5 SWAPS

In case of forwards, futures and options, a particular quantity of specified assets are to be exchanged for a specified cash payment. But in case of swap, cash flow is to be exchanged for cash flow. One company may be paying fixed rate of interest on loan. But it prefers floating rate. Another company may be paying a floating rate. But it prefers fixed rate. So it is sensible for both companies to enter into a swap agreement. Swap allows a borrower to exchange his liability with another type of liability.

Meaning of Swaps

Swap literally means exchange. It refers to exchange a thing in return for another. It is an agreement between two parties to exchange a series of cash flows over a period in the future. Swap is an agreement to exchange one stream of cash flow for another in future. These two streams of cash flows may be called two legs of a swap contract. The basic idea behind swaps is that the parties involved get access to markets at better terms than would be available to each one of them individually. The gains achieved by the parties are divided amongst them depending on their relative competitive advantage.

Financial swap is a specific fund technique which permits a borrower to access one market and then exchange the liability for another type of liability. Thus, under a swap contract future cash flows are traded over a period of time. In short, swap is an agreement between two parties in order to trade future cash flows.

Even though swaps are used for various purposes (from hedging to speculation), their fundamental purpose is to change the character of an asset or liability without liquidating that asset or liability. For example, an investor realising returns from an equity investment can swap those returns into less risky fixed income cash flows, without having to liquidate the equities. A company with floating rate debt can swap that debt into a fixed rate obligation, without having to retire and reissue debt. A swap is a cash-settled OTC derivative.

There is another derivative known as *switch*. Switch is similar to swap. Switch is not an exchange of security for cash but an exchange of one security for another both in the spot market.

Features of Swaps

Swap is a combination of forwards by two counter parties. It is arranged to get the benefits arising from fluctuations in the market.

The following are the significant features of a swap:

1. A swap is nothing but a combination of forwards. So it has all the properties of forward contracts.
2. Swap requires that two parties with equal and opposite needs must come into contact with each other.
3. Swap deals are customised, tailor-made and OTC derivatives.
4. It is in the nature of long-term agreement. It is just like long dated forward contract.
5. Swap agreements are arranged mostly through an intermediary. This intermediary is known as swap facilitator. Generally the role of intermediary is played by large international financial institutions or banks.
6. Most of the swap deals are bilateral agreements. Therefore, there is a problem of potential default by either of the counterparty. This makes swaps more risky.
7. Swaps do not involve an upfront payment. Thus, they have a zero value at the start.

The exchange of one set of cash flows for another

Terms used in Swap Contract

1. **Parties :** Generally, there are two parties in a swap deal. Intermediaries are excluded. For example, in an interest rate swap, the first party can be a fixed rate payer / receiver and the second party can be a floating rate receiver / payer. The parties to the swap contract are known as counterparties.
2. **Swap facilitators :** A swap facilitator is a mediator who assists in formation and completion of a swap arrangement between the interested parties. A swap facilitator is generally a bank. There are two kinds of swap facilitators - Swap broker and swap dealer.

(a) Swap broker : A swap broker is an intermediary. He is an economic agent. He helps in identifying the potential counter parties in a swap deal. He acts only as a facilitator. He

does not take any individual position in the swap contract. He will charge commission for his services.

(b) Swap dealer : A swap dealer associates himself with the swap deal. He often becomes an actual party to the transaction. He may be actively involved as a financial intermediary for earning a profit. He is also known as market maker.

3. **Notional Principal :** Notional principal is the underlying amount in a swap contract. This underlying amount becomes the basis for the deal between counterparties. It is called "notional" because this amount does not vary, but the cash flows in the swap are attached to this amount. For example, in an interest rate swap, the interest is calculated on the notional principal.
4. **Trade date** : Trade date is the date on which both the parties in a swap deal enter into the contract.
5. **Effective date** : This is the date when the initial cash flows in a swap contract begin. The maturity of swap contract is calculated from this date. Effective date is also known as value date.
6. **Reset Date** : This is the date on which the LIBOR rate is determined. The first next date will be generally two days before the second payment date and so on.
7. **Maturity date** : This is the date on which the outstanding cash flows stop in the swap contract.

Advantages of Swaps

The main advantages of swaps are:

1. The investors or companies will be able to obtain cheaper finance than would be possible by borrowing directly in the market.
2. Those investors or companies who may not be able to raise debt directly from the market can arrange funds through swaps.
3. Swaps can be used as long-term hedge instruments.
4. The swap contract is flexible in amount, maturity and other contract terms. It is a powerful tool to tap new capital market and to take advantage of innovative products without increasing the risk.
5. Swaps are vehicles for meeting the financial needs of MNCs. Swap is particularly useful when there are market imperfections.

Disadvantages of Swaps

The main limitations of swaps are:

1. It is difficult to find a counterpart with opposite cash flow obligation who could enter for a swap deal.

2. Termination of a swap contract requires mutual consent of both the parties.
3. It involves an inherent default risk by any of the contracting party. This is because swap is a private bilateral contract traded on OTC (not exchange traded).
4. Swaps are not easily tradable because the secondary market in swap deal is not fully developed worldwide.

Uses of Swaps

Swaps are very useful derivatives. It has variety of uses to different people.

1. **Uses to treasurers:** Treasurers can use swaps to hedge against rising interest rates and to reduce borrowing costs.
2. **Uses to financial managers:** Swaps give financial managers the ability to: (a) convert floating rate debt to fixed rate or fixed rate to floating rate (b) to lock in an attractive interest rate in advance of a future debt issue (c) position fixed rate liabilities in anticipation of a decline in interest rates (d) arbitrage debt price differentials in the capital markets.
3. **Uses to financial institutions etc:** Financial institutions, pension managers and insurers use swaps to balance asset and liability positions without leveraging up the balance sheet and to lock in higher investment returns for a given risk level.

Development or Evolution of Swaps

Swaps are an extension of the parallel loans or the back-to-back loans. Parallel loans and back to back loans were popular in the late 1960s and 1970s as a means of financing investment abroad in the face of exchange control regulations. Parallel loans involve at least four parties. Usually the parties consist of two pairs of affiliated companies. The parallel loans commonly consist of a loan by an affiliate of each company to an affiliate of other company, with the loans being in different currencies. Back to back loans are very similar to parallel loans, but are simple because they involve only two parties instead of four. In a back to back loan the parties simultaneously lend to each other but in different currencies. However, both parallel and back-to-back loans were time consuming and expensive to establish. Another problem was that if one party defaulted the other party was not automatically released from its obligations under the loan agreement. Further, even though the two loans cancelled each other out, they were still considered on balance sheet items for accounting and regulatory purposes. Again, parallel loans were difficult to arrange because it was necessary to find two counter parties with exactly offsetting needs. These defects and problems of parallel loans and back-to-back loans had led to the emergence of swaps. Besides, swap market began due to exchange control regulations in many European countries including UK till late 70s.

The first true currency swap was arranged in August 1981 by Salomon Brothers with the World Bank and IBM as counter parties. The World Bank wanted to issue Euro bonds at the lowest attainable interest cost. Under Salomon Brothers direction, the World Bank put out two

dollar Euro bond issues that matched the maturities and interest payment schedules of IBM's Mark and Swiss France obligations. The World Bank then swapped interest payments with IBM so that IBM made the Bank's dollar interest payments and the Bank made IBM's Marc and Franc interest payments. This arrangement allowed the bank to lower its borrowing cost because the mark and Franc interest rates it paid were lower than dollar interest rate. The first interest rate swap appeared in London in 1982. The motivating factor behind the interest rate swaps was their ability to convert fixed rate interest payments into floating rate interest payments and vice versa. In the early 1980s interest rate swaps were usually between a bank and a company. Banks were able to raise fixed rate finance easily while companies were better equipped to raise floating rate finance. During this period swaps were generally done on a 'matched' basis, i.e. swaps were entered into only if an exact match was available on the other side.

In recent times the market for swaps has grown enormously. Today the volume of interest rate swaps is much larger than that of currency swaps.

Example of Swaps

Imagine that Company X has borrowed ₹ 10,00,000 and pays a variable rate of interest on the loan that is currently 6%. X may be concerned about rising interest rates that will increase the costs of this loan or encounter a lender that is reluctant to extend more credit while the company has this variable rate risk.

Assume that X creates a swap with Company Q, which is willing to exchange the payments owed on the variable rate loan for the payments owed on a fixed rate loan of 7%. That means that X will pay 7% to Q on its ₹ 10,00,000 principal, and Q will pay X 6% interest on the same principal. At the beginning of the swap, X will just pay Q the 1% difference between the two swap rates.

If interest rates fall so that the variable rate on the original loan is now 5%, Company X will have to pay Company Q the 2% difference on the loan. If interest rates rise to 8%, then Q would have to pay X the 1% difference between the two swap rates. Regardless of how interest rates change, the swap has achieved X's original objective of turning a variable rate loan into a fixed rate loan.

Structure of Swap Dealing for Risk Management

A swap is a contract between two parties to deliver one sum of money against another sum of money at periodic intervals. A swap contract begins when two companies with perfect matching of needs. There are difficulties in finding a matching counterparty. Suppose parties with prefect matching needs are located. Problems are not over. Who will undertake the default risk associated with swap on each other? These difficulties can be reduced if an intermediary is involved. The intermediary or swap dealer is normally a bank. It is easier for banks to locate matching counterparties. Thus the bank (intermediary or the swap dealer) facilitates the swap deal. It undertakes the counterparty risk. Also, it performs the role of market maker in swaps.

The most basic form of a swap is an interest rate swap. The structure of a swap can be understood from the interest rate swap. As already stated, the intermediary (bank) helps in locating the counterparties with matching needs. These parties agree to exchange interest payments for a certain period of time. Among the many variants of interest rate swaps, a largely familiar type of swap is a fixed-for-floating rate swap. In this swap, one of the counterparties agrees to make fixed rate payments to the other. In return, the second counterparty agrees to make floating rate payments to the first counterparty. These two payments are known as the legs or the sides of the swap. The fixed rate is known as *swap coupon*. The payments are calculated on the basis of hypothetical amounts called notional principal. The notional principal is not generally exchanged.

A company after entering into a swap agreement may want to exit from it for some reasons. To do this, the company can enter into another swap contract with an opposite position for the remaining maturity period. Alternatively, the company can sell the swap by marking the swap to market and take a hit or book profit depending on the direction of interest rate changes. Any swap which has been sold in the market is known as *seasoned swap*. Another way is to mutually agree to cancel the deal.

Economic Functions of Swap Transactions

The economic functions of swap transactions may be briefly discussed as follows:

1. **Transforming the nature of liabilities :** Swaps transform nature of liabilities. Interest rate swaps are generally used for creating synthetic, fixed or floating rate liabilities with a view to hedge against adverse movement of interest rates. Any firm can transform its fixed rate liability to floating rate liability by entering the swap with bank for paying floating and receiving fixed. Similarly, a firm can transform its floating rate liability to fixed rate liability by entering the swap with bank.

2. **Transforming the nature of assets :** Another function of swap is transforming the nature of assets. Assets provide income to investing firms based on the interest rates. If the interest rates fall, the income too falls. In the circumstances of falling interest rates the firms would like to change the complexion of assets that are on floating rate to fixed rate. Similarly, in times of rising interest rates firms earning interest would like to remain with the market trend rather than get a fixed rate. These are facilitated by having the swaps.

3. **Hedging :** Swaps can be fruitfully used to hedge against the adverse interest rate situations. The swap transactions remain off-balance sheet, it is possible to keep the desired confidentiality.

4. **Reducing the cost of funds :** Swaps save costs for the firms. Swaps have the ability to reduce the cost of funds for both firms. In a swap transaction both parties are able to reduce the cost of funds. Reduction in cost through swap is based on the principle of comparative advantage.

Types of Swaps

There are five types of swaps. They are:

1. Currency swaps
2. Interest rate swaps
3. Credit default swaps
4. Commodity swaps, and
5. Equity swaps

The above mentioned types of swaps are generic swaps. Interest rate swaps and currency swaps are the most commonly used swaps.

Currency Swaps

Currency swap is an exchange of interest flow in one currency for interest flows in another currency. It is an agreement between two parties to exchange a given amount in one currency for another, and to repay these currencies with interest in the future. It is a foreign exchange agreement between two parties to exchange a given amount of one currency for another, and after a specified period of time, to give back the original amounts swapped. Currency swaps can be used to hedge against exchange rate risk. Currency swaps involve two different currencies. In most of the cases banks are intermediaries between the two parties to the swap. Currency swap can be understood from a simple example. An MNC, say Suzuki has borrowed in Japanese Yen at a fixed rate. It wants dollars for its operation in USA. It can swap its exchange risk by entering into a swap contract for giving dollars at a floating rate or fixed rate, for yen, which got at a fixed rate. If it wants both exchange risk hedge and interest rate hedge, Suzuki might surrender its Yen loan at a floating rate to a dollar loan at a fixed rate. Many banks arrange these swaps for a charge of commission.

Let us take another example. Suppose British Petroleum issues pound sterling debt to finance a new oil refinery in USA. Suppose at the same time Ford Motors issues dollar debt to finance a new manufacturing plant in UK. The operating cash flows of foreign outstanding are in the foreign currency. But interest expenses on each parent company's debt are in the parent company's domestic currencies. The financial performance of each foreign subsidiary depends on foreign exchange rates. So each firm is exposed to currency risk. If the two parent companies agree to exchange their domestic currency debt for foreign currency debt, then each firm's exposure to currency risk can be reduced. This exchange of debt is an example of currency swap.

Currency swap is a contract or agreement and is not a loan by itself. Currency swap gives to the parties the right to offset, namely a non-payment of principal or interest with corresponding non-payment in the other currency. In currency swap there is always an exchange of principal amounts at maturity, based on the original amounts of currency at the pre-determined exchange rate.

In practice, currency swaps may also include interest rate swaps. Currency swaps involve three aspects. They are: (a) parties involve exchange debt obligations in different currency, (b) each party agrees to pay the interest obligation of the other party, and (c) on maturity, principal amounts are exchanged at a predetermined exchange rate.

Mechanism of Currency Swap

The mechanism of currency swap can be understood with the help of an example. Suppose firm A can borrow Euro at a fixed rate of 6% or it can borrow US dollar at a floating rate of one year LIBOR (this will be explained later). Firm B can borrow Euro at a fixed rate of 8% and can borrow US dollar at one year LIBOR. If firm B needs fixed rate Euro, it will approach the swap dealer provided firm A needs floating rate US dollar. Now the swap deal will be conducted in different stages as follows:

First stage: In the first stage Firm A borrows Euro at 6% interest. Firm B borrows US dollar at LIBOR.

Second stage: In the second stage the two firms exchange the borrowed currencies with the help of the swap dealer (both firms entered into swap agreement). After the exchange, Firm A will possess US dollar and Firm B will possess Euro.

Third stage: In the third stage, interest payment will flow. Firm A will pay LIBOR on US dollar which will reach the US dollar market through dealer and then through Firm B. Similarly Firm B will pay fixed rate interest which will flow to the fixed rate Euro market through the dealer and then through Firm A. Firm B will pay fixed rate of interest to the swap dealer that will be more than 6% - but less than 8%. It will be, say, 7%. The swap dealer will take its own commission and shall pay to Firm A, in this case only, say, 6.80%.

Fourth stage: In the fourth stage, the two principals are again exchanged between two counter parties. Firm A gets back Euro and repays it to the lender. Firm B gets back US dollar and repays it to the lender.

Benefits from the Currency Swap

The benefits from currency swap (on the basis of the above example) are as follows:

1. Firm A gets the currency of its own choice. Similarly firm B gets the currency of its own choice.
2. The cost of borrowings gets reduced. This brings in gains which will be shared by Firm A and Firm B.

Cost to Firm A

Cost of US dollar debt (without swap) LIBOR

Cost of US dollar after swap:

Interest paid – Interest received = 6% + LIBOR – 6.8%

= LIBOR – 0.8%

This means that cost of dollar debt used by Firm A is 0.8% less under swap arrangement. This is the gain to Firm A

Cost to Firm B

Cost of Euro debt without swap	8%
Cost of Euro debt after swap	7% + LIBOR – LIBOR
	= 7%

This means that the cost of Euro debt used by Firm B is 1% (i.e., 8% - 7%) less under the swap arrangement. This is the gain to Firm B.

3. Currency swap can be used as a tool for hedging foreign exchange exposure. The swap dealer normally uses fixed-for-fixed currency swap and designs the interest rate in such a way that influences the cash flow of the counter parties.

LIBOR

LIBOR stands for London Inter Bank Offered Rate. It is a rate decided on daily basis based on a sample of lending rates offered by leading banks in London. It is the offer rate that a Euromarket bank demands in order to place a deposit at (or make a loan to) another Euromarket bank. The six month LIBOR is mostly used for swaps. This implies that this is the rate payable for borrowing US dollars for six months in London. Another most frequently quoted rate is LIBID. It stands for London Interbank Bid Rate. It is the bid rate that a Euro market bank is willing to pay to attract a deposit from another Euro-market bank.

Hedging through Currency Swaps

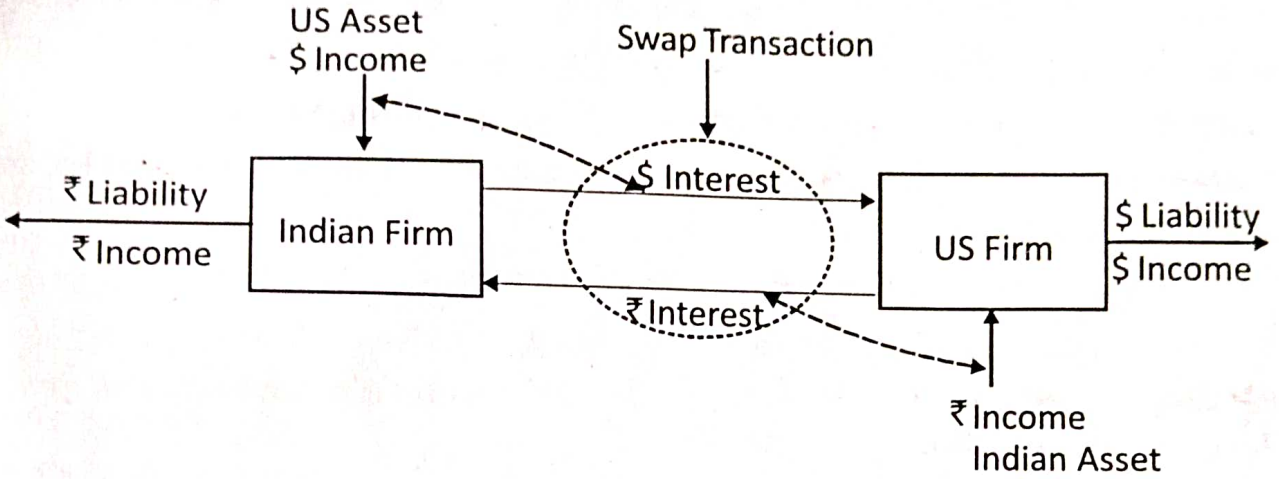
Swaps can be used to hedge the foreign exchange risks. Let us consider an example to see how multinational firms face currency risks and how can these be overcome through a swap deal.

Assume that an Indian firm needs funds for its US operations. The firm raises funds in Indian rupees and commits to serve the interest obligation and the final repayment in Indian rupees. The funds raised in rupees are converted in US dollar to acquire assets in the USA. These assets provide income in US dollar. The Indian firm is facing a risk if rupee strengthens (Dollar depreciates) in the currency markets. The risk arises because the Indian firm receives lesser rupee amount for the fixed return earned in US dollar. Similarly a US firm which needs to acquire assets in India while raises dollar funds in USA, faces the same risk. Its earnings would be in Indian rupees and the liabilities need to be serviced in US dollar. Like the Indian firm US firm also faces a risk of shortfall in US dollar if dollar appreciates (or rupee depreciates).

The vulnerability of both firms is due to uncertainty of exchange rate movement. This may take in either direction. While depreciation of dollar harms the Indian firm, it benefits the US firm. In case dollar appreciates, the US firm is at loss, while the Indian firm gains. Thus both firms face risk. The risks for both the firms arise because it is not known what direction

exchange rates would take. Even though it is possible to make an estimate of the likely direction of exchange rates based on many theories such as purchasing power parity theory and interest rate parity theory, we are concerned here with the unexpected and adverse movement of exchange rates as all forecasts factor in the likely movement while making estimates.

The element of risks can be removed if the Indian firm and US firm enter into a swap as shown below :



Currency swap - Converting Asset / Liability from One Currency to Another

Fig. 1

The above Fig. reveals that the Indian firm has financed its US operations by creating rupee liability. This liability to be serviced by income generations in US dollar faces currency exchange rate risk. Likewise, the US firm having funded Indian operations through US dollar loan would be serviced by rupee income and needs to be converted to US dollar for payment of interest and principal in future whenever they fall due.

Under the swap transaction the mismatch of cash inflow and cash outflow in different currencies for both the firms can be eliminated, by US firm agreeing to pay rupee generated out of its Indian operations to Indian firm in exchange of Indian firm agreeing to pay dollar generated out of its US operations. Thus the rupee asset income flows to the Indian firm, facilitating service of rupee liability. In exchange, US dollar asset income flows to US firm to meet its US dollar obligations. Both the firms avoid the conversion of currencies from one to another. This eliminates the exchange rate risk. Through the swap deal both the firms will have assets and liabilities translated in the same currency. This eliminates the currency risk.

Forms or Types of Currency Swaps

1. **Fixed-for-floating currency swap:** This is the normal form of swap. In this case one counter party pays fixed rate of interest and the other floating rate of interest.
2. **Fixed for fixed currency swap:** In this case both counter parties are paying fixed rate of interest. It is adopted when one counter party possesses an advantageous position while borrowing a particular currency.

3. **Floating for floating currency swap:** In this case both the counter parties pay floating rates of interest.
4. **Amortising swap:** In this case principal amounts amortise over the life of the swap.
5. **Basis swaps:** These involve an exchange of floating rate payments calculated on different basis.

The other form of swaps are participation swaps, zero-coupon swaps, commodity swaps etc.

Advantages of Currency Swaps

1. Currency swaps can be used to hedge against foreign exchange risk.
2. It increases the total amount that a firm can borrow. This facilitates economies of scale. This reduces operating costs.
3. A firm can use its surplus funds more effectively in blocked currencies.
4. It can be used as a means of exploiting the opportunity for arbitrage.
5. It plays an important role in integrating the world's capital markets by overcoming barriers to international capital movements.

Interest Rate Swap

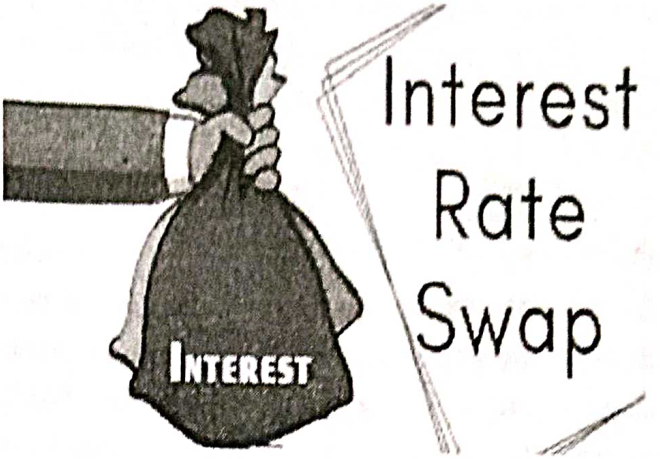
Even though the market for currency swaps developed first, today the interest rate swap market is larger. Interest rate swaps were introduced in 1980s.

Meaning of Interest Rate Swap

Interest rate swap is an instrument to hedge interest rate risk. It is a contractual agreement entered into between two counter parties (swap buyer and swap seller) under which each agrees to make periodic payment of interest to the other for an agreed period of time based on the principal amount. The counterparty who pays fixed rate cash flows is known as swap buyer. One who receives fixed rate cash flows is known as the swap seller. Thus, in any swap, the fixed rate payer is the buyer and the fixed rate receiver is the seller.

Interest rate swap involves the exchange of interest payments. Loans may have fixed interest rate or floating interest rate. Interest rate swap usually occurs when a person or a firm needs fixed rate loan but is able to get floating rate loan. It finds another party who needs floating rate loan but is able to get fixed rate loan. The two parties are known as *counter parties*. They exchange the interest payments and feel as if they are using the loans according to their own choice. It is the swap dealer (usually a bank) that brings together the two counter parties for the swap. The essential conditions for the interest rate swap are: (a) the amount of loan (the principal amount) should be the same in the case of both parties, (b) the periodic payment of interest takes place in the same currency (if different currencies are involved currency swap occurs), and (c) there is synchronization of interest between the two parties, i.e. one getting cheaper fixed rate fund and the other

getting cheaper floating rate fund. Another essential condition giving rise to the swap is that a Quality Spread Differential (QSD) exists. A QSD is the difference between the default risk premium difference on the fixed rate debt and the default risk premium differential on the floating rate debt. Generally the former is greater than the latter. In short, interest rate swap is an exchange of fixed interest payments for floating interest payments by two counter parties.



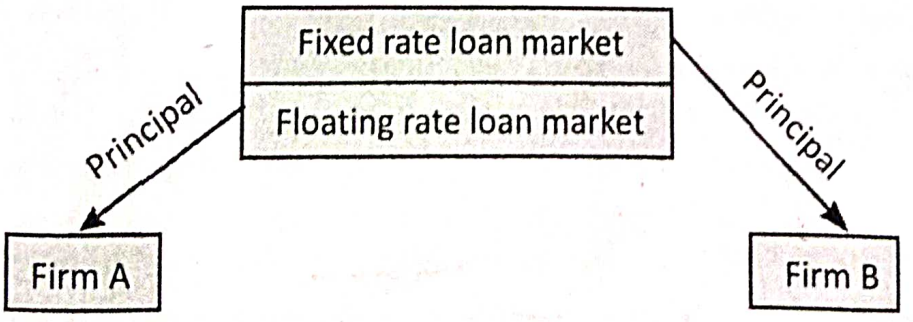
The principal amounts are the same in two cases. They are in the same currency. Hence the principal amounts are not exchanged. They are only notional (notional principal is used only to calculate the interest payments). It is the interest payment that is exchanged on periodic payment dates. Usually the net difference between the two interest payments is paid by the party whose payments exceed the other's. This is known as netting of swaps. The interest payments are called the legs of the swap and the fixed rate is called the swap coupon.

Process of Interest Rate Swap

The process of interest rate swap can be understood with the help of an example. Suppose Firm A needs fixed rate funds (loan) which are available to it at the rate of 9.50% payable half yearly. But it has access to cheaper floating rate funds available to it at LIBOR + 0.3%.

Firm B needs floating rate funds available to it at 6 month LIBOR flat, but has access to cheaper fixed rate funds available to it at the rate of 8.5% payable half yearly. The amounts of principal in both cases are the same and are in the same currency. The interest rate swap will take place in the following stages:

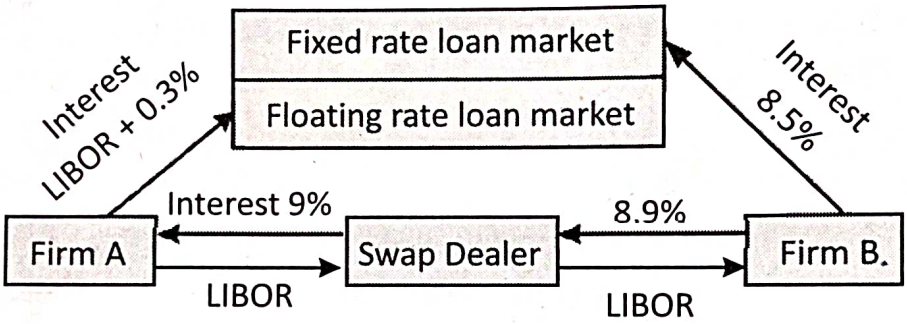
First stage: If firm A has access to floating rate loan market, it will borrow from floating rate loan market. Similarly, Firm B having access to fixed rate loan market, will borrow fixed rate loan. This may be shown below:



Second stage: We have seen that both firms have not borrowed according to their choice. Hence they approach a swap dealer. Since firm A needs fixed rate loan, the swap dealer asks

the firm to pay fixed rate interest to swap dealer as if it has borrowed fixed rate loan. The fixed rate interest payable through the swap dealer is higher than what Firm B has to pay to the lender in the fixed rate loan market but lower than what Firm A has to pay to the lender if it had borrowed from the fixed rate loan market. It is, say, 9%. In exchange, the swap dealer pays Firm A the interest at 6 month LIBOR. Firm A pays LIBOR + 0.3% to the lender on its floating rate borrowing.

On the other hand, the swap dealer asks Firm B to pay 6 month LIBOR as if it has borrowed floating rate loan. In exchange, swap dealer pays firm B fixed rate interest which is higher than what Firm B has to pay to the ultimate lender. This is the interest rate what the swap dealer has received from A minus swap dealer's own commission. It is, say, 8.9% (after commission 0.1%). Here Firm B gets interest from the swap dealer at 8.9% and pays interest to the fixed rate lender at 8.5%. This stage may be summarized as follows:



Third stage: At maturity, the two firms repay the loan (principal). Firm A repays the floating rate loans and Firm B repays fixed rate loan.

Thus in interest rate swap only payments of interest are exchanged or swapped. Through interest rate swap, both firms have used loan according to their choice and their borrowing costs are reduced.

Impact on the Cost of Borrowing

Based on the above example, we can compute cost of borrowing after swap and the gain.

Firm A's cost of borrowing

Cost of floating rate loan	LIBOR + 0.3%
Less: Floating rate interest received	LIBOR
Net cost differential	0.3%
Add: Swap coupon	9.0%
Total cost of borrows	9.3%

Had Firm A borrowed fixed rate loan which is actually needed, it would have to pay interest at the rate of 9.5%. But as a result of swap deal, it has to pay interest only at 9.3%. Thus there is an interest saving of 0.2% (i.e. 9.5% - 9.3%).

Firm B's Cost of Borrowing

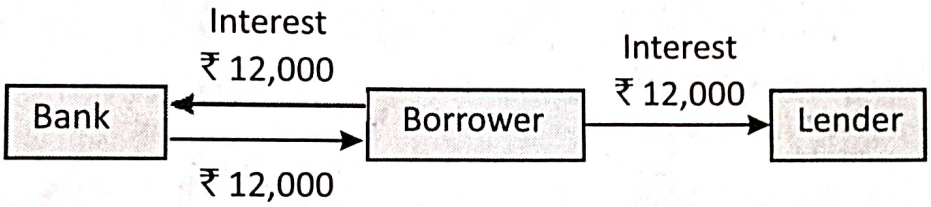
Cost of fixed rate borrowing		8.5%
Less: Fixed rate borrowing		8.9%
Net cost differential		– 0.4%
Total cost of borrowing	=	LIBOR – 0.4%

Had Firm B taken floating rate loan, it would have to pay LIBOR. But as a result of swap deal, it has to pay less i.e. LIBOR – 0.4%. Thus saving interest cost is 0.4%.

Hedging of Interest Rate Risk

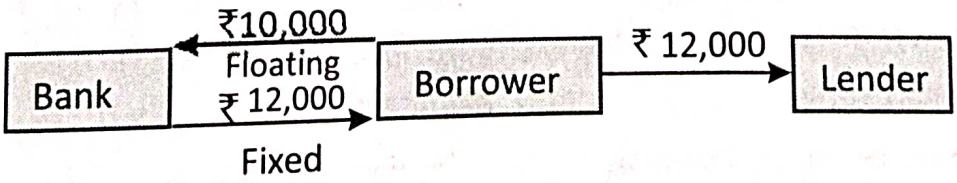
Apart from reducing the cost of borrowing, interest rate swaps are used also for hedging interest rate risk. Suppose a person borrows (say ₹ 1,00,000) at fixed rate (say 12%). If he anticipates a fall in interest rate, he would like to convert it to floating rate. Suppose, the borrower swapped the fixed rate loan with another bank on the expectation that interest rate will fall to 10%.

Initially (when the rate of interest is 12%)



It should be noted that the original agreement is between borrower and lender. Then the liability (loan) is handed over to bank as per swap agreement with the bank. The borrower pays ₹ 12,000 as interest (fixed rate) to the lender and as per swap agreement (exchanging fixed interest liability for floating interest liability), the borrower pays interest ₹ 12,000 to bank and the borrower receives interest from the bank ₹ 12,000. In this case there is no profit, no loss.

Later (when interest falls to 10%)

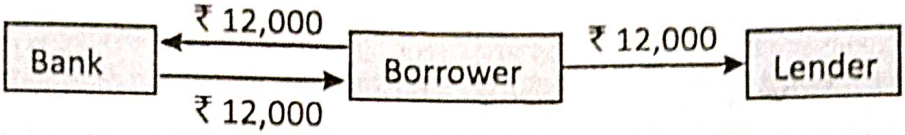


In this case, the borrower pays fixed interest ₹ 12,000 to the lender (as per agreement with the lender) and as per swap agreement with the bank, the borrower pays only ₹ 10,000 as interest to the bank (as a result of swapping fixed interest for floating interest) and the borrower receives from the bank ₹ 12,000. There is a profit of ₹ 2,000 for the borrower as a result of swap agreement with the bank. In other words, the interest liability for the borrower is ₹ 10,000 only. In the absence of swap agreement he wouldn't get the benefit of fall in interest (i.e. he would have to pay ₹ 12,000).

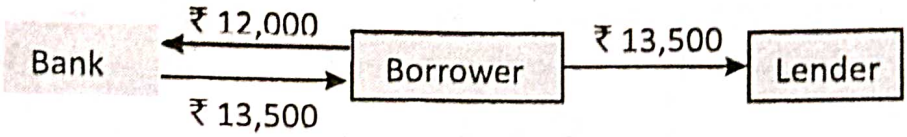
It should be noted that the exchange of fixed rate interest for floating rate interest will be profitable only when the interest rate falls.

When a rise in interest rate is expected, the borrower would like to swap floating interest for fixed interest. Suppose the interest rate is expected to be increased to 13.5%. Then the position will be as follows:

Initially (when the interest rate is 12% - floating)



Later (when interest rate rises to 13.5%)



As per the original agreement between borrower and lender, the borrower gives interest ₹ 13,500 to the lender (when the interest rises to 13.5%). However, as per swap agreement with the bank (exchange of floating interest for fixed interest) the borrower pays only fixed interest ₹ 12,000 and he receives interest from the bank ₹ 13,500 (i.e. @ 13.5%). Thus, the risk on account of increase in interest liability when the rate of interest rises is hedged through swap agreement with the bank.

Various Forms of Interest Rate Swaps

The original structure of interest rate swap discussed above is known as generic swap (or plain vanilla swap). Apart from this, there are some other variants of generic swap. These are as follows:

1. **Coupon swap:** Coupon swaps trade fixed rate interest payment for floating rate interest payments and vice versa.
2. **Basis swap:** In this case two parties exchange floating interest rate payments but based on different instruments, or different reference rates etc.
3. **Putable swaps:** This gives the swap seller (who pays floating rate) the chance to terminate the swap at any time before its maturity. If the interest rate rises, the floating rate payer will terminate the swap.
4. **Callable swaps:** This gives the holder or swap buyer (who pays fixed rate) the right to terminate the swap at any time before its maturity (say when the interest rate falls).
5. **Rate capped swap:** This is an interest rate swap with the cap feature. If a floating rate payer anticipates a rise in interest rate, then he can purchase a cap at a fee payable

upfront to the fixed rate payer so that the floating rate payable cannot exceed the capped rate. When a firm borrowing floating rate loan fears a rise in interest rate, it may buy an interest rate cap for the loan equivalent amount that will help reduce the interest rate exposure. In short, interest rate cap protects the borrower against a rise in the interest rate. Interest rate floors are bought by investor or the depositor (interest rate caps are bought by borrower). Interest rate floor protects the investor against a fall in the interest rate. Interest rate collar is a combination of caps and floors. It protects the buyer from rising interest rates and protects the seller from falling interest rates.

Advantages of Interest Rate Swaps

Swaps are essentially a derivative used for hedging and risk management. The advantages of interest rate swaps are summarized as below:

1. It does not involve any exchange of principal amounts. It consists only of an agreement to exchange interest flows: Therefore risk is less.
2. The documentation charge is minimum.
3. It is not contingent liability because the risk is unquantifiable. Hence it need not be shown as a foot-note. It means it is an off balance sheet item.
4. Interest rate swap can be used both in asset and liability management to allow for flexibility. It can also be used for hedging and for increasing profitability.
5. Swapping fixed to fixed rate may save the issuer's money if interest rates decline.
6. By swapping, a borrower can raise funds at a fixed rate when interest rates are rising and then switch to floating rates in case they are falling.

Difference between Currency Swaps and Interest Swaps

Interest rate swaps	Currency swaps
1. Cash flows exchanged are in the same currency.	1. Cash flows exchanged are in two different currencies.
2. There is only one notional principal amount.	2. There are two notional principal amounts.
3. Notional principal amount is not exchanged.	3. Notional principal amounts are exchanged.
4. No counterparty risk is involved.	4. Counter party risk is involved.
5. Benchmark rate is MIBOR for all domestic swaps.	5. Benchmark rate is LIBOR.

Credit Default Swaps (CDS)

This is a credit derivative contract between two counter parties. The buyer of CDS is known as protection buyer. The seller of CDS is known as protection seller. The protection buyer makes a series of payments to the protection seller and in exchange receives a pay-off if an underlying financial (credit) instrument defaults or experiences a similar credit event.

Equity Swaps

An equity swap is a transaction in which one party agrees to make a series of payments determined by the return on a stock, a group of stocks, or a stock index to another party in return for a cash flow that could be based on a fixed rate, a floating rate, or a return on another stock or stock index. For example, one party can promise to receive the return on the CNX Nifty to another party in return for paying 12% fixed.

An equity swap is different from an interest rate swap. This is because the stock returns can be negative and the party that receives payments based on equity return may have to make payments if the stock return is negative.

Thus, it is possible that one party may be making payments in both the legs of the swap transaction. This is not the case in an interest rate swap. In an interest rate swap the floating rate is set at the beginning of the period, whereas in an equity swap, the return on the stock is known only at the end of the period.

Example

Suppose, the NIFTY on day 1 is 5,600. Under an equity swap, this return is to be swapped for 4% on a notional principal of ₹ 10,00,000. The swap period is 6 months after which the NIFTY is quoted at 5,800, return on NIFTY is calculated as follows :

$$\text{Return} = \frac{\text{NIFTY}_T - \text{NIFTY}_0}{\text{NIFTY}_0} \times 100$$

$$= \frac{5800 - 5600}{5600} \times 100 - 3.57\%$$

Notional principal = ₹ 10,00,000

4% interest on ₹ 10,00,000 = ₹ 40,000

3.57% Return on ₹ 10,00,000 = ₹ 35,700

So, the first party shall pay ₹ 35,700 to the other party who will pay ₹ 40,000 to first. In the same case, if the fixed rate of interest was 3%, then the receipt of first party would be ₹ 30,000 only.

Commodity Swaps

A commodity swap is an agreement between two counter parties to exchange cash flows depending upon the price of a given commodity. Essentially, it is an agreement whereby a floating price is exchanged for a fixed price. One party will pay a fixed price for the given commodity (notional underlying), while the counter party will pay floating price for the same commodity on the settlement date. Commodity swaps are used to lock-in the price of a commodity.

Reverse Swaps

Swaps are designed to continue for several periods (months or quarters). Both parties should perform their obligations till maturity. At times, a party may find that the implications of the swap for him have become negative, and thus may be interested to come out of it. There are a number of ways in which a party can come out of the swap arrangement. But terminating an existing swap can be costly and subject to the willingness of the other party.

Another way is to take a counter position through some other swap or other derivative to set off the financial implications of the existing swap. The position taken is known as Reverse Swap. In this case, the party can approach the same dealer or some other dealer for a swap which will counter the implications of the existing swap.

Swap Derivatives

When swaps are combined with options and forwards, we shall derive some other derivatives. For example, when swap is combined with forward, we get a new derivative called forward swap. It combines the features of swaps and forwards. Similarly, when swap is combined with option, we get an innovative derivative called swaption . This combines the features of swap and option. Thus forward swaps and swaptions are swap derivatives. They are derived from swaps. These may be briefly discussed as below :

Forward Swaps

Forward swap is a forward contract to enter into a swap. It commits the two parties to enter into a swap. In the case of forward swaps, the commencement date is delayed to a future date. This is mostly useful for those investors who do not need funds immediately but would like benefit from the existing rate of interest. Thus a forward swap is a contract that obligates the two parties to enter into a swap at a later date at a fixed rate agreed to in advance. In short, it is a forward contract on swap. Forward swap is a type of interest swap. It is also known as *deferred swap*.

A forward swap committies the two parties to enter into a swap at a specific fixed rate. One part, the long, commits to enter into the swap to pay the fixed rate, the other commits to enter into the swap to receive the fixed rate. Because it is a forward contract, there is no cash flow up front.

Uses of Forward Swaps

The most obvious application of a forward swap is when a company anticipates that it will need to enter into a swap at a later date and would like to establish a swap rate in advance. A forward swap would permit the company to benefit from a favourable interest rate move, while protecting it against an unfavourable move.

Forward swaps can be used as a substitute for a forward on a bond. When firms issue bonds an consider the possibility of wanting to change them from fixed rate to floating rate (or vice versa) at later date, a forward swap can provide such that fluxability.

Another application of a forward swap is in creating synthetic callable debt. A callable bond is a bond in which the issuing firm has the right to call or retire it early.

Swaptions

Swaption is a derivative on a derivative. It is an option on swap. Option on swap (or swaption) gives the buyer the right but not the obligation to enter into a swap contract at some future date for payment of a premium. The strike rate in swaption is the interest rate that would be application for the fixed leg of the underlying swap. The reference rate and the tenure of the swap are finalised at the time of entering into the swaptions. The exercise can be American or European style. Upon exercise of swaption the underlying swap contract is entered. However, they can be cash settled too.

A 6 month 3 -year swaption means that the buyer of the swaption has an option to enter into a 3 year swap 6 months from now.

Types of Swaptions

Swaptions can be of two types. They are receiver swaption and payer swaption.

(a) Receiver Swaption : A receiver swaption gives the buyer of the swaption the right to enter into an interest rate swap as receive fixed rate (pay floating rate) counterparty. He will be benefited if the interest rates decline because he is assured of a fixed rate that is more than the prevailing rate.

(b) Payer swaption : A payer swaption gives the buyer of the swaptions the right to enter into an interest rate swap as pay fixed rate (receive floating rate) counterparty. He will be benefitted if the interest rates rise.

Rules of Exercise of Swaptions

The rules of exercise the swaptions are as follows :

Rate on Expiry	Payer Swaption	Receiver Swaption
When Interest > Strike rate	Exercise	Do not exercise
Interest < Strike rate	Do not exercise	Exercise

Let us examine payer swaption with a three year swap as underlying with the strike rate of 10%. The swaption matures in two years at the expiry of which the holder gets a right but not obligation to enter into the underlying swap with paying fixed at 10% for receiving floating rate.

Such an option would be useful for a firm which (a) pays floating rate interest on its borrowing, (b) anticipates rise in interest rates in future, and (c) believes that the swap if entered after two years would have swap rate greater than 10%, the strike rate in the swaption.

This situation can be effectively covered by entering a forward swap with two years as forward period and three years as swap period. However, with forward swap it would be obligatory on the firm to enter into the swap at 10% which would be disadvantages if the

market rate for swap happens to be lower than 10%. With swaption it is not obligatory to enter the underlying swap. If the swap rate happens to be less then 10%, the firm would enter the swapon market rate rather than exercise the swaption.

Similarly one can demonstrate for receiver swaption, underlying swap would require paying floating for receiving fixed rate specified in the strike of the option. This would be exercised when the swap rate on the expiry of swaption is less than the strike rate. It would be applicable for the firm expecting to enter into a swap to convert its existing liability from fixed rate to floating rate, or asset from floating rate to fixed rate.

Difference between Swaptions and Interest Rate Caps

Swaptions are different from interest rate caps. An interest rate cap is a series of call options on forward rates and each of it will be exercised individually by the buyer depending on whether it will be profitable to him or not. On the other hand, a swaptions exercise will make all the cash flows in a swap to occur. A swaption can only be exercised once whereas a cap may be exercised as many times as the number of caplets that underline it. Hence it will be definitely expensive to hedge using caps rather than with swaptions. A swaption provides a hedge on the short term volatility of the long term interest rates, while cap is a hedge on long term volatility of short term interest rates.

Applications of Swaptions

Swaptions are useful in many ways to corporates and financial institutions. Banks and financial institutions can use them to speculate on the interest rates or to hedge a part of their swap books. Many corporates when they go for a public issue of bonds, issue them with call and put features. A put option will enable the bond holder to put back the bond when interest rates rise subsequent to the issue of the bonds. In this instance, the firm has to redeem the bonds and has to borrow at the higher prevailing rate. In such circumstances, a payer swaption will enable the firm to borrow at a lower fixed rate, i.e., the puttable bond is converted into a nonputtable bond. Generally callable bonds will be called back by the issuer in case of fall in interest rates subsequent to the issue of the bonds. When interest rates are likely to fall, demand for such non-collable bonds will be high because the investors can lock-in a higher fixed rate. To ensure full subscription, a firm can issue non-callable bonds but afterwards if the firm also wants to enjoy the benefits of fall in interest rates, they can do this by entering into a receiver swaption. So the firm can effectively convert the non-callable bonds into callable bonds.

Total Return Swap

A total return swap is a swap in which party A pays the total return of an asset, and party B makes periodic interest payments. The total return is the capital gain or loss, plus any interest or dividend payment, it may be noted that if the total return is negative, then party A receives this amount from party B. The parties have exposure to the return of the underlying

stock or index, without having to hold the underlying assets. It is also known as *total rate of return swap*.

Credit Default Swap

This is the most widely used credit derivative. It is an agreement between two parties on one more portfolio of reference assets (loan or bond) in which one party (the protection buyer) pays a fee to a second party (the protection seller) one time or periodically over the life of the contract and in return the protection seller assumes the default risk of the reference asset.

Cancelable Swap

Cancellable swap is the swap that can be cancelled before expiration. If a firm finds that it is economical to cancel the swap, it can do so if it is a cancelable swap. Then it may cancel the obligations or part thereof by paying or receiving the value of the swap at that point of time

Extendable Swap

The extendable swap is constructed on the same principle as the double -up swap, except that instead of doubling the swap, the provider has the right to extend the swap, at the end of the agreed period, for a further predetermined period.

Pricing and Valuation of Swaps

Pricing of the swap is important for two reason. First, banks are ready to offer swap to the desired customers. For this then are required to quote the swap rates for paying and receiving a fixed rate of interest for receiving / paying the benchmark variable rate. The other reason for valuing the swap is for the purpose of cancellation of an existing swap.

The price of the swap is the difference between the value of two cash flows. Swaps can be priced by determining the values of each stream of cash flows. The value of each stream of cash flows is the present value of cash flow in the stream. If the cash flow is in different currencies, the present values are converted into a single currency at the prevailing exchange rate.

Swaps can be valued on the similar ways as bonds as they constitute a series of cash flows at various points of time. The cash inflows are first discounted at a an appropriate rate to find the present value. This process is continued for cash inflows too. The difference between the present value of inflows and outflows is the value of swap. Normally the prevailing LIBOR (in India, we use PLR) used for discounting the cash flows of floating rate. For fixed rate, market quoted rate is used.

Valuation of Interest Rate Swap

An interest rate swap consists of fixed rate cash flows and floating rate cash flows in the opposite direction. At the time of inception of swap, the value of swap is zero. This implies that the present values of cash inflows and outflows are equal and its aggregate flow is zero. However, after the swap is initiated, the circumstances would change. The value of interest rate swap at

any time is the net difference between the present value of the payments to be received and the present value of the payments to be made. It becomes positive to one party and is equivalently negative to the other party. This tells how much cash the two parties must exchange to nullify the remaining obligations in the swap.

There are two approaches for swap valuation. They are : (a) Swap as portfolio of two bonds made (b) Swap as a series of forward contract. We here discuss only the first approach.

Swap as Two Bonds (Swap as Pair of Bonds).

Under this approach, we consider the inflows and outflows of interest at periodic intervals equivalent to that of bonds. In an interest rate swap, one leg of transaction is on a fixed rate and the other leg is on the floating rate of interest. We also know that if one owns a bond he receives interest and if one issues a bond, he pays interest . Therefore, a swap comprises : (a) the cash inflows equivalent to the interest on the bond owned, (b) the cash outflow equivalent to paying the interest on the bond issued. Therefore, a swap is equal to two bonds - one issued and the other owned. A swap where one pays fixed and receives floating can be viewed as combination of having issued a fixed rate bond, paying the fixed coupon rate and simultaneously owning a floating rate bond, receiving a floating rate as per the market conditions.

While setting up the swap, the coupon rate (the fixed leg receipts / payments) is fixed in such a manner that the values of cash inflows and cash outflows are equal and the both parties to the swap arrangement are in equilibrium, the net present values of the cash flows being zero. However, the interest rates are dynamic. Hence the value of cash flows as determined at the start of swap will not remain same as time passes. The value of the swap will depend upon the behaviour of bond prices with respect to the changes in the interest rates.

The change in value of the floating rate bond will be nominal and temporary (it changes only during the two interest payments). Therefore, the value of swap determined on the basis of difference in the present values of the fixed and floating legs, is predominantly dependent on the value of fixed rate bond. The value of the bond with fixed rate payments will be equal to sum of coupon payments and the notional principal amount discounted at an appropriate rate. The discount rate to be used for each coupon payment is known from the term structure of interest rates. The value of the fixed interest payment leg is given as :

$$V_c = \sum_{1}^{n} \frac{c_i}{(1+r_i)^n} + \frac{P}{(1+r_n)}$$

where, V_C = Value of the fixed interest payment leg (PV of fixed coupon bond)

C_i = Coupon payment at time, i, r_i = Discount rate for period, i,

n = Number of periods remaining P = Notional principal amount

Similarly , we can calculate the value of the floating rate bond V_f. This is equal to present value of next interest payment and the principal. The value of the floating leg may be calculated below :

$$V_f = \frac{F_1}{1+r_1)} + \frac{P}{(1+r_1)}$$

where, V_f = Value of the floating leg.

F_1 = Next payment of interest r_1 = Discount rate for period 1

P = Notional principal amount

Thus the value of the swap for one receiving fixed and paying floating will be equal to the differential of the fixed leg and floating rate cash flows. It is expressed as follows :

Value of swap = PV of fixed coupon bond - PV of floating rate bond

or

$$V_s = V_c - V_f$$

or

$$V_s = \sum_1^n \frac{C_i}{(1+r_i)^n} + \frac{P}{(1+r_n)^n} - \frac{F_1}{(1+r_1)} - \frac{P}{(1+r_1)}$$

Example 1

Let us consider an example of valuation of swaps assuming it to be pair of bonds (two bonds). Assume that two years ago Firm A has entered a 5 year interest rate swap where it receives fixed 8% and pays MIBOR (Mumbai Inter Bank Offer Rate) +1%. For simplicity of exposition, we assume annual payments. There are three remaining annual payments.

Since the time of the swap, the interest rates have moved upwards causing the value of the swap to change. It may be noted that the value of the swap was zero two yeas ago when it was set up. Assume that the payment of the floating rate determined one period advance is at the rate of 9.5% (MIBOR was at 8.50% then). The term structure of interest rates as on today is as follows :

1 year : 10%

2 year : 10.5%

3 year : 11%

Solution

We find the value of the floating rate bond for an assured principal payment of ₹ 100 by discounting the interest (₹ 9.50) and the principal (₹ 100) at 10%.

Value of the floating rate bond $(V_f) = \frac{109.5}{1.10} = ₹\ 99.545$

The value of fixed rate bond can be found by discounting the three cash flows at the appropriate discount rate given by term structure, is calculated below :

$$V_c = \frac{8}{(1+0.10)} + \frac{8}{(1+0.105)^2} + \frac{8}{(1+0.11)^3} + \frac{100}{(1+0.11)^3} = ₹ 92.793$$

Now we can calculate the value of swap as follows :

Value of Swap = PV of inflow - PV of outflow

i.e., PV of fixed coupon bond - PV of floating rate bond

or, $V_s = V_c - V_f = 92.793 - 99.545 = -₹ 6.752$

The swap can be cancelled if Firm A pays ₹ 6.752

Valuation of Currency Swaps

In case of currency swaps the valuation can be determined by considering the swaps as a pair of bonds. So, the price of swap will be the difference between the current value of both the bonds, one denominated in the foreign currency and another in the local currency. Then the value of currency swap may be expressed as below :

$V_s = V_f - V_l$

Where V_s denotes value of currency swap, V_f denotes the value of foreign currency bond, and V_l denotes the value of local currency bond.

Example 2

Let us consider a flat rate of interest in India and the USA. The US rate is 3% p.a. and Indian rate is 8% p.a., both the rates being compounded continuously. The Axis Bank has entered into a currency swap where it receives 7.5% p.a., in Indian currency and 4% p.a., in US dollars. The principal amount in both the currencies are ₹ 5 lakh and US $ 75 lakhs. The swap period is for 2 years and current exchange rate is 1US $ = ₹ 50

Solution

The price or value of the currency swap is calculated as follows :

$V_s = V_f - V_l$

$V_f = 0.375e^{-0.08} + 5.375e^{-0.08 \times 2}$

$= \$ 0.3461 + \$ 4.5802 = \$ 4.9263 = ₹ 246.315$ (i.e., 4.9263 x 50)

$V_l = 3e^{-0.03} + 78e^{-0.03 \times 2} = ₹ 2.9113 + ₹ 73.4576 = ₹ 76.3689$

Therefore, $V_s = 246.315 - 76.3689 = ₹ 169.9461$

If Axis bank were to pay US$ and receive Indian Rupees, the value of the currency swap would have been ₹ 169.9461.

Cross-Currency Interest Rate Swap

This swap combines the features of both a currency swap and an interest rate swap. It is designed to convert a liability in one currency with a stipulated type of interest payment into one denominated in another currency with a different type of interest payment. The most common form of cross currency interest rate swap converts a fixed rate liability in one currency into a floating rate liability in second currency (liability swap). The same structure happens for asset swap.

Nongeneric or Exotic Swaps

A number of new generation swaps have been emerged in recent years. They have unusual features. Their structures are very complex. They are non-standard swaps. Their coupon, notional, accrual and calendar used for coupon determination and payments are tailor-made to serve client's perspectives and needs in terms of risk management, accounting hedging, asset re-packaging, credit diversification etc. Such swaps are called nongeneric or exotic swaps. These swaps are combinations of swaps, bonds, and many other potential elements like credit related instruments.

Compared to vanila interest rate swaps, nongeneric swaps offer the additional challenge of modeling accurately the yield curve, the skew and correlation of the various forward LIBOR and longer maturity rates involved in the product.

All nongeneric swaps can be broadly classified into first generation non-generic swaps and second generation nongeneric swaps.

Some of the very popular first generation non-generic swaps may be briefly discussed as follows :

1. **Forward starting swap :** This is a swap agreement created through the synthesis of two swaps differing in duration for the purpose of fulfilling the specific time frame needs of an investor. It is also called *delayed start swap* or *deferred start swap*. This swap is meant for protection in future.
2. **Roller - coaster swap :** In this swap, interest rate risk can be shifted by converting floating rate liability to fixed rate liability or vice versa. A roller-coaster swap is a seasonal swap providing flexibility of payments at predetermined periods in order to best meet cyclical financing needs or other requirements of the counterparty.
3. **Amortising swap :** This is an interest rate swap in which the principal amount decreases at prespecified points of time over the life of the swap.
4. **Accreting swap :** This is an opposite of amortising swap. In this swap the principal amount increases at pre-specified points of time over the life of the swap. It is used to swap an exact series of cash flows derived from some form of asset inflows and to hedge for an accreting asset if the investor wants to take only the credit risk and not interest rate risk.
5. **Constant maturity swap :** This is a swap that allows the purchaser to fix the duration of received flows on a swap. It allows efficient hedging of yield curve and in particular long - dated interest rate risk.
6. **In- arrear swap :** This is a swap that pays and resets at the same time. Usually there is a two business day delay between the reset and the pay dates. In- arrear swap is tailored to trade the steepening or flattening of the yield curve versus the realised short- dated among market rates.

7. **Quanto swap :** It is also called *differential swap* or *diff swap*. Thought the two legs use rates of different denominated currency, all payments are done in one currency. This swap removes the currency exposure.
8. **Leveraged swap :** In a leveraged swap, the counterparty on the floating leg makes payments which are a multiple of a floating benchmark.
9. **Power swap :** This is a contract between two parties wherein the floating rate payer pays the floating rate square or cubic or any power of the rate to the counter party
10. **Overnight index swaps :** These were introduced in early 1990s. This is a fixed-for-floating interest rate swap with the floating rate leg tied to an index of daily interbank rates or overnight /call money index.

The first generation of non-generic swaps have been widely used for asset and liability management as well as simple trading strategies.

Some of the second generation non-generic swaps may be outlined as below :

1. **Index amortising swap :** Its notional amortisation schedule is linked to a floating rate. This swap is of great use when hedging pool of liabilities whose notional can amortize according to early redemption mainly influenced by the overall level of the interest rate. This type of swap requires a good modelling of the dependence between the different floating rates.
2. **Bermudan swaps :** These are used to hedge structured (callable, putable) bonds, as well as providing additional flexibility when to exercise the Bermudan swaption (either receiver or payer Bermudan swaptions)
3. **Range accrual swaps :** These are swaps whose notional accretes when a certain floating rate, often a different rate from the one used to pay, lies within a range. Accrual swaps are in fact a strip of digital options.
4. **Asian swaps :** These are swaps whose libor fixing are averaged to get smoother payment. These are often used in combination of other exotic features.
5. **Digital (Binary) swap:** This is a swap that pays a certain fixed amount if the rates is above or below a certain level. Binaries can be completely replicated.
6. **Barrier swaps :** These are also called trigger swaps, whose pay-off is activated or deactivated when a certain floating rate goes above or below a certain threshold.
7. **Chooser swap/swaptions :** In this case the option holder can choose to enter into a receiver or a payer swap. Other forms of choose swap/swaptions allow the user to specify when to fix the floating rate, during an observation window.
8. **Corridor swap :** Volatility can be hedged through corridor swap. A corridor swap is a variance swap that takes into consideration daily variation of market rates within a specific range. In corridor swap structure, there is a payment obligation for one counterparty only when the underlying asset price is within the predetermined range.

Risk Management Function of Swap Transactions

Swaps are useful instruments for risk management. Swaps can be used for risk management in the following ways :

1. **To hedge against the risk of rising interest rates :** Swaps are valuable hedging tools because they allow a firm with a sizable floating-rate debt to hedge or protect itself against the risk of rising interest rates. If interest rates increase, a firm with floating rate debt will experience higher floating interest rates. We know that when interest increases, net income will fall. A greater percentage of the firm's operating income will go to the pocket of floating rate debenture or bond holders, leaving less for the shareholders. Thus, firm with floating rate debt are exposed to the risk of increasing interest rates. To hedge this risk, the firm can enter into a fixed-for-floating interest rate swap. Then the firm can transform existing floating rate debt into synthetic fixed-rate debt. That is, the firm can lock in a fixed rate for the remaining life of the bond. Similarly, a forward swap can be used to protect against a rise in interest rates in future. In short, forward swap can be used to manage risk exposure.

2. **To hedge against the risk of falling interest rates :** A fund manager or investor may fear a fall in interest rate in the future. When the interest rates fall, the income will decline. Hence the fund manager or investor is exposed to risk. To hedge this risk, the fund manager can enter into an interest rate swap. In this case, he is the receive-fixed party. A swap dealer will agree to pay the fund manager a fixed rate for coupon payments in exchange for the variable coupon payment.

3. **To hedge against the market price risk and interest rate risk :** Financial institutions such as commercial banks, investment banks, insurance firms, mortgage firms and trust, govt. agencies etc. are exposed to market price risk as well as interest rate risks. Such institutions can use swaps for hedging market price risks and interest rate risks. These financial institutions can manage the risk exposure by entering into a swap where the institutions pay fixed and receive floating. They use swap instruments to hedge their asset liability mismatches as well as to hedge their interest rate forecasts to increase their operational income. Swap instruments help firms to change their debt portfolios interest obligations from fixed to floating rate or floating to fixed rate on the basis of their future interest forecasts. This swap arrangement results in lower debt funding costs compared to un-hedged debt obligations.

4. **To derive the benefit of comparative advantage in borrowing or lending :** It is likely that the counterparties and swap dealer are benefited as a result of swap deal. Such advantage occurs only due to the fact that one of the parties has a comparative advantage in borrowing or lending as compared to the other party. This advantage is then shared by all concerned parties. The comparative advantage in borrowing arises because of the differing credit rating of parties. Some companies have a comparative advantage in fixed rate borrowing. Others may have a comparative advantage in floating rate borrowing. Consequently, in order to avail the comparative advantage, a company may borrow at fixed rate whereas it really wants

to borrow at fluctuating rate. To change the interest rate exposure from fixed rate obligation to floating rate obligation and vice versa, a firm can use interest rate swaps.

5. **To hedge against the risk of a decline in a revenue stream:** A firm can use a fixed-for-fixed currency swap to hedge its risk of a decline in a revenue stream. The revenue (from exports) is likely to decline because of the fluctuations in the exchange rates.

6. **To hedge against the risk of an increase in cost :** A firm which imports goods or services from a foreign country faces the risk that the price of the foreign currency is likely to increase. This leads to increase in cost and decline in profit. To hedge currency risk exposure, the firm can use a fixed-for-fixed currency swap.

PRACTICAL PROBLEMS

Illustration 1

Higher Grade Ltd. (HG) and Lower Grade Ltd. (LG) have to borrow ₹ 100 lakhs each. The relevant Interest rates are as follows:

	Fixed Rate	Floating Rate
Higher Grade Ltd.	12.0 per cent	LIBOR + 0.1 per cent
Lower Grade Ltd.	13.4 per cent	LIBOR + 0.6 per cent

HG is interested to borrow at floating rate while LG is interested to borrow at fixed rate obligations. You are required to design an appropriate swap. The swap dealer must get a commission of 0.1 per cent and profit be shared equally by two companies.

Solution

HG has advantage over LG under fixed rate as well as the floating rate obligations. But it has coparatively higher advantage in fixed rate (1.4 per cent), as against 0.5 percent in floating rate. The net gain of 0.9 per cent, 0.1 per cent is payable to the swap dealer. The remaining gain of 0.8 per cent may be shared equally (0.4 per cent) by HG and LG. The swap arrangement would be:

	Interest Inflow	Swap Inflow	Swap CJittflow	Net Cash-flow
HG	12.0 per cent	12.4 per cent	LIBOR + 0.1 per cent	LIBOR - .3 per cent
LG	LIBOR + 0.6 per cent	LIBOR - 0.1 per cent	12.5 per cent	13 per cent
Dealer	-	12.5 per cent	12.4 per cent	0.1 percent
		LIBOR + 0.1 per cent	LIBOR + 0.1 per cent	

The swap arrangement helps HG to borrow at a net cost of LIBOR - 0.3 percent and LG to borrow at 13 percent. So, both making a gain of 0.4 percent. In the process, the swap dealer is getting a commission of 0.1 per cent.

Illustration 2

A Ltd. holds fixed rate bonds with coupon rate of 7%. B Ltd. is a recipient of floating rate interest through floating rate bonds with coupon rate of LIBOR + 2%. Both apprehend a