GUIDE TO DERIVATIVES AND STRUCTURED PRODUCTS

Yogendra Sisodia
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Derivatives: Meaning
A derivative is an asset whose value is derived from the value of some other asset. The other asset is generally known as the underlying (for example, a commodity like Gold or financial assets like Shares or Equity Indices). Imagine that you have signed a legal contract that, with the payment of a small upfront margin gives you the right to buy a fixed quantity of an underlying asset like Reliance Stock at a price determined now at any time in the next three months. Here you have not paid the full amount but a small upfront margin and you have an obligation to buy a certain quantum of Reliance shares in the forthcoming next three months. Such kind of exotic contracts are called as derivatives. Some of the popular derivative examples are:

- interest rate derivatives

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- foreign exchange derivatives
- credit derivatives
- commodity derivatives
- equity derivatives

Derivative products are either traded on stock exchanges (Exchange Traded Derivatives) or bought and sold privately (Over the Counter Market). Exchange traded derivatives are those derivatives which are traded through specialized derivative exchanges whereas over the counter (OTC) derivatives are those which are privately traded between two parties and involves no exchange or intermediary as a third party. Those Derivatives which are traded on exchanges are standardized products as exchanges cannot customize products to suit individual needs. Those that are bought or sold over the counter could be customized to your needs.

![Derivative Usage (Global Fortune 500)](source: ISDA)

Some of the biggest International derivatives exchanges are:
- CME Group Inc. consisting of 3 exchanges
  - Chicago Mercantile Exchange (CME)
  - Chicago Board of Trade (CBOT)
  - New York Mercantile Exchange (NYMEX)
- Eurex
- Chicago Board Options Exchange
- London International Financial Futures and Options Exchange

In India, equity derivatives are traded within regular stock exchanges under a separate segmental framework. India does not have exclusive exchanges for equity derivatives.

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In India national level derivatives exchanges where financial derivatives are traded are
- Bombay Stock Exchange (BSE)
- MCX-SX
- National Stock Exchange (NSE)

**Derivatives: Difference between Spot and Derivatives**

The spot market gives the investor an opportunity to invest in stocks of companies listed on a stock exchange at an agreed price prevailing on the exchange with immediate (spot) settlement (payment and delivery). In practice, spot settlement happens on day t + 2, which is two days after the trading day. Example - you can purchase stock of Reliance from The Stock Exchange, Mumbai (BSE) and the National Stock Exchange (NSE) through your broker on any trading day at prevailing prices. When you buy shares of a company in the spot market, you are commonly referred to as an investor or a shareholder. When you own a share, you are sharing in the success of the business, and you actually become a part owner of the corporation like Reliance.

Consider the previous mentioned legal contract by with the payment of a small upfront margin gives you the right to buy a fixed quantity of an underlying asset like Reliance Stock at a price determined now at any time in the next three months. The above example represents a Futures contract within the universe of Derivatives. The segment of organized stock exchanges where trading in Derivatives takes place is known as derivatives segment. In India, derivatives are traded within regular exchanges under a separate segmental framework.

**Derivatives: Benefits of Exchange traded contracts**

Some of the benefits of an exchange traded contract are:

- Information dissemination.
- Open and transparent mechanism.
- Fixed Quantity/Lot size of the underlying asset like Sensex or Nifty index.
- The time when expiry takes place example last Thursday of every month.
- Minimum price change also known as tick size.
- Novation to eliminate counterparty risk.

Thus exchange traded derivatives reduces illiquidity and counter-party risk.

**Novation**
Novation is used to describe a special situation where the clearing house

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becomes buyer to every seller and vice versa to reduce counter party risk. A Clearing House exists primarily to reduce the risks of settlement failures.

Fig: Novation in exchange traded derivatives

In India we have three major clearing houses:
- BOISL for BSE
- MCX-SX Clearing Corporation Ltd. (MCX-SX CCL) for MCX-SX
- National Securities Clearing Corporation Limited (NSCCL) for NSE

Derivatives: Derivative Market Products and Participants

**Forward**
A forward contract is a contractual agreement made directly between two parties. One party agrees to buy a commodity or a financial asset on a date in the future at a fixed price. The other side agrees to deliver that commodity or asset at the predetermined price. In a forward contract, the two parties are taking a risk on each other and if the counterparty does not perform, the first party may suffer a loss. In the sub-prime crisis that recently rocked the financial world, banks were afraid to deal with each other as each bank ran the risk that the other bank may not be in a position to perform its part of the derivative contract.

**Futures**
A futures contract is essentially the same as a forward, except that the deal is affected through an organized and regulated exchange. The stock exchange provides settlement guarantee. The
two parties do not know each other and do not carry a risk of the other party not performing as per the contracted terms. If the counterparty does not perform, the exchange is legally required to step into the shoes of the non-performing party.

**Swap**
A swap is an agreement made between two parties to exchange payments on regular future dates, where the payment legs are calculated on a different basis. As swaps are OTC (Over Trade Counter) deals, there is a risk that one side or the other might default on its obligations.

**Options**
An Option gives one party the right to buy or sell an underlying asset by a certain date at a fixed price. The party buying the option has an option (meaning it is not bound to perform), while the other party selling the option has an obligation (meaning that it is bound to perform).

**Index Futures**
An equity index futures contract is an agreement:
- made between two parties;
- on an organized futures exchange;
- to exchange cash compensation payments;
- Based on the movements in the level of an equity index.
One of the most liquid equity index futures contracts traded in Indian markets is Nifty Futures on NSE and Sensex Futures on BSE.

**Index Options**
It is a call or put option on a financial index. Investors trading index options rely on the overall movement of the stock market as represented by a basket of stocks. Options on the Sensex and Nifty are some of the most actively traded options in India.

**Stock Futures**
It is a type of investment where an agreement is reached to buy or sell a stock at a future date like Reliance on an exchange like BSE. These are contracts where the buyer takes on the obligation to buy and the seller takes on the obligation to sell on a pre specified future date.

**Stock Options**
It is a privilege, sold by one party to another that gives the buyer the right but not obligation to buy (call) or sell (put) a stock at an agreed upon price within a certain period or on a specific date.

In domestic market we have Futures and Options available following indices:

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Some of the worldwide known indices for which derivatives are available are
- S&P 500 (U.S.)
- Nikkei 225 (Japanese)
- FTSE 100 (British)

In India BSE and NSE combined Future & Options on individual companies is less than 300 (as of Dec 2009). However it is growing slowly.

**Commodity Futures**
The basic concept of a Futures contract remains the same whether the underlying happens to be a commodity or a financial asset. However there are some features which are very peculiar to commodity Futures markets. In the case of financial derivatives, most of these contracts are cash settled. Even in the case of physical settlement, financial assets are not bulky and do not need special facility for storage. Due to the bulky nature of the underlying assets, physical settlement in commodity Futures creates the need for warehousing.

**Currency Futures**
When the underlying of Futures is an exchange rate, the contract is termed a “currency futures contract”. In other words, it is a contract to exchange one currency for another currency at a specified date and a specified rate in the future. Therefore, the buyer and the seller lock themselves into an exchange rate for a specific value and delivery date. Both parties of the futures contract must fulfill their obligations on the settlement date.

<table>
<thead>
<tr>
<th>Underlying</th>
<th>The exchange rate in Indian Rupees for US Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading Hours</td>
<td>9:00 AM to 5:00 PM (Monday to Friday)</td>
</tr>
<tr>
<td>Contract Size</td>
<td>USD 1,000</td>
</tr>
<tr>
<td>Price Quotation</td>
<td>INR per 1 USD</td>
</tr>
<tr>
<td>Tick Size</td>
<td>INR 0.0025</td>
</tr>
<tr>
<td>Minimum Initial Margin</td>
<td>1.75% on first day &amp; 1% thereafter</td>
</tr>
<tr>
<td>Contracts</td>
<td>All months with a maximum maturity of 12 months</td>
</tr>
<tr>
<td>Settlement Mechanism</td>
<td>Cash Settled in Indian Rupee</td>
</tr>
<tr>
<td>Final Settlement Rate</td>
<td>RBI USDINR Reference Rate</td>
</tr>
<tr>
<td>Last Trading Day</td>
<td>Two working days prior to the last business day of the expiry month at 12 noon</td>
</tr>
<tr>
<td>Final Settlement Date</td>
<td>Last working day of month, except Saturday. It will be same as that for interbank settlement in Mumbai</td>
</tr>
</tbody>
</table>

Fig: Contract specification of USDINR on MCX-SX

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Interest Rate Futures

In an IRF “notional” government bond form the underlying instruments. The underlying bond may not exist in reality. One other salient feature of the interest rate futures is that they have to be physically settled unlike the equity derivatives which are cash settled in India.

<table>
<thead>
<tr>
<th>Design Criteria</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underlying</td>
<td>10 year Notional Coupon bearing Government of India Security</td>
</tr>
<tr>
<td>Coupon</td>
<td>Notional coupon 7% with semi annual compounding</td>
</tr>
<tr>
<td>Trading Hours and Days</td>
<td>9:00 AM to 5:00 PM; Monday to Friday</td>
</tr>
<tr>
<td>Lot Size of Futures Contract</td>
<td>Rs. 200,000</td>
</tr>
<tr>
<td>Quotation</td>
<td>Similar to quoted price of Gol security: Day count convention: 30 / 360 day basis</td>
</tr>
<tr>
<td>Tenor</td>
<td>Maximum Maturity: 12 months</td>
</tr>
<tr>
<td>Contract cycle</td>
<td>Four quarterly contracts a year – expiring in March, June, September, and December</td>
</tr>
</tbody>
</table>
| Daily settlement price| ➢ Closing price of the 10-year Notional Coupon-bearing Gol security futures contract on the trading day.  
➢ Closing price = Weighted Average price of the futures for last half an hour.  
➢ In the absence of last half an hour trading the price as determined by the exchanges, would be considered as Daily Settlement Price. |
| Settlement            | ➢ Settled by physical delivery of deliverable grade securities using the electronic book entry system of the existing Depositories (NSDL and CDSL) and Public Debt Office (PDO) of the RBI.  
➢ The delivery of the deliverable grade securities shall take place from the first business day of the delivery month till the last business day of the delivery month.  
➢ The owner of a short position in an expiring futures contract shall hold the right to decide when to initiate delivery.  
➢ The short position holder shall have to give intimation, to the Clearing Corporation, of his intention to deliver two business days prior to the actual delivery date.  
| Deliverable Grade Securities | Gol securities maturing at least 7.5 years but not more than 15 years from the first day of the delivery month with a minimum total outstanding stock of Rs 10,000 Crores.  
| Conversion factor      | The Conversion Factor for deliverable grade security would be equal to the price of the deliverable security (per rupee of the principal), on the first day (calendar day) of the delivery month, to yield 7% with semiannual compounding.  
| Last trading day and delivery day | Seventh business day preceding the last business day of the delivery month; and last business day of the delivery month |

Fig: Contract specification of IRF on MCX-SX

Major participants in derivatives markets are:

**Hedgers**

Hedgers trade with an objective to minimize the risk in trading or holding the underlying securities. Hedgers willingly bear some costs in order to achieve protection against unfavorable price changes. They use the futures or options markets to reduce or eliminate this risk.

**Speculators**

Speculators are participants who wish to bet on future movements in the price of an asset. Futures and options contracts can give them leverage; that is, by putting in small amounts of money upfront, they can take large positions on the market. As a result of this leveraged speculative position, they increase the potential for large gains as well as large losses.

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Arbitragers

Arbitragers work at making profits by taking advantage of discrepancy between prices of the same product across different markets. If, for example, they see the futures price of an asset getting out of line with the cash price, they would take offsetting positions in the two markets to lock in the profit.

Derivatives: Difference between Forward and Futures

A forward contract is a commitment to purchase at a future date a given amount of a commodity or an asset at a price agreed on today. The price fixed now for future exchange of underlying asset is the forward price.

The party with a “long position” will be the buyer of the underlying asset and the party with a “short position” will be the seller.

![Timeline for forward contract](image)

Fig: Timeline for forward contract

Features of forward are

- Bilateral and custom tailored
- Traded over the counter (not on recognized exchanges)
- No money changes hands until expiry.
- Counter-party risk involved.

A futures contract is an exchange-traded, standardized, forward-like contract that is marked to the market daily. This contract can be used to establish a long (or short) position in the underlying asset.

Derivatives: Examples and Payoffs

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Examples and Payoff Diagrams of Futures

Fig: Payoff Diagram of a trader having long position on Reliance.

Above example shows the profits for a long futures position. The trader bought 1 lot (say 100 futures) when the Reliance spot was trading at 2000. The Reliance spot went up by 500 points. He made a profit of INR 50,000 (2500-2000 * 100).

Fig: Payoff Diagram of a trader having long position on Reliance.

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Above example shows the profits for a short futures position. The trader short sold futures when the Reliance spot was trading at 2000. The Reliance spot went down by 500 points. He made a profit of INR 50,000. (If 1 lot = 100 futures)

Examples and Payoff Diagrams of Options

Option Types
Call option - A call option is the right, not the obligation, to BUY an asset at a fixed price before a predetermined date.
Put option - A put option is the right, not the obligation, to SELL an asset at a fixed price before a predetermined date.

Option Style
American- American-style options allow the option buyer to exercise the option at any time before the expiration date.
European - European-style options do not allow the option buyer to exercise the option before the expiration date.

Option Premium/Option price is the price which the option buyer pays to the option seller. It is also referred to as the option premium.

Option Buyer
Option Buyer is the one who by paying the option premium buys the right but not the obligation to exercise his option on the seller.

Option Seller (Option writer)
Option seller is the one who receives the option premium and is thereby obliged to sell/buy the asset if the buyer exercises on him.

The Exercise (Strike) Price
It is the fixed price at which the option can be exercised. So if you buy a Nifty call option that has a strike price of INR 4500, then you have bought yourself the option to buy the Nifty at a price of INR 4500.

Expiration Date
This is the date before which the option can be exercised.
At expiration, the call option’s own value is only worth the price of the asset less the exercise price, and at expiration, the put option’s own value is only worth the exercise price less the price of the asset.

Example on Nifty Call Option

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A trader wants to purchase Nifty on 26 Nov 09 however since market volatility is there he wants to use options for safety.

Assume the following hypothetical transaction

On 03-Nov-09

He purchased 50 Nifty Call option each having price of INR 164 having strike price 4500

(1 Nifty lot size is 50)

Cash outflow = (164*50 = 8200)

On 26-Nov-09

Nifty Spot 5005

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But since he has purchased 50 call options on strike price 4500
he have to pay only 4500*50 = 225000
Instead of 5005*50 = 250250

<table>
<thead>
<tr>
<th>Inflow</th>
<th>Outflow</th>
<th>Profit (Inflow – Outflow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5005-4500)*50 = 25250</td>
<td>8200</td>
<td>17050</td>
</tr>
</tbody>
</table>

If on the other hand spot price at 26Nov09 would have been 4200.
He would have not exercised call option and there would have been miniscule outflow of INR 8200.

Example on Bharti Airtel Put Option

Fig: Daily settlement price for Bharti Airtel Put option (29Oct09 Expiry)
A trader wants to sell Bharti Airtel on 29 Oct 09 however since market volatility is there he wants to use options for safety. Assume the following hypothetical transaction:

**On 01-OCT-09**
He purchased 500 Bharti Airtel Put option each having price of INR 1 having strike price 350 (1 Airtel lot size is 500)
Cash outflow = (1*500 = 500)

**On 29-OCT-09**
Airtel Spot 311
But since he has purchased 500 put options on strike price 350
The other counterparty has an obligation to buy at INR 350*500 = 175000
Instead of 311*500 = 155500

<table>
<thead>
<tr>
<th>Inflow</th>
<th>Outflow</th>
<th>Profit (Inflow – Outflow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(350-311)*500 = 19500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

If on the other hand spot price at 29Oct09 would have been 360.
He would not have exercised the put option and had a miniscule loss of 500.

**Intrinsic Value and Time Value**

Intrinsic Value is that part of the option’s value that is *In the Money* (ITM).
Time Value is the remainder of the option’s value. *Out of the Money*
(OTM) options will have no Intrinsic Value, and their price will solely be based on Time Value. Time Value is another way of saying hope value. This hope is based on the amount of time left until expiration and the price of the underlying asset.

A call is ITM when the underlying asset price is greater than the strike price.
A call is OTM when the underlying asset price is less than the strike price.
A call is At the Money (ATM) when the underlying asset price is the same as the strike price.

Put options work the opposite way:
A put is ITM when the underlying asset price is less than the strike price.
A put is OTM when the underlying asset price is greater than the strike price.
A put is ATM when the underlying asset price is the same as the strike price.

Intrinsic and Time Values for calls:
- Call Intrinsic Value = stock price – exercise price
- Call Time Value = call premium – call Intrinsic Value
The minimum Intrinsic Value is zero.

Intrinsic and Time Values for puts:
- Put Intrinsic Value = exercise price – stock price
- Put Time Value = put premium (or value) – put Intrinsic Value
The minimum Intrinsic Value is zero

![Fig: Long on Call Option](image)

The above example shows the profit for the buyer of a Reliance call option. As Reliance spot rises, the call option is in-the-money. If upon expiration, Reliance closes above the strike price of 2000, the buyer would exercise his option and profit to the extent of the difference between the Reliance close and the strike price. The profits possible on this option are potentially

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unlimited. However if Reliance falls below the strike of 2000, he lets the option expire. His losses are limited to the extent of the premium of INR 160 he paid for buying the option.

Fig: Short on Call Option
The above example shows the profit for the seller of a Reliance call option. As the spot Reliance rises, the call option is in-the-money and the writer starts making losses. If upon expiration, Reliance closes above the strike of 2000, the buyer would exercise his option on the writer who would suffer a loss to the extent of the difference between the Reliance spot close and the strike price. The loss that can be incurred by the writer of the option is potentially unlimited, whereas the maximum profit is limited to the extent of the up-front option premium of INR 160 charged by him.
Fig: Long on Put Option
The above example shows the profit for the buyer of Reliance put option. As can be seen, as the spot Reliance falls, the put option is in-the-money. If upon expiration, Reliance spot closes below the strike of 2000, the buyer would exercise his option and profit to the extent of the difference between the strike price and Reliance spot close. The profits possible on this option can be as high as the strike price. However if Reliance rises above the strike of 2000, he lets the option expire. His losses are limited to the extent of the premium of INR 160 he paid for buying the option.

Fig: Short on Put Option
The above example shows the profit for the seller of Reliance put option. As the Reliance falls, the put option is in-the-money and the writer starts making losses. If upon expiration, Reliance
spot closes below the strike of 2000, the buyer would exercise his option on the writer who would suffer a loss to the extent of the difference between the strike price and Reliance close. The loss that can be incurred by the writer of the option is a maximum extent of the strike price whereas the maximum profit is limited to the extent of the up-front option premium of INR 160 charged by him.

**Examples and Payoffs of Swaps**

Swaps are one of the most innovative and widely treaded derivatives on OTC.

![Notional Amount of IRS (In USD Billions)](image)

Fig: Notional Amount of IRS (In USD Billions)
Reference Rate
Reference rate determines payoffs. Following are widely used reference rates:

- LIBOR - London Interbank Offered Rate
- MIBOR - Mumbai Inter-Bank Offer Rate
- TIBOR - Tokyo Interbank Offered Rate

The London Interbank Offered Rate is a daily reference rate based on the interest rates at which banks borrow funds from other banks in the London interbank market.
Plain Vanilla Interest Rate Swap

- Company A pays fixed rate of interest (Fixed Payer)
- Company B pays floating interest (Floating Payer)
- Same notional principal (Same currency)
- On specified dates

Fig: Different tenure LIBOR Rates

Fig: Transaction details in IRS

Dealers (Market Makers)

Fig: How dealers benefit
Plain Vanilla Foreign Currency Swap

- Example: A bilateral agreement to
  - Pay 10% on an Indian Rupee principal of INR 40,000,000 and receive 5% on a US dollar principal of $1,000,000.
  - Cash flows are exchanged every year for 5 years

Uses

- To secure cheaper debt in desired currency
- Taxes
- Exchange rate hedging

Cash Flows in Currency Swap

At origination:

At each annual settlement date:

At maturity:

Fig: Transaction details in Currency swap

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 Dealers (Market Makers)

**Difference between Interest Rate Swap and Currency Swap**

- In an interest rate swap the principal is not exchanged
- In a currency swap the principal is usually exchanged at the beginning and the end of the swap’s life
- There is greater credit risk with a currency swap when there will be a final exchange of principal

**Comparative Advantage**
We take an example. Suppose General Electric wants to borrow AUD, Qantas wants to borrow in USD.

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Fig: Borrowing rates in different markets.

Since the difference between USD rates is 2% whereas difference between AUD rates is .04%, total gain to all parties is 1.6% (2.00-0.04).

Derivatives: Valuation

Futures Valuation

The relationship between the spot and Futures price of an asset reflects the net cost of holding (or carrying) that asset relative to holding the Futures. Cost Of Carry denotes the interest earned on the underlying assuming continuous compounding.

\[ F = S \cdot e^{r \cdot t} \]

Where:

\( F \) = Futures Price

\( S \) = Spot price

\( e \) = 2.718 for continuous compounding

\( r \) = Cost of financing

\( t \) = Time till expiration (years)

As a Futures contract nears expiration, the Futures price and the cash price converge to eventually become the same price.

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We have following black sholes assumptions:

- The option price and the stock price depend on the same underlying source of uncertainty
- We can form a portfolio consisting of the stock and the option which eliminates this source of uncertainty
- The portfolio is instantaneously riskless and must instantaneously earn the risk-free rate

This leads to the Black-Scholes formula

\[
\begin{align*}
c &= S_0 N(d_1) - Ke^{-rT}N(d_2) \\
p &= Ke^{-rT}N(-d_2) - S_0 N(-d_1)
\end{align*}
\]

where

\[
\begin{align*}
d_1 &= \frac{\ln(\frac{S_0}{K}) + (r + \sigma^2/2)T}{\sigma \sqrt{T}} \\
d_2 &= \frac{\ln(\frac{S_0}{K}) + (r - \sigma^2/2)T}{\sigma \sqrt{T}} = d_1 - \sigma \sqrt{T}
\end{align*}
\]

- \(N(x)\) is the probability that a normally distributed variable with a mean of zero and a standard deviation of 1 is less than \(x\).

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- $c$: European call option price
- $p$: European put option price
- $S_0$: Stock price today
- $K$: Strike price
- $T$: Life of option
- $s$: Volatility of stock price
- $r$: Risk-free rate for maturity $T$ with cont compounding

**Example:**
The stock price 6 months from expiration of an option is INR 42, the exercise price is INR 40. Risk free interest rate is 10% p.a. and volatility is 20% p.a.

- $S = 42$, $K = 40$, $r = 0.1$, $\sigma = 0.2$ and $T = 0.5$
- $D_1 = 0.7693$
- $D_2 = 0.6278$
- $K e^{-rT} = 40 e^{-0.05} = 38.049$
- $C = 42N(0.7693) - 38.049N(0.6278)$
- $P = 38.049N(-0.6278) - 42N(-0.7693)$
- $C = 4.76$
- $P = 0.81$

$N(x)$ can be found using NORMDIST function in excel.

**Settlement of options contracts**

Options contracts have three types of settlements, daily premium settlement, exercise settlement, interim exercise settlement in the case of option contracts on securities and final settlement.

**Daily premium settlement**
Buyer of an option is obligated to pay the premium towards the options purchased by him. Similarly, the seller of an option is entitled to receive the premium for the option sold by him. The premium payable amount and the premium receivable amount are netted to compute the net premium payable or receivable amount for each client for each option contract.

**Exercise settlement**
Although most option buyers and sellers close out their options positions by an offsetting closing transaction, an understanding of exercise can help an option buyer determine whether exercise might be more advantageous than an offsetting sale of the option. There is always a possibility of the option seller being assigned an exercise. Once an exercise of an option has been assigned to an option seller, the option seller is bound to fulfill his obligation (meaning, pay the cash settlement amount in the case of a cash-settled option) even though he may not yet have been notified of the assignment.

**Interim exercise settlement**
Interim exercise settlement takes place only for option contracts on securities. An investor can exercise his in-the-money options at any time during trading hours, through his trading member. Interim exercise settlement is effected for such options at the close of the trading hours, on the day of exercise. Valid exercised option contracts are assigned to short positions in the option contract with the same series (i.e. having the same underlying, same expiry date and

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same strike price), on a random basis, at the client level. The CM who has exercised the option receives the exercise settlement value per unit of the option from the CM who has been assigned the option contract.

**Final exercise settlement**

Final exercise settlement is effected for all open long in-the-money strike price options existing at the close of trading hours, on the expiration day of an option contract. All such long positions are exercised and automatically assigned to short positions in option contracts with the same series, on a random basis. The investor who has long in-the-money options on the expiry date will receive the exercise settlement value per unit of the option from the investor who has been assigned the option contract.

---

**Swaps Valuation**

Swaps can be valued as difference between two bonds. Here we will understand swap valuation via examples

**Interest Rate Swap Example**

- Pay six-month LIBOR, receive 8% (s.a. compounding) on a principal of $100 million
- Remaining life 1.25 years
• LIBOR rates for 3-months, 9-months and 15-months are 10%, 10.5%, and 11% (cont comp)

• 6-month LIBOR on last payment date was 10.2% (s.a. compounding)

*(s.a. = semi annual)

*(cont = continuous compounding)

<table>
<thead>
<tr>
<th>Time</th>
<th>B$_{fix}$ cash flow</th>
<th>B$_{fl}$ cash flow</th>
<th>Disc factor</th>
<th>PV B$_{fix}$</th>
<th>PV B$_{fl}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>4.0</td>
<td>105.100</td>
<td>0.9753</td>
<td>3.901</td>
<td>102.505</td>
</tr>
<tr>
<td>0.75</td>
<td>4.0</td>
<td></td>
<td>0.9243</td>
<td>3.697</td>
<td></td>
</tr>
<tr>
<td>1.25</td>
<td>104.0</td>
<td></td>
<td>0.8715</td>
<td>90.640</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>98.238</td>
<td>102.505</td>
</tr>
</tbody>
</table>

Value of Swap if seen as difference between fixed and floating bond

= -4.267 million USD

Fixed Payer is in Loss

Floating Payer is in Gain

e$^ {(-.1*.25)} = .9753$

e$^ {(-.105*.75)} = .9243$

e$^ {(-.11*1.25)} = .8715$

$(105.100)*.9753 = 102.505$

**Currency Swap Example**

• All Japanese LIBOR/swap rates are 4%

• All USD LIBOR/swap rates are 9%

• 5% is received in yen; 8% is paid in dollars. Payments are made annually

• Principals are $10 million and 1,200 million yen

• Swap will last for 3 more years

Yogendra Sisodia
• Current exchange rate is 110 yen per dollar

<table>
<thead>
<tr>
<th>Time</th>
<th>Cash Flows ($)</th>
<th>PV ($)</th>
<th>Cash flows (yen)</th>
<th>PV (yen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.8</td>
<td>0.7311</td>
<td>60</td>
<td>57.65</td>
</tr>
<tr>
<td>2</td>
<td>0.8</td>
<td>0.6682</td>
<td>60</td>
<td>55.39</td>
</tr>
<tr>
<td>3</td>
<td>0.8</td>
<td>0.6107</td>
<td>60</td>
<td>53.22</td>
</tr>
<tr>
<td>3</td>
<td>10.0</td>
<td>7.6338</td>
<td>1,200</td>
<td>1,064.30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9.6439</td>
<td></td>
<td>1,230.55</td>
</tr>
</tbody>
</table>

Value of swap if seen as diff. between two bond =

1,230.55/110 – 9.6439 = 1.5430 million

Current exchange rate is 110 yen per dollar

 Trading Strategies with Real examples

**Hedging Currency Risk using Currency Futures by Exporter**

![Diagram: Short Position in USD/INR used for hedging](image)

For example, if an exporter is likely to receive USD after three months, there is a risk of USD depreciation. To offset this risk, the exporter can hedge the USD receivables by selling USD in the forward or futures market.

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Hedging Currency Risk using Currency Futures by Importer

An importer who has risk of USD appreciation can take a long USD position in the forward or futures market.

Hedging Commodity Risk using Commodity Futures by Exporter

An active exporter in the commodity futures market expects gold price to fall in the month of May 2009. He already owns the Gold in cash market and wants to hedge against risk of price fall during his export. On the basis of his view about the gold price movement, he sells one contract (of 1 kg each) of gold June futures at the price of Rs 7,800 per 10 gm in April 2009. In May 2006, gold June futures actually moves as per his anticipation and decreases to Rs 7,600 per 10 gm, which gives him a hedge of Rs 20,000 on squaring off the short position of one contract of gold June futures.
Hedging Commodity Risk using Commodity Futures by Importer

A jeweler expects gold price to fall in the month of May 2009. He is having obligation to make jewelry out of Gold and wants to hedge against risk of price fall during his import. On the basis of his view about the gold price movement, he buys one contract (of 1 kg each) of gold June futures at the price of Rs 7,600 per 10 gm in April 2009. In May 2009, gold June futures actually moves as per his anticipation and increases to Rs 7,800 per 10 gm, which gives him a hedge of Rs 20,000 on squaring off the long position of one contract of gold June futures.
Arbitraging using Stock Futures

If the Futures price is overvalued than spot price:

1. The arbitrageur shorts overvalued Futures; simultaneously he is long in spot.
2. On or before expiry date, the arbitrageur square off his Futures and settle spot position.
3. The difference between Futures prices and Spot prices on the purchase and settlement date is his gain.
Example:

1. The arbitrageur shorted 1 lots (100 underlying shares in 1 lot) of ACC on 02-May-07 (See figure). Purchased 100 ACC shares. For simplification we assumed no margins or transaction taxes.
2. On 26-Jun-07 he settled by offsetting the Futures position and selling the spot
3. The profit is calculated in Table given below.

<table>
<thead>
<tr>
<th>Futures Profit</th>
<th>((763.05 - 599.1) \times 100)</th>
<th>16395</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Loss</td>
<td>((599.1 - 753.7) \times 100)</td>
<td>-15460</td>
</tr>
<tr>
<td>Net Profit</td>
<td></td>
<td>935</td>
</tr>
</tbody>
</table>

Table: Net Profit calculation on ACC.

**Speculating using Interest Rate Futures**

If speculator expects interest rates to go up, they sell IRF and if they have the opposite expectation, they buy IRF. If the interest rate movement turns out to be the way the investor expected, he would make profit; otherwise, he would make losses.

<table>
<thead>
<tr>
<th>Expectation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Rate UP</td>
<td>SHORT IRF</td>
</tr>
<tr>
<td>Interest Rate DOWN</td>
<td>LONG IRF</td>
</tr>
</tbody>
</table>
Table: Actions based on expectations in bond market.

A speculator expects the long term interest rate to rise.
On Day 1, the trader short 100 contracts of the near month 10 Year futures on MCX-SX at Rs. 94
Speculator on Day 2 buys 100 contracts at Rs. 92.00 to squares off his position
Therefore total profit for trader is $100 \times 20000 \times (2)$ or Rs 40,000,000.

**Option Strategy: Straddle**

A long straddle is a strategy where the investor buys a call and buys a put with the same strike and time to expiration.

The most common use of the strategy is when the trader expects a large move but is unsure about which direction. The strategy attempts to play both sides of the market hoping that the move in the underlying stock, whether up or down, is sufficient to cover the cost of the losing option. A better use of the straddle is to buy them if trader expects *increases* in volatility. Increased volatility will increase the price of both calls and puts. So, if trader is faced with a big announcement or news, he should buy the straddle only if he thinks the market has underestimated the volatility.

---

**Option Strategy: Butterfly spread**

The butterfly spread is one of many strategies that belong to a family collectively known as "wing spreads"; they get this name, from the shape of their profit and loss diagrams. The
butterfly spread is designed for traders to take advantage of pricing discrepancies between spreads.

For the long butterfly, the trader will buy 1 low strike, sell 2 medium strikes, and buy 1 high strike all with the same expiration dates. The butterfly can be executed with either calls or puts (or a combination). The high and low strikes must be the same distance from the medium option.

Option Strategy: Calendar spread

A calendar spread is any spread where the trader buys a particular month, and then sells the same strike of a different month. Since the trader is spreading months, it is known as calendar spread. Also, because months represent time, these are equally known as time spreads or horizontal spreads. With a calendar spread, the trader is expecting the stock to sit flat -- this trade is actually a play on time-decay and volatility as opposed to direction.
Hedging using Swaps

Swap may be initiated due to asymmetric information and other imperfections in the market about the parties to an interest rate swap. For example, a party may enjoy an absolute advantage in securing debt at the fixed and floating rate over another party. However, the same party (which has absolute advantage in both rates market) enjoys only a relative or comparative advantage in one of the markets (fixed), while the party with an absolute disadvantage in both fixed and floating rate markets, is expected to enjoy a comparative advantage in the floating rate market. Swaps also help companies hedge against interest rate exposure by reducing the uncertainty of future cash flows. Swapping allows companies to revise their debt conditions to take advantage of current or expected future market conditions. As a result of these advantages, currency and interest rate swaps are used as financial tools to lower the amount needed to service a debt.

Currency Swaps are often used because a domestic firm can usually receive better rates than a foreign firm. For example, suppose company A is located in the U.S. and company B is located in England. Company A needs to take out a loan denominated in British pounds and company B needs to take out a loan denominated in U.S. dollars. These two companies can engage in a swap in order to take advantage of the fact that each company has better rates in its respective country. These two companies could receive interest rate savings by combining the privileged access they have in their own markets.
• Interest Rate Swap are used for converting a liability from
  o fixed rate to floating rate
  o floating rate to fixed rate
• Currency swap are used for conversion from a liability in one currency to a liability in another currency for achieving tax benefits.

Currency and interest rate swaps allow companies to take advantage of the global markets more efficiently by bringing together two parties that have an advantage in different markets. Although there is some risk associated with the possibility that the other party will fail to meet its obligations, the benefits that a company receives from participating in a swap far outweigh the costs.

Derivatives: Legal Framework in India

SECURITIES CONTRACT (REGULATION) ACT, 1956

The Securities Contracts (Regulation) Act, 1956 [SC(R)A] was enacted to prevent undesirable transactions in securities by regulating the business of dealing therein and by providing for certain other matters connected therewith. This is the principal Act, which governs the trading of securities in India.

By virtue of the provisions of the Act, the business of dealing in securities cannot be carried out without registration from SEBI. Any Stock Exchange which is desirous of being recognised has to make an application under Section 3 of the Act to SEBI, which is empowered to grant recognition and prescribe conditions. This recognition can be withdrawn in the interest of the trade or public.

The Securities Contract Regulation Act (SCRA) was amended in December 1999 to include derivatives within the definition of securities. The passage of this Act made derivatives legal as long as they were traded on a recognized stock exchange. Exchange Traded Financial Derivatives were introduced in India .In June 2000, on the National Stock Exchange and the Bombay Stock Exchange.

FORWARD CONTRACTS (REGULATION) ACT 1952

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The Forward Contracts (Regulation) Act, 1952 (FC(R) Act) provides for the regulation of commodity futures markets in India and the Forward Markets Commission (FMC), the commodity futures market Regulator, is a statutory body set up in 1953 under the provisions of the FC(R) Act. Before the promulgation of the Forward Contracts (Regulation) Amendment Ordinance, 2008, FMC did not have regulatory powers and authority like Securities and Exchange Board of India (SEBI). It also did not have the financial autonomy as it depended on budgetary allocation and its administrative autonomy was also restricted as it was subject to rules and regulations of the Government in all matters including recruitment of staff.

The Forward Contracts (Regulation) Amendment Ordinance, 2008 mainly provides for strengthening and restructuring of FMC on the lines of SEBI. The amendments effected in the FC(R) Act, inter alia, provides for: (a) updation of existing definitions and insertion of some new definitions; (b) changes in provisions relating to composition and functioning of FMC; (c) enhancement of the powers of FMC; (d) corporatization and demutualization of the existing Commodities Exchanges and setting up of a separate Clearing Corporation; (e) registration of Intermediaries; (f) enhancement of penal provisions in the FC(R) Act; (g) permitting trading in options in goods or options in commodity derivatives; and (h) making provision for designating the Securities Appellate Tribunal (SAT) as the Appellate Tribunal for purposes of FC(R ) Act also including that of levying fee.

SEcurities AND EXCHaNge BOARD OF INDIA ACT, 1992

To ensure effective regulation of the market, SEBI Act, 1992 was enacted to establish SEBI with statutory powers for: (a) Protecting the interests of investors in securities, (b) Promoting the development of the securities market, and (c) Regulating the securities market. Its regulatory jurisdiction extends over companies listed on Stock Exchanges and companies intending to get their securities listed on any recognized stock exchange in the issuance of securities and transfer of securities, in addition to all intermediaries and persons associated with securities market.

RBI-SEBI STANDIng TECHnICAL COMMITTEE ON EXCHANGE TRADED CURRENCY AND INTEREST rate derivatives

With a view to enable entities to manage volatility in the currency market, RBI on April 20, 2007 issued comprehensive guidelines on the usage of foreign currency forwards, swaps and options in the OTC market. At the same time, RBI also set up an Internal Working Group to explore the

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advantages of introducing currency futures. The Report of the Internal Working Group of RBI submitted in April 2008, recommended the introduction of exchange traded currency futures. With the expected benefits of exchange traded currency futures, it was decided in a joint meeting of RBI and SEBI on February 28, 2008, that an RBI-SEBI Standing Technical Committee on Exchange Traded Currency and Interest Rate Derivatives would be constituted. To begin with, the Committee would evolve norms and oversee the implementation of Exchange traded currency futures. The Terms of Reference to the Committee were as under:

1. To coordinate the regulatory roles of RBI and SEBI in regard to trading of Currency and Interest Rate Futures on the Exchanges.
2. To suggest the eligibility norms for existing and new Exchanges for Currency and Interest Rate Futures trading.
3. To suggest eligibility criteria for the members of such exchanges.
4. To review product design, margin requirements and other risk mitigation measures on an ongoing basis.
5. To suggest surveillance mechanism and dissemination of market information.
6. To consider microstructure issues, in the overall interest of financial stability.

**RBI CIRCULAR ON CURRENCY DERIVATIVES**

On 6th August 2008 RBI had issued Notification on CD. The directions issued under this notification are titled “Currency Futures (Reserve Bank) Directions, 2008”. Some of salient features of this notification are:

(i) Currency Futures means a standardized foreign exchange derivative contract traded on a recognized stock exchange to buy or sell one currency against another on a specified future date, at a price specified on the date of contract, but does not include a forward contract.

(ii) Currency Futures market means the market in which currency futures are traded.

(iii) Currency futures are permitted in US Dollar - Indian Rupee or any other currency pairs, as may be approved by the Reserve Bank from time to time.

(iv) Only ‘persons resident in India’ may purchase or sell currency futures.

(v) The Standardized currency futures shall have the following features:
   a. Only USD-INR contracts are allowed to be traded.
   b. The size of each contract shall be USD 1000.
   c. The contracts shall be quoted and settled in Indian Rupees.
   d. The maturity of the contracts shall not exceed 12 months.

(vi) The Scheduled Banks have to obtain permission from the respective Regulatory Departments of RBI to participate in Currency Futures Markets.

(vii) Other regulated entities have to obtain concurrence from their respective regulators for participation in Currency Futures Markets.

(viii) The membership of the currency futures market of a recognized stock exchange shall be separate from the membership of the equity derivative segment or the cash segment.
Prior to Financial Year 2005–06, transaction in derivatives were considered as speculative transactions for the purpose of determination of tax liability under the Income-tax Act. Finance Act, 2005 has amended section 43(5) so as to exclude transactions in derivatives carried out in a “recognized stock exchange” for this purpose. This implies that income or loss on derivative transactions which are carried out in a “recognized stock exchange” is not taxed as speculative income or loss. Thus, loss on derivative transactions can be set off against any other income during the year. In case the same cannot be set off, it can be carried forward to subsequent assessment year and set off against any other income of the subsequent year. Such losses can be carried forward for a period of 8 assessment years. It may also be noted that securities transaction tax paid on such transactions is eligible as deduction under Income-tax Act, 1961.

Derivatives: Complex Structured Products

Most of these complex products are OTC traded. The market for swaps is by far one of the most innovative in the world. Swaps are introduced in the over-the-counter market to restructure assets, obligations, and mitigate and transfer risk for those who wish to avoid it to those who are equipped to take it for profit.
Some Examples of Structured Products

Equity Swap

- Total return on an equity index is exchanged periodically for a fixed or floating return
- Usually one leg is based on the performance of an equity or equity index over a defined period based upon the notional. The other leg is based on a reference rate, e.g., LIBOR, or a fixed rate, or the performance of another equity or equity index.

\[ \text{NIFTY} \]
\[ \text{LIBOR + SPREAD} \]

Fig: Equity swap payoff

Commodity Swap: Oil Swap

- The parties agree on a notional amount that is expressed in barrels of oil (rather than in dollars)
- The notional amount is usually not exchanged.
- Similar to a fixed-for-floating interest rate swap, payments are made on the basis of fixed and floating oil prices.
  - **Example:** One party receives a cash flow based on an oil price that is fixed at the origination of the contract and pays a cash flow based on the average spot price over a period.
    - Oil prices increase, this party makes a net payment
    - Oil prices decrease, this party receives a net payment
    - No physical quantities of oil are exchanged.

Deferred swap

- In a deferred swap (forward start swap), the cash flows do not begin until sometime after the initiation of the swap agreement
  - If the swap begins now, the deferred swap is called a **spot start swap**

Advantage
Financing for Green Field Projects

\[ \text{Floating} \]
\[ \text{Fixed} \]
\[ T0 \quad T1 \quad T2 \]

Fig: Deferred swap payoff

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Credit (default) swaps

- It is basically an agreement between the protection (or insurance) buyer and the protection seller. The protection seller promises to compensate the protection buyer in the event of a predefined default event by the bond or loan issuer. In return, the insurance buyer pays a regular fixed payment (or premium) for the duration of the protection period, or up to a default event.

**Advantage**
Acts as Insurance

![Diagram showing how CDS works](Source: RBI)

**Fig: Notional Amount of CDS (In USD Billions)**

**CDS and AIG bailout**

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On October 22, 2008, those creditors of Lehman Brothers who bought credit default swaps to hedge them against Lehman bankruptcy settled those accounts. The net payments were $5.2 billion even though initial estimates of the amount of the settlement were between $100 billion and $400 billion.

On March 15, 2009, under mounting pressure from Congress and after consultation with the Federal Reserve, AIG disclosed a list of major recipients of collateral postings and payments under credit default swaps, guaranteed investment plans, and securities lending agreements. During December 2008, AIG paid $18.7 billion to various financial institutions, including Goldman Sachs and Société Générale to retire obligations related to credit default swaps (CDS). As much as $53.5 billion related to swap payouts are part of the bailout.

**Amortizing swap**
- An amortizing swap is a swap in which the notional amortizes (or declines) over the life of the swap according to an amortization schedule.
- The rate of amortization can be either preset or defined by a reference rate.
  - **Advantage**
    - It is useful to hedge a liability that is expected to decrease predictably

**Inflation Swap**
An inflation swap is an interest rate swap whereby the floating leg of the swap is set by reference to an inflation index rather than by reference to a short-term reference rate.

Inflation swap can be for:
- USD which is based on US CPI (U.S. CPI)
- EUR for which you can choose any of the following indices: ITCPI, FRCPI
  - **Advantage**
    - Hedge against central bank credit tightening policies (due to the fact that central banks will tighten monetary policy to fight rising inflation)

**Interest Rate Cap Floor and Collar**

**Interest Rate Caps**
Interest rate caps are call options on interest rates where the buyer of the cap pays to the seller of the cap, usually an intermediary or insurance company, a fee up front so that the buyer gets protection from rising interest rates above the strike price (the cap rate) agreed to by both parties. The cap is intended to ensure the buyer that its interest rate over the life of the loan will not exceed the maximum rate (the cap rate or strike price) of say 9 percent. Caps are activated when the interest rate exceeds the strike price of 9 percent, as the caps buyer receives compensation for the difference between the cap rate and interest rate
**Interest Rate Floors**
Floors are put options that provide downside protection on the underlying instrument with an unknown payoff in the future. They provide insurance that the return will be no less than the minimum rate—floors rate—of, say, 5 percent over the life of the option.

**Interest Rate Collars**
Buying put options, the floors, and simultaneously selling call options, the caps, creates collars. The motivation for such transactions is to finance some or all of the cost of the purchase of the floors by selling the caps and forgoing the potential of an increase in interest rates that could otherwise improve the performance.

![Collars structure](image)

**Mortgage and Asset Backed Derivatives**
Pooling single or multifamily mortgages creates the pass-through security in a portfolio by repackaging their cash flows into new securities and selling the new securities to broader classes of investors. The objective of repackaging an ordinary coupon-paying instrument into shares or participation certificates through securitization is to increase liquidity and marketability as well as to realize economic rent, as the investment banking firm realizes the difference between what it pays for the securities in the pool and what it receives from the shares when the shares are sold in the secondary market. By separating coupons from principal, stripped Treasury and municipal securities are created that prove successful, as the sums of the parts exceed the whole. Most mortgage debt instruments are embedded with the call option, providing the issuer the opportunity to prepay part or all of the issue at par, if the issuer deems doing so to be
appropriate. The pass-through created from pooling the mortgages also entails prepayment risk, which investors in the pass-through find troubling. From the pass-throughs, two distinctive derivatives are created—collateralized mortgage obligations (CMOs) and stripped mortgage-backed securities (SMBS)—that address prepayment risk. Investors in the bond market make investment decisions based on the nature of their assets and liabilities that lead to segmentation of the debt market. For example, money market funds invest in the short end of the market, and prepayment risk is not a primary concern. However, long-term investors, such as insurance companies and pension funds, find prepayment risk of significant importance. Derivatives that provide protection against prepayment risk afford these investors the opportunity to mitigate reinvestment rate risk embedded in the prepayment options. These derivatives are popular in Western markets.

**Range Accrual Swap**

Unlike a regular swap where the floating rate is compared to the defined strike on a single fixing date in every payment period, in a range accrual swap the coupon (which can be either a fixed coupon or a floating coupon) is conditional on some event happening. That is, on how many days an observation rate (usually the LIBOR index) is within a predefined range, set using an upper and a lower barrier.

![Range Accrual Swap Diagram](image)

The interest rate paid by the second leg on each payment date is calculated as follows:

- n/N * interest rate * notional where:
  - n is the number of fixings in the payment period that the observation rate (e.g., 3-month USD LIBOR) lies within a specified range.
  - "N" is the total number of fixing days in the payment period.
  - "Interest rate" is either a fixed rate or a reference rate.
  - Note If the interest rate used here is a floating rate, if the first leg is also paying a floating rate it will have to include a floating spread (this is to ensure a preferable interest rate).

**Advantages**

In this swap there are two variables, the fixed rate and the floating rate’s floating spread. These
are used together or separately to ensure that one party receive or pay a preferable rate (as appropriate).

Example:

The Party B pays a fixed rate 4.40% assuming that the 3M LIBOR will stay within a predefined range (i.e. 3.50% - 5.50%) during the next 2 years to Party A. If during the observed 1-month period, the 3M LIBOR is within the predefined range, the Party B will receive the full amount of the 3M LIBOR.

During the month 3M LIBOR breaks the predefined range of 3.50-5.50% during 7 days of the month, at the end of the period the party B will receive only a part of the 3M LIBOR, amounting to 4.90% * 23/30 = 3.76%, instead of the whole amount of the 3M LIBOR as of the fixing date in the beginning of the period, which is 4.90%.

Fig: Transactions during fixed for floating range accrual swap

**Binary Options**

Binary options (all-or-nothing options, digital options) have payoff either some fixed amount of underlying asset or nothing at all. Binary options are usually European-style - for a call, the price of the underlying must be above the strike at the expiration date.

They are of two types:

- **Cash-or-Nothing (Settled in Cash)**
- **Asset-or-Nothing (Settled in Underlying)**

**Binary options : OTC to Exchange Traded**

Binary option contracts have long been available in OTC for speculation purpose. U.S. Securities and Exchange Commission approved its rule filing to list cash-settled binary options on broad-based indexes on May 2008.

- Chicago Board Options Exchange (CBOE) list binary options on S&P 500 and VIX.

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Payoffs

<table>
<thead>
<tr>
<th>Option Type</th>
<th>Payout of 0</th>
<th>Payout of Cash Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call</td>
<td>Spot &lt;= Strike</td>
<td>Spot &gt; Strike</td>
</tr>
<tr>
<td>Put</td>
<td>Spot &gt;= Strike</td>
<td>Spot &lt; Strike</td>
</tr>
</tbody>
</table>

Asian Options

In case of the usual European option and American option, the payoff of the option contract depends on the price of the underlying instrument at maturity. However in Asian options the payoff is determined by the average underlying price over some pre-set period of time. Asian

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options have a lower volatility and hence rendering them cheaper relative to their European counterparts. They are commonly traded on currencies and commodity products which have low trading volumes.

**International Swaps and Derivatives Association (ISDA)**

ISDA was formed in 1985, after a group of 18 swap dealers and their counsel began work in 1984 to develop standard terms for interest rate swaps. ISDA's primary purpose is to encourage the prudent and efficient development of the privately negotiated (or "over-the-counter" (OTC)) derivatives business by, among other things:

- Promoting practices conducive to the efficient conduct of the business, *including the development and maintenance of derivatives documentation*; and
- Promoting the development of sound risk management practices.

**ISDA Master Agreement for OTC products**

Market participants that enter into OTC derivatives transactions could, as they used to, document each transaction in a separate, comprehensive agreement. Such an agreement, being independent from any other agreement between them, would necessarily be lengthy. It would not merely set forth the economic terms of the relevant transaction, but would also include terms relating to the general legal and credit relationship between the parties. These types of terms, in addition to the economic terms of the transaction, would have to be negotiated each time the parties entered into a transaction. The ISDA Master Agreement offers participants in the OTC derivatives markets all of these benefits. When two parties negotiate and sign an ISDA Master Agreement, they agree upon the ongoing legal and credit relationship between them. While they can, of course, agree to amend the terms of their agreement at any time, there is no need to negotiate a whole host of issues each time they enter into a new transaction. Also, unlike many other financial master agreements, the ISDA Master Agreement can be used to document a range of different types of transactions (it is "multi-product"). The most widely used agreement in the OTC derivatives markets is currently the 1992 ISDA Master Agreement (Multicurrency-Cross Border).

**Schedule**

A key feature of ISDA's documentation is its "modular architecture". ISDA has published a number of different documents, with a variety of purposes. Essentially, market participants are provided with a number of "building blocks" that they can use as they see fit, and in a highly efficient and flexible manner. This architecture is evident in the structure of the ISDA Master Agreement itself. It consists of two parts: the printed form and the Schedule.

- The printed form makes up the first 18 pages of the agreement. The intention is that parties signing an ISDA Master Agreement do not physically amend the printed form on the agreement itself.
• The Schedule is the part of the agreement that the parties negotiate. It allows the parties to make certain choices, to amend provisions contained in the printed form, and to include any appropriate additional provisions. One of the key choices the parties make in the Schedule is whether the agreement should be governed by the laws of New York State or the laws of England (it is designed to be governed by either).

Confirmations
As described above, if two market participants have entered into an ISDA Master Agreement, then, each time they enter into a transaction, they only have to negotiate and document the economic terms of the transaction. Confirmations are the documents in which the parties record those economic terms. The ISDA Master Agreement itself provides that the agreement includes the Schedule and the documents and other confirming evidence (each a "Confirmation") exchanged between the parties confirming individual transactions. Further, each Confirmation is identified (or should be identified) either in its own terms or through another effective means as a "Confirmation", and states that it supplements, forms a part of, and is subject to, the ISDA Master Agreement between the parties. In this way, the provisions of the agreement govern transactions documented in Confirmations. The use of Confirmations to document the economic terms of transactions again illustrates the modular architecture of ISDA documentation.
Structure of ISDA agreement

+ Schedule
+ Confirmations.

**Some Important Sections**

**Section 4 - Agreements**
- Maintain Authorizations
- Comply With Laws
- Tax Agreement
- Payment of Stamp Tax

**Section 5(a) - Events of Default**
- applies to each party
- Event of Default will occur if:
  - a party has failed to pay/deliver
  - the other party gives notice of such failure
  - such failure is not remedied within one Local Business Day/Local Delivery Day after notice
- Local Delivery Day

Yogendra Sisodia
Section 6(e)-Payments on Early Termination

- Termination Events - Mid-Market Events:
- Illegality/Force Majeure Event
- Early Termination Amount determined as above
  (Depending on whether there is one Affected Party or two
  Affected Parties), but, for the purpose of determining a
  Close-out Amount or Close-out Amounts, mid-market
  Quotations/values used

Section 13 - Governing Law and Jurisdiction

- Submission to jurisdiction of the English courts now generally non-exclusive
- Submission to jurisdiction of New York courts unchanged

Section 14 - Definitions

- Early Termination Amount
- General Business Day
- Non-affected Party
- Termination Currency

Jurisdictions

Clause 13 of the Master Agreement provided for exclusive jurisdiction of the English courts in relation to "any suit, action or proceedings relating to any dispute arising out of or in connection with" the Master Agreement. The clause (as amended by the Schedule to the Master Agreement) also excluded third party rights under the Contracts (Rights of Third Parties) Act 1999, save for those of the parties' affiliates. The clause further provided that if an affiliate desired to bring a claim under the Master Agreement it would have to agree to the provisions of the jurisdiction clause.

Key Points covered in ISDA agreement

In nutshell following key points are considered in the agreement.

- Specified Entity
- Specified Transaction
- Cross Default
- Credit Event Upon Merger
- Automatic Early Termination
- Payments on Early Termination
- Termination Currency

Yogendra Sisodia
Case Study: HHB (Helping Hand Bank) v/s ECI (Export Corporation of India) in FX deal

Introduction
HHB is India's largest international bank with 101 branches in 41 cities, having a combined customer base of 8.1 million in retail banking and over 1,000 top corporate relationships. Key businesses include Consumer Banking – primarily credit cards, mortgages, personal loans and wealth management – and Wholesale Banking, where the Bank specializes in the provision of cash management, trade finance, corporate finance and advisory, treasury and custody services. HHB is one of the India's top foreign scheduled commercial banks. Helping Hand Bank is a primary dealer in the foreign currency market.

ECI is one of the India's topmost export houses. It is a large conglomerate which exports goods ranging from needles to sophisticated machinery. ECI has charged HHB for concealing facts and putting in fraudulent misinterpretations regarding foreign currency transactions.

Background
Banks and companies are violating the Foreign Exchange Regulations Act (FEMA) while transacting in currency derivatives in the last few years. Violation of FEMA guidelines were committed by banks and exporters, who in many cases entered into derivative contracts far in excess of their genuine underlying exposure and also tried to use the hedging tools as profit-making tools.

Scores of Indian companies and banks got into litigation last years after companies were saddled with millions of dollars of losses in currency derivatives which they claim were sold by banks dangling the carrot of trading profits without any purpose of hedging. But banks maintained that these companies bought those currency derivatives knowing the risks well but blamed banks when they incurred losses.

The Reserve Bank of India has laid down strict rules on the use of currency derivatives. In April 2007, the central bank issued guidelines stipulating that banks should sell derivatives only to investors who “understand the nature of the risks.”

Yogendra Sisodia
Derivatives are financial instruments used for speculation and as insurance against fluctuations in the markets. But during the market boom (2005-2007) many companies were looking to boost profits and bought derivative contracts which initially helped them and banks charged fees on those transactions. Those bets went sour when the markets turned. Some of the companies that suffered huge losses are Wockhardt, Alps Industries, Ranbaxy Laboratories, Suzlon Energy and HCL Tech. Some of the companies such as Rajshree Sugars, Nahar Industrial Enterprises and Sundaram Brake dragged banks to court last year after they discovered the enormity of losses they have made. They claimed that the banks had promised trading profits and the contracts were not made for hedging purpose. But banks maintained that the companies that bought currency derivatives were aware of the risks involved in these contracts.

The following are guiding norm for primary dealers in currency derivatives market.

- RBI’s master circular ‘Master Circular on Risk Management and Inter-Bank Dealings’ strictly notifies that dealer could not offer the binary (non plain vanilla options). As a dealer offering any non plain vanilla option is clearly a violation of FEMA guidelines.
- Main motive of dealers should not be to charge fees in such transactions until the underlying exposure in derivative are for hedging not speculation.
- Primary dealers should make sure that the clients acting as counterparty understand the nature of the risks in such transactions.

The study case is similar where EHI is a major exporter and HHB is offering its services to EHI as a primary dealer in OTC market.

**Start of FX exotic deals**

HHB and EHI were having long term relationship. By granting short term loans, processing payments, accepting deposits, carrying out investments, etc. HHB boasted that is creating added value for its clients. HHB apart from regular banking was involved in consultancy and asset management.

Asset management covers a range of banking activities: portfolio management, investment advisory, securities trading and lending business (collateral loans, securities lending and borrowing). With a discretionary portfolio management agreement, clients authorise a bank to undertake, for their account and at their risk, all the actions it deems appropriate within the framework of the normal asset management activities of a bank. Clients expect their assets to be managed professionally and in their best interests. The bank contracts to exercise its undertaking to the best of its knowledge and abilities, taking into account clients’ circumstances but acting as it sees fit within the scope outlined as part of the investment goals defined with the client.

Yogendra Sisodia
In accordance with the advice got by the HHB a resolution during 2006 was passed by the committee of EHI to hedge against foreign currency risk using the products offered by HHB as a primary dealer. Following were the major reasons to appoint them by committee

- They were long term partners and HHB understood the nature of EHI’s business.
- The Relationship manager and associate director of HHB were very amiable in nature.
- EHI doesn’t understand these complex instruments and want to outsource to experts in foreign currency risk market.
- There was peer pressure because EHI’s competitor were not only hedging but also gaining on such FX exotic deals while EHI’s traditional deals’ of hedging with USD forwards were not lucrative on up side.

Deals

Deal 1
EHI was persuaded to buy 12 binary options on the USD, pay off .50 per USD, exercisable if spot rate is below 47 maturing from Dec 2006 to Nov 2007, notional 2$ mn each.

In return
EHI undertook range accrual swap to pay 7% (p.a.) on $24 mn for every day 12 month LIBOR was less than 3 month LIBOR by more than .1%. (EHI was having no exposure thus it was having naked position).

Deal 2
EHI was persuaded to buy 12 binary options, pay off 1 per USD, exercisable if Average USD (AVGUSD) for month is within 10% range of Month end USD EOMUSD (0.9*EOMUSD < AVGUSD AND 1.1*EOMUSD > AVGUSD) maturing from Dec 2007 to Nov 2008, notional 2$ mn each.

In return
EHI undertook range accrual swap to pay 7% (p.a.) on $24 mn for every day 12 month LIBOR was less than 3 month LIBOR by more than .1% and with the embedded option that:

If EOMUSD is within range of 30% of EOMEURO then for that month all business day will be counted for above calculation.

(EHI was having no exposure thus it was having naked position).

Deciphering the Deals

Deal 1

Yogendra Sisodia
Since EHI was persuaded to buy 12 binary options on the USD, pay off .50 per USD, exercisable is spot rate is below 47 maturing from Dec 2006 to Nov 2007, notional 2$ mn each. The EHI got 1 mn ($2mn * Rs .50) every month or $12 mn inflow in all.

For floating part

176 out of 253 days satisfied the criteria when 12 month LIBOR was less than 3 month LIBOR by more than .1%.
=0.07*24*1000000*(176/253) = 1,168,695.65 USD was outflow

<table>
<thead>
<tr>
<th>Deal for EHI</th>
<th>Inflow (Outflow) *Time Value not taking into consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Option</td>
<td>24mn *.5 = (12000000)</td>
</tr>
<tr>
<td>Swap Floating Leg</td>
<td>=0.07<em>24</em>1000000*(176/253) = (1,168,695.65)</td>
</tr>
<tr>
<td>Total</td>
<td>=12000000 – 1168695 = 10831305 USD</td>
</tr>
</tbody>
</table>

Table: Scorecard of EHI

**Deal 2**

This deal is combination of Asian and Binary Option. EHI was persuaded to buy 12 binary options, pay off 1 per USD, exercisable if Average USD (AVGUSD) for month is within 10% range of Month end USD EOMUSD (0.9*EOMUSD < AVGUSD AND 1.1*EOMUSD > AVGUSD) maturing from Dec 2006 to Nov 2007, notional 2$ mn each.

Not a single month was there which was favorable to EHI, Thus outflow was (1*24 mn) =24 mn.

Yogendra Sisodia
For the floating part

113 out of 252 days satisfied the criteria when 12 month LIBOR was less than 3 month LIBOR by more than .1%. However due to embedded option clause the days came out to be 209 out of 252.

\[=0.07\times24\times1000000\times\left(\frac{209}{252}\right) = 1,393,333.33 \text{ USD was outflow}\]

<table>
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<th>Deal for EHI</th>
<th>Inflow (Outflow) *Time Value not taken into consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Option</td>
<td>= 24mn *1 = (24000000)</td>
</tr>
<tr>
<td>Swap Floating Leg</td>
<td>=0.07<em>24</em>1000000*(209/252) = (1,393,333.33) USD</td>
</tr>
<tr>
<td>Total</td>
<td>=12000000 + 1168695= (25393333) USD</td>
</tr>
</tbody>
</table>

Table: EHI’s Scorecard

Thus this year EHI made a massive loss of 25393333 USD.

**Conclusion**

The gain to EHI in first year and then huge losses in second year were purely random or the deal clauses were deliberately put by HHB to entice EHI for such deals? Also these sophisticated deals esp. embedded options and exposure to EURO when not required were morally right or there was conflict of interest by banker as a primary dealer. What will be fate of such OTC deals? Exchange traded currency derivatives provide the solution or not? Literacy about OTC derivatives and understanding of risk by corporate before entering into deals are left best on discretion of reader.

Yogendra Sisodia
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