinsic Value |
| --- | --- |
| Intrinsic value refers to the amount by which the option is in the money i.e. the amount an option buyer will realize, before adjusting for a premium paid, if he exercises the option instantly. Therefore, only in-the-money options have intrinsic value whereas at-themoney and out-of-the-money options have zero intrinsic value. | The difference between option premium and intrinsic value is the time value of that Option. ATM and OTM options will have only time value because the intrinsic value of such options is zero. The time value is directly proportional to the length of time to the expiration date of the option. The longer the time to expiration, the higher is time value. |

## Option Pricing Fundamentals

- Spot price of the underlying asset
- Strike price of the option
- Volatility of the underlying asset's price
- Time to expiration
- Interest rate

## Option Greeks

**Delta:** It measures the sensitivity of the option value to a given small change in the price of the underlying asset. It may also be seen as the speed with which an option moves concerning the price of the underlying asset.

*Delta = Change in option premium/Unit change in price of the underlying asset.*

**Gamma:** It measures the change in delta concerning the change in the price of the underlying asset. This is called a second derivative option about the price of the underlying asset. It is calculated as the ratio of change in delta for a unit change in the market price of the underlying asset.

*Gamma = Change in an options delta / Unit change in the price of the underlying asset.*

**Theta:** It is a measure of an option's sensitivity to time decay. Theta is the change in option price given a one-day decrease in time to expiration. It is a measure of time decay. Theta is generally used to gain an idea of how time decay is affecting your option positions.

*Theta = Change in an option premium / Change in time to expiry*

**Vega:** This is a measure of the sensitivity of an option price to changes in market volatility. It is the change of an option premium for a given change (typically 1%) in the underlying volatility. Vega is positive for a long call and a long put.

*Vega = Change in an option premium / Change in volatility*

**Rho:** It is the change in option price given one percentage point change in the risk-free interest rate. Rho measures the change in an option's price per unit increase in the cost of funding the underlying.

*Rho = Change in an option premium / Change in cost of funding the underlying*

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