

## Chapter 2 – Literature Review

### 2.1 Brief history of exchange-traded Derivatives

The largest derivatives exchange, the CBOT was formed in 1848. It is now part of the CME group. Forwards contracts on commodities were standardized on CBOT in 1865. Thus this can be said to be the beginning of Futures trading on a large platform. Japan had derivatives on rice on the Dojima Rice Exchange as early as 1730. This is believed to be the birth of organized trading on derivatives (Futures). This initiative led to the formation of Osaka Securities exchange in Japan. The currency futures on the international arena were successfully launched by the Chicago Mercantile Exchange's International Monetary Market in 1972.

### 2.2 Derivatives in India

Over the counter products like the Forward Rate Agreement (FRA) and Interest Rate Swap (IRS) were allowed by the RBI in 1999. In June 2000, Index Futures were introduced on the National Stock Exchange and the Bombay Stock Exchange. This was followed by launch of Index Options and Stock Futures in 2001. The Currency Futures were started on NSE in 2008 and Currency Options were introduced in 2010. Currency options, currently, are available only on the USD-INR pair. In India the Futures and Options contract on Index, Stocks and Currencies are cash settled. NSE and BSE are the leading exchanges for derivatives trading in India. Derivatives on commodities like cotton were available as early as 1875 under the aegis of Bombay Cotton Traders Association. Forwards on oil seeds were available in 1900. However in 1960s the Government apprehending heightened speculative activities, which were deemed detrimental to farmers and the nation's interest, restricted/banned trading in various derivative instruments. It took a while before many of the derivative products were re-introduced in India.

## 2.3 Types of participants

Derivatives trading facilitate important functions like price discovery and hedging. The efficiency of any market depends on the scale of participation by various players. Participants can broadly be categorized as speculators, hedgers and arbitragers. These are explained below with reference to the currency derivatives markets.

**Speculators:** These participants are the risk takers, who take a directional bet on the underlying asset price. For example, if one believes that the US\$ is going to get stronger vis-à-vis the Indian Rupee in the coming weeks, he may buy (go long) in the related Currency Future (US\$-INR). He may alternatively or also buy a Call Option or sell a Put Option. In these cases if the exchange rate moves as expected by the speculator, he may gain. Conversely if the exchange rate moves against his prediction, then he would incur a loss. It is important to note that a speculator is characterized by the fact that he takes a bet on the direction of the underlying assets price (here the US\$) with an intention to make gains. Derivatives provide the added feature of leverage which magnifies the returns available. Speculators do not have any exposure to the asset and they do not have any need to hedge. Their role is vital to the market as they provide the basic risk transfer alternative to the Hedgers, that is, speculators impart liquidity.

**Hedgers:** Those participants who are exposed to the Price risk of an asset and want to safeguard against the adverse impact of price movement of an asset are Hedgers. To elaborate, a hedger is one who holds an asset for sale in the near future or is expected to buy an asset soon and is concerned about adverse price movements before the sale or purchase happens. In the context of foreign currency, importers and exporters are exposed to the risk of adverse exchange rate movement. For example an exporter who is to receive his payment after a month may be exposed to the risk of the domestic currency strengthening against the foreign currency (in which the exporter is to receive the payment). Let's say ABC Ltd., from India, has exported goods worth US\$ 1, 00,000 to its customer on Feb 5, 2018. The US\$ - INR rate on this date is Rs. 64.03. The customer enjoys a credit period of two months and would make the payment on April 5, 2018. If the exchange rate moves to 63.53 on April 5, 2018 then the exporter would stand to lose Rs. 0.50 on each US\$ received and converted to

Indian Rupees. This would reduce his profit by Rs. 50,000 on the deal. To guard against this uncertainty in cash flows/profit, the exporter has the choice of hedging by selling a Currency Forward or a Currency Future. Alternatively, the exporter could also buy a Put option with a strike of 64.00, paying the prevailing premium. If the exporter sold US\$-INR Futures for one lakh US\$, expiring April 25, 2018 at the exchange rate of Rs. 64.05, he could guard against adverse movement in exchange rates. On April 5, 2018 when US\$ 1, 00,000 are received, if the Spot exchange rate of one US\$ is Rs. 63.53, the exporter loses Rs. 0.50 on each US\$ realized. If the Futures contracts on April 5, 2018 are quoting at Rs. 63.55 the exporter can square of his Short position in the Futures contract and this can lead to a gain of Rs. 0.50 (Rs. 64.05 – Rs.63.55) per US\$. This could mean that the effective exchange rate realized per US\$ would be Rs. 64.05 (Spot + gain on Futures position). Thus the Futures contract can act as hedge against the loss caused due to adverse exchange rate fluctuation. In case the exchange rate unexpectedly moves higher (i.e. the US\$ strengthens), the Spot rate realized would be better (than what prevailed a Feb 5, 2018) but there would be a loss on the Futures position and effective exchange rate realized would be close to the exchange rate at which the Currency Futures were sold. The hedge set up guards the exporter against the adverse impact, on Cash flows/ profits, which could be caused due exchange rate fluctuation. A hedger is characterized by his motive to safeguard against price risk and is not interested in taking a speculative directional bet on asset price. A hedger has an underlying exposure to an asset, unlike the speculator. This differentiates a hedger from a speculator. Hedgers are the focal point of this research.

Arbitraders: This class of participants is interested in making a 'riskless' profit by exploiting the mispricing of an asset across two different markets. Covered Interest arbitrage is explained later in the chapter. Arbitraders are neither interested in taking a risky directional bet on the asset price nor are they interested in safeguarding an asset's exposure to adverse price movement. An arbitrader would buy the asset from a market where it is underpriced and sell it in the market where it is overpriced simultaneously, thereby making a riskless profit.

## 2.4 Terminology in the Foreign Currency Markets

Foreign Currency markets have a certain jargon which needs to be understood by participants in this market. Some of the terms are defined as follows:

Foreign exchange rates: Bid and Ask rates

In the OTC foreign currency markets, banks are major players. They are market makers or dealers. The rate at which a dealer would buy from other participants is called the Bid rate. The rate at which a dealer sells foreign currency to others is called the Ask rate. An illustration of the quote is given below:

ABC Bank Ltd.: Quotation for 1 US\$

Bid rate	Rs. 64.00	Ask rate	Rs. 64.50
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What this means is that if an exporter wants to sell his US\$ to ABC Bank, then he will get Rs. 64.00 for each US\$ sold to the bank. However, if an importer wants to buy US\$ from the bank, then he will need to pay Rs. 64.50. This difference between the Bid and Ask rate is termed as the “spread”. It implies that if bank completes a transaction of buying and selling a US\$ it will earn profit of Rs. 0.50, or 50 paisa, at the prevailing spread.

Mid rate: The average of the Bid and Ask rate is referred to as the Mid rate. In the above example the average would be Rs. 64.25 per US\$. Percentage spread can be calculated as:

$$\% \text{ Spread} = (\text{Spread} / \text{Mid rate}) * 100$$

Spot Rate and the Forward Rate:

The transactions carried out in the foreign currency market may be undertaken for immediate or future settlement. Spot transactions refer to those which are settled within two working days of their being undertaken. Settlement in this case refers to the actual exchange of currencies. For example if an exporter has sold US\$ 10,000 in the spot market at the exchange rate of Rs. 64.00 per US\$ on June 14, 2017 to a bank, the settlement of this deal would happen on June 16, 2017. On the settlement date (also called as the ‘value date’), i.e., June 16, 2017, the exporter would deliver US\$ 10,000 to the bank and the bank would pay the exporter Rs. 6, 40,000. This would be the conclusion of the transaction.

When the transaction is entered into for a future settlement at a rate that this is fixed at the time of the transaction, the rate so fixed is a Forward Rate. In the example above, if the exporter agrees to deliver US\$ 10,000 after a month i.e., on July 14, 2017 at the rate of Rs. 64.10 per US\$ to the bank, then it would constitute a Forward Contract wherein the settlement would take place after a month at the agreed rate. In this transaction, the currencies would get exchanged on July 14, 2017. The bank would pay Rs. 6, 41,000 to the exporter and would receive US\$ 10,000 from the exporter as agreed one month prior.

**Premium and Discount to the Spot rate:** The Forward Rate may be quoted as a premium or discount to the spot rate. If the spot rate of one US\$ is Rs. 64.00, then a one-month forward rate of Rs. 64.10 indicates a premium of Rs 0.10 premium to the spot rate. A situation where the Forward Rate is above the Spot rate is termed as 'Contango'. In contrast, if there is discount of Rs. 0.05 to the Spot, then the Forward rate would be Rs. 63.95 (Spot – Discount). This situation where the Forward rate is less than the Spot rate is termed as Normal Backwardation.

## 2.5 Pricing of Currency Forwards

What should be the Forward rate? The Forward rate, tied to a Spot rate is dependent on the interest rates available of the concerned pair of currencies. An illustration would be in order: Assuming free flows of capital across borders and no rigid controls on foreign currency markets, the forward rate will be determined as below, disregarding transaction costs:

Consider a Spot rate of 1US\$ ( $S_0$ ) = Rs. 64.00

Interest on US\$ ( $R_f$ ) = 3% p.a.

Interest on INR ( $R_d$ ) = 7% p.a.

If, today, a person has US\$1 available for a year, there are two choices available to the person.

- 1) Invest the US\$ at the rate of 3% ( $R_f$ ) for a year. At the end of one year the person would have  $US\$1 * (1 + R_f) = 1 * (1.03) = US\$ 1.03$
- 2) The second choice is that the US\$ can be converted into Indian Rupees and the same may be invested at the rate of 7% p.a. ( $R_d$ ) for a year and the maturity amount so

received is converted back to US\$. The US\$ converted to INR would fetch Rs. 64.00 at the Spot rate. This can be invested at 7% p.a. for a year to cumulate Rs. 68.48 [ $1 * S_0 * (1 + R_d)$ ]. This amount received at the end of one year can be converted back to US\$ at the then prevailing spot rate. If this expected Spot rate (after one year), denoted as  $S_t$ , is the Forward rate at the current point in time then the amount of US\$ one would get by converting the maturity amount of Rs. 68.48 would be  $US\$ 68.48 / S_t$ . i.e.  $1 * S_0 * (1 + R_d) / S_t$ .

- 3) **To preclude arbitrage opportunities, the US\$ amount obtained from either step 1 or step 2 above has to be the same.** This implies that :

$$US\$1 * (1 + R_f) = 1 * S_0 * (1 + R_d) / S_t$$

Solving for  $S_t$  and re arranging the terms of the above equation -:

$$\begin{aligned} S_t (\text{Forward Rate}) &= S_0 * (1 + R_d) / (1 + R_f) \\ &= 64.00 * (1 + 0.07) / (1 + 0.03) \\ &= \text{Rs. } 66.4854 \end{aligned}$$

Therefore the Forward rate on a one-year Forward US\$ contract should be Rs. 66.4854, given the Spot and the interest rates on the two currencies.

## 2.6 Arbitrage Mechanism

As a corollary, questions that could arise are: What is the support for the Forward rate derived above? Why couldn't the Forward rate in the above illustration be different from Rs. 66.4854 to a US\$? Two scenarios are considered. One in which the Forward rate quoted is numerically higher than Rs. 66.4854 and another in which it is numerically lower.

Suppose the rate is, say,  $US\$1 = \text{Rs. } 67.10$  for one-year Forward contract. In this situation arbitrage, to make a riskless profit, can be quickly initiated as follows:

1. Borrow Rs. 64.00 from the Indian market at the rate of 7.0% p.a. for one year. The loan payable with interest would be Rs. 68.48 ( $64.00 * 1.07$ ).
2. With the borrowed money buy US\$1 at the spot rate and invest it at 3.0% p.a. for one year
3. Commit to sell US\$ 1.03 forward at the rate of 67.10 per US\$ after one year.

At the end of one year:

- a. Receive US\$ 1.03 from the investment made at step 2 above.
- b. Deliver US\$ 1.03 to exchange at the contracted rate of Rs. 67.10 realizing Rs. 69.113 (Step 3 above)
- c. From the amount received i.e., Rs. 69.113, pay off the borrowed money with interest. The loan payable with interest would be Rs. 68.48 as computed previously. This would yield a riskless profit of Rs. 0.633 (69.113 – 68.48)

Arbitraders would spot this opportunity and would begin selling the US\$ in the Forward market. This would put pressure on the US\$ in the Forward market and push the one-year rate down. This pressure would continue till the Forward rate reaches Rs. 66.4854 at which point the arbitrage opportunity would vanish.

In contrast, if the rate were, say, US\$1 = Rs. 65.90 for a one-year Forward contract, the arbitrage transactions will be as follows:

1. Borrow US\$1 from the overseas market at the rate of 3.0% p.a. for one year. The amount repayable at year-end will be US\$1 1.03.
2. Sell the borrowed US\$ at the spot rate to realize Rs. 64.00 and invest it at 7.0% p.a. for one year in the Indian market.
3. Commit to buy US\$1 1.03 at the rate of Rs. 65.90 per US\$1, after one year.

At the end of one year:

- a. Receive Rs. 68.48 from the investment as mentioned in the preceding steps.
- b. Buy US\$ 1.03 at the rate of Rs. 65.90 as agreed above by paying Rs. 67.877
- c. Pay off the debt that is, US\$1 1.03.

In the process a riskless profit of Rs. 0.603 (68.48 – 67.877) is made. The arbitrage opportunity, when exploited by many simultaneously, would lead to purchases of US\$ in the Forward market, driving the Forward rate upwards till it reaches Rs. 66.4854 at which point the arbitrage would vanish.

The above process is termed as ‘Covered Interest Arbitrage’. It is a sound and powerful explanation regarding what the Forward currency rate should be.

The arbitrage mechanism with the Cash settled exchange-traded Currency Futures would be similar. The difference is that on the date of expiry the foreign currency requirement would be met from the Spot market. It is pertinent to note that that rate of foreign currency on the day of expiry of the Futures contract has to be the same as the Spot rate of that day in order to avoid arbitrage opportunity. The mechanism for Cash settled US\$ Currency Futures contract is illustrated below.

Extending the example supra, suppose the rate quoted on the exchange on a one-year US\$-INR Currency Futures is higher than Rs. 66.4854, say 1 US\$ = Rs. 67.10. In this situation arbitrage, to make a risk less profit, can be set up as follows:

1. Borrow Rs. 64.00 from the Indian market at the rate of 7.0% p.a. for one year.
2. With the borrowed money buy one US\$ and invest it at 3.0% p.a. for one year
3. Sell US\$ Currency Futures with an expiry of one year at the rate of 67.10 per US\$ for an amount 1.03 dollars. For simplicity it is assumed that lot size permits this quantity in Futures contract.

At the end of one year the Spot rate could be above or below the Futures rate. Both situations are dealt with. First assume that the Spot rate after one year is higher at 1 US\$ = Rs. 67.20

- a. Receive US\$ 1.03 from the investment made at step 2 above.
- b. Sell these in the Spot market at the prevailing rate of Rs. 67.20 realizing Rs. 69.216
- c. The short position is squared off by buying 1.03 US\$ in the Currency Futures contract. This leads to a loss of Rs. 0.10 (67.1 – 67.2) per US\$. This loss Rs. 0.103 (1.03\*0.10) on Short position is settled in cash from the money received at step 2. Also pay off the Indian Rupee loan. The loan payable with interest would be Rs. 68.48 (64.00 \* 1.07).

After paying the loan and accounting for the Futures loss the net gain is Rs. 0.633 (69.216 - 0.103 - 68.48).

Now considering a scenario where the Spot rate after one year is lower than the contracted Futures rate, say 1 US\$ = Rs. 66.80, the following steps would apply at the end of one year:

- a. Receive US\$ 1.03 from the investment made at step 2 above.
- b. Sell these at the in the Spot market at the prevailing rate of Rs. 66.80 realizing Rs. 68.804
- c. The Short position is squared off by buying 1.03 US\$ in the Currency Futures contract. The leads to a profit Rs. 0.30 (67.10 - 66.80) per US\$. The profit of Rs. 0.309 (1.03\*0.30) is received in cash as result of settlement of the Currency Future contract.
- d. Also pay of the Indian Rupee loan. The loan payable with interest would be Rs. 68.48 (64.00 \* 1.07).
- e. After repaying the loan and taking into account the profit made in Currency Futures position the net gain is Rs. 0.633 (68.804 + 0.309 - 68.48)

After paying the loan and accounting for the Futures profit the arbitrage has a net gain of Rs. 0.633 (68.804+0.309-68.48). In effect the loss/gain in the Spot market is offset by gain/loss in the Futures market and a riskless arbitrage is available.

The arbitrage process above assumes that the currencies are freely convertible into one another without any capital controls across international borders and disregards transaction costs.

## **2.7 Non Deliverable Forward (NDF)**

The countries where there were capital control restrictions were devoid of hedging opportunity to foreign investors and traders. To address this issue, Non Deliverable Forward contracts were developed. This is similar to a Forward contract but in an NDF the delivery of the underlying asset (like currency or commodity) is not required. These evolved in seventies in Australia when the Australian currency was subject to controls. Cash settled Futures are similar to NDFs. The NDF market primarily consists of Asian currencies like Chinese Yuan, Indian rupee, Korean won, Indonesian rupiah, and Philippine peso. NDF in a currency is generally traded offshore, outside the geographical bounds of country of currencies. An example could be an NDF on Chinese Yuan being traded in the Singapore market. NDFs are used also when the banking system allows Forwards only when there exists an underlying

exposure for hedging. This disallows speculation and arbitrage in the currency market and affects the depth of the market adversely. NDFs may provide opportunity for speculators too.

NDFs are generally quoted and settled in US\$. Cross rates can be used for other currencies too. Since delivery is not possible due to restrictions on free convertibility of currency, the settlement of NDF is done based on the difference in the contracted Forward rate and Spot rate at the end of the tenure of the contract. The settlement has to be done in a currency that is freely acceptable. Most NDFs are cash settled in US\$ on a notional principal amount. These are mostly OTC products. The arbitrage principles developed in the earlier sections are more readily applicable to the NDFs since they are not under capital controls or regulations.

## **2.8 Strategies for hedging trade related foreign exposure in India**

Foreign currency exposure can arise when a business entity trades with a foreign country and has to receive or pay in currency other than the domestic currency. Exposure could also arise if an entity has obtained a loan or invested in assets denominated in foreign currency. The focus of this research is on trade related exposure. The alternative strategies available to Indian entities to hedge their foreign currency exposure are follows:

**Currency Forward:** A broad definition has been provided earlier. Based on the same an illustration would highlight its utility. An exporter who has shipped goods worth US\$ 10,000 and expects the payment to come after a month, is exposed to the risk that Indian rupee could appreciate and therefore he may realize a diminished amount when the foreign currency payment is converted to Indian Rupees. Assume that a bank (say SBI) is offering a Forward Contract with a Bid of 1 US\$ = 64.50 for a one-month tenure. If the exporter believes that there is a chance of the expected Spot rate after a month being less than 1 US\$ = 64.50 he would go for booking a Forward contract to sell US\$ 10,000 after a month at the Bid rate. After a month if the actual Spot rate turns out to be Rs. 63.90 per US\$, the exporter stands protected. However if the Spot rate turns out to be 65.00, the exporter would still realize Rs. 64.50 and there would be an opportunity loss of Rs. 0.50 per US\$ hedged. The Forward brings in certainty in cash flow and protects the exporter. In India, all the leading banks offer Forwards on currency. Obviously these are OTC products. An importer can use the Currency Forward to hedge against the probable loss caused by appreciation of the foreign currency by buying the currency in the Forward market.

Currency Futures: These are similar to Forwards as discussed earlier. In India, Currency Futures are traded on NSE, BSE and MCX-SX (Multi Commodity Exchange). These are leading exchanges for currency trading. In India only cash settled Currency Futures are allowed. These exchange-traded contracts came into vogue in 2008. Therefore, these can be said to be relatively of recent origin in the country. The RBI had constituted an internal working group to study the introduction of Currency Futures. After due consideration, the RBI allowed Currency Futures trading. To illustrate assume an importer has imported goods worth US\$ 50,000 and would pay after two months. The issue he is faced with is the depreciation of Rupee against the US\$ in the coming two months. In case the Rupee weakens, the importer would have to shell out more Indian Rupees to buy US\$ 50,000. To hedge against this uncertainty the importer can look for cover using the Currency Futures traded on the exchanges. Assume that the importer is required to pay on July 14, 2017 (after two months). The US\$-INR Futures contract with an expiry date of July 26, 2017 is being traded at Rs. 64.50. The importer can go long on fifty Currency Futures (lot size of US\$ 1,000). It would be noted that in this case the expiry of the Currency Futures contract does not coincide with the exact date of payment to be made. On July 14, 2017 the importer would square of the long position on Futures by selling off fifty contracts at rate prevailing on that day. If the US\$ has strengthened by this time then the Futures rate is also expected to rise, proving a gain on the Futures position. This can be used to offset the disadvantage of buying US\$ at a higher rate from the Spot market to make the payment. Conversely if, the US\$ has depreciated against the Indian Rupee there would be a loss on the Futures position but the importer would be buying the US\$ at lower rate from the Spot market to make the payment. Hence the loss in the Futures is likely to be mitigated by advantage in the Spot market. It is to be noted that for taking a position in the Futures market 'margin' at the prescribed rate is also required to be posted. In a nutshell:

Realized rate (for Buying US\$) = Spot rate +(-) Loss(Gain) on Futures position

The attendant charges like brokerage, turnover tax and interest cost on margin posted are required to be considered while calculating the effective buying rate realized. The realized rate is close to the Futures rate at which the contract is booked while initiating a hedge. An exporter can utilize the same Futures to hedge the risk of depreciation in foreign currency by going short on the Futures. Futures contracts in India are available on US\$, Japanese Yen (JPY), Great Britain Pounds (GBP) and the Euro.

Currency Option: In India, Currency Options are available in one currency pair i.e., US\$-INR. In case an importer wants to hedge against an expected depreciation in Indian rupee against the US\$, the importer would need to buy a 'Call Option'. This would give him right to buy a stated amount of foreign currency at the Strike price. Extending the example above, instead of going long on Futures the importer can buy a Call option with a Strike of Rs. 64.50 with expiry on July 26, 2017. To buy this Option the importer needs to pay the price called the Premium. Suppose the Premium is Rs. 0.15 per US\$. Later, on July 14, 2017, if the US\$ Spot rate, say, at Rs.64.10 is below the Strike price, the Call Option is 'Out of the money' (OTM) and not worth exercising. It may trade at a low premium like Rs. 0.01. In India, Currency Options like the Futures are cash settled. Therefore, on July 14, 2017 the importer would lift the hedge by selling the Call Option at the prevailing price i.e., Rs. 0.01. This loss of Rs. 0.14 is offset by the advantage of buying the currency at a lower rate of Rs. 64.10. Similarly if the Spot Rate on the July 14, 2017 is above the strike price, say, at Rs. 64.90, there is an advantage of exercising the Call Option and therefore, the Option may trade at Rs. 0.65.

In this case the importer would square off the hedge by selling the Call Option at Rs. 0.65 making a profit of Rs. 0.50 (0.65-0.15) per US\$. The US\$ will be bought from the Spot market at the prevailing rate of 64.90. The effective rate for buying the US\$ would be Rs. 64.40 (64.90 – 0.50). The buying price of the foreign currency can be summarized as: Foreign currency (realized buying rate) = Spot rate – (+) [Net Gain (Loss) on the Option Hedge]

Some terms related to Options are summarized below:

**Strike Price:** Contracted Price at which the underlying asset (here, the foreign currency) can be bought or sold by the Option holder.

**Expiry of Option:** Last date by/on which the right of buying or selling the currency needs to be exercised.

**European and American Style Option:** An Option gives the right to buy or sell the currency by a particular date. In case the Option is American style, the right can be exercised on any day up to the date of expiration. In case the Option is European Style it can be exercised only on the date of expiration. In India the currency Options are European Style.

**Premium:** The price paid for acquiring the right to buy (in a Call Option) or sell (in a Put Option) the underlying asset.

**Option writer:** The person who sells the right (either the Call or Put Option). The Option buyer pays the Premium to the Writer for the acquiring the right and becoming the holder of the privilege (without an obligation to do so) to buy or sell the underlying asset.

**At-the-Money (ATM), In-the-Money (ITM) and Out-of the-Money (OTM) Options:** In the situation where it is advantageous for the Option holder to exercise the option, the option is said to be In-the-Money (ITM). If it is disadvantageous for the Option holder to exercise the Option it said to be Out-of the-Money (OTM) option. When it is neither advantageous nor disadvantageous to exercise the option, it is called At-the-Money (ATM) Option. The advantage or disadvantage depends on the type of the Option along with the prevailing price of the underlying asset compared with the Strike price. Table 2.1 depicts the moneyness of Options

**Table 2.1 Moneyness of Call and Put Option**

	Moneyness of Call	Moneyness of Put
If Strike Price is Greater than underlying asset Price	Call is Out of the money	Put is In the Money
If Strike Price is equal to the price of underlying asset	Call is At the money	Put is At the money
If Strike Price is less than the underlying asset price	Call is in the money	Put is out of the money

**Natural Hedge:** There are business entities that may have a part of their revenue in the foreign currency. These may also have costs (due to imports) in foreign currency. In such a case, the business entity enjoys a natural hedge as it could pay for its costs using the foreign currency

receipts. The fluctuations of foreign exchange rates may not affect these entities and they are likely to have a lesser need for hedging via derivative products.

## 2.9 Exotic Options

The 'plain vanilla' option traded on exchanges has a simple structure and pay off. However there are more complex Option products available in the OTC market. Some of them are briefly discussed below:

**Forward Start Option:** In this option the right to buy/sell the underlying asset is conferred on purchase of the option, but can be exercised only after a fixed time period has elapsed. Like a manager of a company may be given the right to buy the shares of a company, but the right can be exercised only after, say, one year from the grant of the right.

**Binary or Digital Option:** The payoff in a standard Call or Put is based upon the difference between underlying asset price and the strike price. In a Binary Option the payoff is either a fixed sum of money or nothing. These Options are also referred to as 'cash or nothing' option. The payoff is dependent on the asset price crossing the strike price. The payoff instead of cash can also be in the form of an asset being delivered in lieu of cash. This is called 'asset or nothing' option.

**Barrier Options:** These Options either come alive or get extinguished upon the asset price hitting a particular barrier. Once the barrier is touched they behave as plain vanilla options. There can be 'Knock-in' or 'Knock-out' options. Knock-in options come alive only after the barrier is touched and the Knock-out options are extinguished upon the underlying asset hitting the barrier. There can be two variants of Knock-in options i.e., up and in and down and in. Similarly for Knock-out options there is up and out and down and out. For example there can be a up and in Call Option with a strike price of Rs. 100 on a stock with an expiry of three months and a barrier of Rs. 110. Assume that the current market price of the stock is Rs. 99. Even if the price moves to Rs.105 the option will not be activated (though it is In-the-money). Once the price of the stock touches Rs.110 this Option will become alive and then will be treated as a normal Call Option with the specified Strike.

**Asian Options:** The payoff of a normal Call option is dependent on the final price of the underlying asset and the strike price. In an Asian option, instead of the final price of the

underlying, the average price of the asset over the life of option is considered and payoff is given as average price minus the strike price. Another variant of this option is that payoff is defined as the difference between the final price and the average of asset price over the life. In this case the strike price is taken as the average of the underlying asset prices.

**Bermudian Options:** The American style Options are such that they can be exercised anytime till the expiry whereas European Options can be exercised only at the maturity. Bermudian Options are somewhere in between. They can be exercised more than once during the tenure of the option at pre-decided time intervals till the maturity of the Options.

**Shout Options:** In these options the holder has the right to 'shout' at the writer during the tenure of the option. The holder would generally shout when the option is In-the-money and wants to lock in a gain while still expecting a higher profit till expiration of the option. Therefore the payoff is higher of the payoff at shout or the expiry.

## **2.10 Report of RBI Internal Working Group for introducing Currency Futures in India**

In the post liberalization era the capital controls on currency flows diminished and this led to sizeable rise in cross border trade and investments. This also called for providing more alternatives for currency risk hedging in addition to the OTC products available. Currency Futures were being considered for introduction in the Indian market. Prior to launch of exchange-traded futures the RBI wanted to thoroughly examine the pros and cons of exchange-traded currency derivatives. An internal working group was constituted by RBI which presented its report in 2007.

The mandate and terms of reference the RBI Internal Working Group inter alia included the following:

- Provide specification of proposed Futures contract with regards to size, tenure etc.
- Study the extant legal framework and suggest necessary changes for the launch of exchange-traded Currency Futures.
- Assess the likely impact of Futures on volatility in the Spot market.
- Estimate the impact on RBI's efficacy in implementing its desired monetary policy in the wake of introduction of Currency Futures.
- Suggest a framework for setting up an exchange.

The group reviewed the impact of Currency Futures in the international market. In 2007 South Africa had just introduced these exchange-traded derivatives. RBI was faced with the moot question: Should capital controls (though limited) co-exist while allowing Futures? India had liberalized to a great extent by 2007 (starting in 1990s) and the Rupee was fully convertible on the current (trade) account but not on the capital account. There were several relaxations in controls on the capital account too, but it was not fully and freely convertible. However the country was moving towards fuller convertibility. The introduction of Futures would have been one step forward in this direction. The apprehension regarding Futures was that this could lead to ‘dollarization’ of the Indian economy. Dollarization refers to official acceptance of a foreign currency for dealing in domestic market and eliminating the need for having home currency. In partial dollarization the domestic currency and foreign currency both co-exist as official currencies. The residents of the home country may begin to hold assets in foreign currency. The negative impact of this could be that the Central Bank of the home country may lose hold on implementation of the desired monetary policy. In an extreme situation, when the foreign country whose currency has been accepted officially is following an expansionary policy and domestic economy is facing high inflation, the Central Bank of the home country may not be able to effectively tighten credit policy which is aimed at containing inflation. This is because the financial markets and the currency markets are linked. The Central Bank may also not be able to act as the ‘Lender of the last resort’ in a dollarized economy as it would not be able to print its currency. This was an important consideration for the RBI. To maintain moderate control and guard against any extreme impact of dollarization the group suggested ‘Cash’ settled Futures contract for India. After due thought and consideration the working group felt that the likely adverse impact of Futures could be controlled and monitored through proper policy framework and that the benefits of Futures could far outweigh the expected disadvantages and hence recommended the introduction of Futures.

### **2.11 Highlights of the regulatory framework concerning the currency derivatives in India**

There is strong empirical evidence that legal framework affects the functioning and development of financial markets. A conducive legal environment with a proper surveillance and safety mechanism is likely to have a healthy effect on the growth of currency markets.

The laws pertaining to foreign currency transactions are contained mainly in the Reserve Bank of India Act (RBI Act) and Foreign Exchange Management Act (FEMA). The RBI Act was amended in 2006 to give it an overriding effect over the Securities and Contract Regulations Act. The amendment introduced the definition of the term ‘derivative’ (to include foreign currency derivatives) and empowered RBI to regulate dealing in the same. The provisions contained in FEMA empowered the RBI to restrict dealing on capital account or otherwise in foreign currency without its prior approval. Even if approval was to be granted, it was only for the purpose of hedging based on a crystallized underlying exposure evidenced by rigorous documentation. Small and Medium enterprises were granted some leeway from the rigorous documentation for hedging exposure up to US\$ 1, 00,000. Therefore, in effect, FEMA allowed transactions only for hedging and not for speculative or arbitrage activities. In a currency futures market these restrictions on speculative and arbitrage activities were not desirable and therefore a recommendation was made to amend the FEMA provisions accordingly.

It may be pertinent to note that the currency deals the world over are still dominated by OTC markets. The Triennial Central Bank Survey of foreign exchange and OTC derivatives markets in 2016 conducted by the Bank for International Settlements provides the data on average daily turnover in the foreign exchange market. The April 2016 data are presented Table 2.2.

**Table 2.2 OTC Foreign Exchange Turnover, Net-Net Basis<sup>1</sup> Daily Averages in April, In Billions of US Dollars**

Instrument	2001	2004	2007	2010	2013	2016
Foreign exchange instruments	1,239	1,934	3,324	3,973	5,357	5,067
Spot transactions	386	631	1,005	1,489	2,047	1,652
Outright forwards	130	209	362	475	679	700
Foreign exchange swaps	656	954	1,714	1,759	2,240	2,378
Currency swaps	7	21	31	43	54	82
Options and other products <sup>2</sup>	60	119	212	207	337	254
<i>Memo:</i>						
<i>Turnover at April 2016 exchange rates<sup>3</sup></i>						
Exchange-traded derivatives <sup>4</sup>	12	25	77	145	145	115

1 Adjusted for local and cross-border inter-dealer double-counting (i.e. “net-net” basis). 2 The category “other FX products” covers highly leveraged transactions and/or trades whose notional amount is variable and where decomposition into individual plain vanilla components was impractical or impossible. 3 Non-US dollar legs of foreign currency transactions were converted into original currency amounts at average exchange rates for April of each survey year and then reconverted into US dollar amounts at average April 2016 exchange rates. 4 Sources: Euromoney Trade data; Futures Industry Association; The Options Clearing Corporation; BIS derivatives statistics. Foreign exchange futures and options traded worldwide. (Source: www.bis.org)

Table 2.2 highlights that the exchange-traded derivatives account for a small percentage (2.2%) of the total foreign exchange turnover. Turnovers in Forwards are almost six times that of exchange-traded derivatives. However the turnover of exchange-traded derivatives is rising and has almost grown ten times from 2001 to 2016.

The introduction of Currency Futures was aimed at providing a cost effective, efficient and transparent platform to small and medium players in India. The portion reproduced from the Internal working group’s report underscores the point:

“6.04 The Group acknowledged that since the currency futures segment is meant to provide non-institutional market participants a means to hedge their currency exposures in a transparent and price-efficient manner, the size of the currency futures contract should not be

unduly large. Large institutional and corporate customers are able to manage beneficial rates even in the OTC segment. The price discovery function of the exchanges is significant for the individuals and SMEs. Further, price discovery should be such that the individuals and SMEs are able to trade on the same prices as are available to the large customers. ....”

Traditionally the importers and exporters in India have relied on Currency Forward (OTC) products to hedge their transaction exposure. Futures were aimed at providing an added choice with SMEs expected to benefit from it. Currency Futures were finally introduced in 2008 in India. So, questions that arise are: Has the introduction of futures achieved the expected objective of providing an effective hedging alternative to the OTC Forwards in India? Can the SME importer or exporter in India benefit from the Currency Futures vis-à-vis Forwards in India?

The researcher was interested in knowing whether empirical evidence was available to gauge the performance of Futures v/s Forwards. *One can gauge effectiveness of the foreign currency hedge, based on the exchange rate realized as a result of the hedge.* A literature review of the extant studies was done. The material reviewed is discussed in the following sections.

## **2.12 Literature review of extant studies related to currency derivatives**

Copeland and Joshi (1996), aimed at finding out whether the forex hedging programs, undertaken by corporate entities, were more effective compared to a situation where no hedging was done. The effectiveness was measured by comparing the variability of hedged cash flows versus that of the unhedged cash flows. The variability of the cash flows was measured in terms of the standard variation of the cash flows. Effect of hedging on cash flows was captured using a proxy from translation adjustments mentioned in the financial statements of the companies. Data for one hundred and ninety eight (198) companies over ten years were studied. The results of the research indicated that only 1 in 198 companies was able to reduce the cash flow volatility by more than 20%. About 13 companies were able to reduce the cash flow volatility by 10%.

It was mentioned in the research that in effect hedging programs were not effective in reducing the cash flow volatility to an extent that would make the hedging program meaningful. Another important example for a European Airline company was highlighted wherein the hedging program actually went against the company's interest and nullified the natural hedge. The company's revenue in the local European currency was linked to movement in the US Dollar. A weak Dollar (Foreign currency for European Company) meant lesser revenues and the same also meant lesser cash outflow for payment in dollar terms. The reverse would be the situation if the Dollar got stronger against the European currency. This natural hedge was, in effect, nullified by undertaking hedging on Dollar. The airline faced a cash crunch due to MTM payments on the forward hedge and the operating cash flows were negatively impacted. So it was advised that the extent of correlation between the cash flows and FX rate movements is important while hedging decisions are undertaken. The crux of the research was that FX hedging alone could not meaningfully or significantly impact the volatility in the cash flows of a company and there were several other factors like demand for services or products, cost related to raw material and labor that had impact on the volatility of operating cash flows of a corporation.

Geczy, Minton & Schrand (1997) studied the determinants of using derivatives by corporates. The study outlined three broad parameters:

- Incentives for use currency derivatives (for Managers, Bondholders, Equity Holders)
- Variation in Cash flows / earnings due to exposure to foreign exchange rate risk
- Cost of implementing a hedging strategy.

The sample of firms was drawn from the Fortune 500 list and published data for 1990 were utilized. The firms were divided into users and non-users of derivatives. Proxy variables were used for three parameters (determinants); like Option on stocks available to managers was a proxy for incentives for using currency derivatives. The bondholders are concerned with the reduction in financial distress costs. The probability of financial distress was considered to be higher for firms with higher long-term debt ratios and lower interest coverage ratios. The variation in cash flows due to foreign currency exposure was captured through foreign pre-tax income and foreign sales as proportions of total income and total sales respectively. The cost of hedging was indicated by economies of scale as reflected in the size of a firm as also the degree of foreign exposure (again indicated by foreign income and foreign sales). Two

other variables i.e., R&D expenses as a proportion of sales (RD) and Capital Expenditure divided by total Book Value (CAPEX) of the firm were also considered as proxies for growth opportunities.

The difference in the means of the variables between user and non-user firms was tested for significance. The results showed that incentives for use of currency derivatives like managerial options and long-term debt ratio were not significantly different for users of derivatives when compared with non-users. However, user firms with growth opportunities significantly differed in the means of RD and CAPEX from non-users of derivatives. The outcomes show that growth opportunities need support of derivatives to reduce any unexpected variation in cash flows due to exchange rate movement.

With regard to the cost of implementing a hedging program, the user firms were significantly larger in size (market cap). They also had a larger foreign exchange exposure arising out of foreign currency denominated debt or foreign sales or imports. Variation in cash flows due to exchange rate risk is a significant determinant for the use of currency derivatives.

Instruments of corporate hedging in India were examined (Anuradha S, and Runa S) with special reference to foreign exchange risk management. The research paper was exploratory in nature and relied on published financial data of 2006-2007 for companies like Maruti Suzuki Ltd., Ranbaxy, Mahindra and Mahindra, Reliance Industries and others. It was found that these Indian Companies relied heavily on Forwards and Options (both OTC contracts) for hedging their short-term foreign currency risk, arising out of import or export transactions. Currency Swaps were mainly utilized for long-term currency risk that emanates from foreign currency debt. Based on research conducted, Allayanis and Ofek (2001) determined that there is conclusive evidence to suggest that firms with larger size, R&D expenditure and exposure to exchange rates through foreign sales and foreign trade are more likely to use derivatives. Currency Futures have not been considered in this paper as they were introduced in the second half of 2008 in India. However the paper does highlight the need for exchange-traded derivatives in the form of futures contract.

The question whether introduction of currency futures increase the volatility in the spot currency market was studied in RBI Working Paper Series by Somnath Sharma (Sharma, 2011). This paper also reviewed the work done on this topic earlier and found that there is no conclusive evidence to suggest that index futures increase volatility in the spot market. An example was given about the study done by Figlewski (1980), who found that the futures

contracts for Treasury Bills (GNMA pass-through certificates) provides evidence that futures market activity increases the volatility of cash prices. A study by Bae, Kwon and Park (2004) focused on the effect of the introduction of index futures trading in the Korean markets on spot price volatility. The authors concluded that introducing futures and options trading on the Korean stock exchange resulted in both larger spot price volatility and greater market efficiency (allowing for quicker adjustment of market prices to information). Some other like Darrat, Rahman and Zhong (2002) find that index futures trading cannot be blamed for increased volatility in the spot market. In effect no conclusive evidence has been found to suggest that futures trading causes increase in spot rate volatility. However Somnath Sharma (Sharma 2011), conducted a study on Indian Currency futures (US\$-INR) between April 2007 and 2010 to find a causal relation between the activity (volume) in futures market and spot rate volatility. It was concluded that there is two-way causality and in effect futures activity does have impact on the spot rate volatility.

The effect of use of foreign currency derivatives on value of the French firms was studied by Clark and Mefthe (Clark and Mefthe, 2010). The study was conducted on 176 large firms in France. Published annual reports for the year 2004 were relied upon for data on financials and derivatives used by the firms. Multivariate analysis was used to study the effect of use of derivatives on the value of the firm. Other variables like size of the firm and Current Ratio were also studied for their impact on the value of the firm. Tobin's Q was considered a proxy for the value of a firm and was the dependent variable. The study concluded that use of derivatives was a positive and significant determinant of Tobin's Q. The research also highlighted that use of derivatives by larger firms had a greater impact on the value of the firm compared to the impact on value of smaller firms.

Hedging a portfolio of consisting of domestic equities and international investments has been considered in a GMO white paper (LeGraw, 2015). The researcher argues, from a U.S. investor's perspective, that hedging the foreign currency exposure on international investments may hedge that exposure on a stand-alone basis; however, the hedged portfolio may have a higher correlation in US equities vis-à-vis an unhedged portfolio. The higher correlation between the hedged international investments and the domestic U.S. equities may increase the volatility (which is a measure of risk) of the total portfolio. Therefore hedging overseas investments should be done with care. The paper recommends hedging for only those companies which have revenues and cost in domestic currency only.

P.K. Jain, Surendra S. Yadav and Ashish Kumar Rastogi (2009) conducted a study on the effect of type of ownership on the risk management practices followed by firms in India. They studied public sector undertakings, foreign controlled firms and privately owned entities in India. Based on Chi-square test they found a significant difference in risk management practices of these firms. They found that almost all the privately owned firms hedge their risk with four-fifths of the foreign controlled firms and two-thirds of the public sector firms doing so. Volatility of financial markets is a significant factor affecting risk management. The firms are highly concerned about monitoring and evaluating the risk of derivatives.

Vargas and Kessakorn (2013) sought to examine if international portfolios of investments, by European investors, in emerging economies like China and India performed better using Forwards or Puts. The research was not able to reach a firm conclusion as to whether forward contracts or put options outperform one another. The strike price of the Put had an impact on the performance of the portfolio. Their findings suggested that forward contracts are more effective compared to put options with strike prices of 1%, 5% and 10% above spot rate whereas put options with strike price of 15% above the spot rate is more effective compared to forwards in term of hedging currency risk in international portfolio. The limitation with this research was that the Put prices were calculated using a formula as no data of Put prices were available.

Determinants of derivatives usage were studied with a global sample (Sohnke M et al., 2009) to overcome the shortcoming of country-specific sample of firms. The sample was drawn from 50 countries that included 7319 firms. The research examines the theory related to factors that motivate hedging. In research prior to this paper, it had been suggested that firms with higher leverage, shorter debt maturity and low liquidity are likely to use derivatives. Large firms with high dividend yield and stable cash flows are less likely to use derivatives. The research found that, consistent with the financial distress and tax hypotheses, general derivatives users have both higher leverage and lower liquidity (as estimated by quick ratios). However, other results are counter to the financial distress hypothesis. Hedgers are larger and more profitable (higher ROA), and have longer debt maturity and higher interest coverage ratios. It was also observed that hedgers have lower market-to-book ratios and capital expenditures and tend to be less R&D intensive. This was not consistent with the finding of Geczy *et al.* (1997). However, the interaction between market-to-book and leverage has the

predicted difference: hedgers are more likely to be growth firms with high debt levels. This research showed that the factors like leverage and liquidity were not the only determinants for use of derivatives. Large firms with higher ROA (return on assets) also used derivatives. This suggests that besides the determinants established by research work, the motivation behind the use of derivatives could be the intuitive reasoning adopted by finance managers.

Simkins, Carter, and Rogers (2003) did research on the impact of hedging on the US Airline industry. The study was aimed at finding the effect of fuel price hedging on the value of the US Airline companies. The researchers studied the advantage of hedging in terms of preserving the internal cash flows, that could be utilized to purchase aircrafts in future as well as for making acquisition of weak companies during a downturn. Data from 1979 to 2000 was analyzed for US airline companies. Correlation among jet fuel costs, cash flows and investment opportunities (capital expenditures) was studied. The rationale presented was that the hedging was more valuable, when jet fuel costs and investment opportunities are positively correlated and operating cash flows are negatively correlated to fuel cost. Higher jet fuel cost tends to reduce cash flow for the company. A lower cash flow environment could force weak companies to get acquired and companies that preserved their cash flows by hedging could use these opportunities to acquire weaker companies. The study also focused on impact that hedging programs have on the value of the airline companies. The researchers found that hedging programs and value of the firm are positively correlated.

Levich and Thomas (1993) looked at the strategy of hedging foreign currency risk based on technical rules. The study made a comparison of strategies that simply follow “always hedge” or “never hedge” with the strategies of ‘hedge sometimes allowing for partial hedging or over hedging’ if the rule indicated so. The research basically studies active foreign currency risk management. The study focused on Filter rules and Moving average cross over rules. The filter rule for filters of 0.5%, 1%, 2%, 3%, 4%, 5% and 10% were analyzed. The moving average rules for 5/1, 20/5 and 100/1 were examined. Moving averages required long-term and short-term moving averages. A rule ‘5/1’ means five days moving average versus one day moving average. The research found that it was possible to generate better returns (which are statistically significant) for international bond portfolio and currency futures, for U.S. investors, by following simple technical trading rules versus the ‘buy and hold strategies’. It

made a case for active or selective hedging vis-à-vis passive 'always hedge' or 'never hedge' full exposures to foreign currency.

Guay, W., and Kothari, S.P. (2003) studied the extent to which large non-financial firms hedge their financial risk using derivatives. The study took a relook at the impact of hedging on the value of the firm. Previous studies showed that hedging corporate risk enhances the value of the firm. To study the impact of fluctuations in interest rate, exchange rate and commodity price on the value of the firm, the researchers examined the benefit of derivatives used for hedging. Impact on cash flow of the firms and the value of firms was estimated assuming a move of three standard deviations in interest rate, exchange rate and commodity price simultaneously. The study found an average impact of \$15 million on cash flows which was relatively small compared to the annual operating cash flows of the firm. It was, therefore, suggested to take a relook at the conclusions of earlier studies of Allayannis and Weston (2001) which suggested that use of derivatives could give an edge, as high as four percent in terms of market value to users of derivatives compared to non users.

Hentschel and Kothari (2001) examined whether the firms use derivatives with motive of speculation or hedging. It mentioned that US regulators are concerned about the use of derivatives for speculative purposes and hence a study that throws light on association of use of derivatives with speculation could provide pointers to the regulators for action. It was concluded that there isn't a significant association between firms' derivative positions and the standard deviations of firms' stock market returns. The risk characteristic was defined as the standard deviation of the stock market returns. The study found that there wasn't a significant difference between the risk characteristic of firms that held large derivatives position and the ones that either had no or very low derivatives positions. Therefore, it was suggested that the regulator should not be worried about the widespread notion that U.S. corporations were using derivatives with a speculative motive.

Kit Pong Wong (2003) examined the 'separation theorem', which states that the production decisions of firms are neither affected by risk attitudes of the firms nor by the incidences of uncertainty, if the firms have access to Futures and Forwards markets. The study also examined the 'full hedging theorem' which states that firms selling exclusively in foreign markets should fully hedge their exposure. The researcher mentions that as a corollary of the full hedging theorem, Options are redundant as hedging tool. The research suggests that separation theorem holds when selling exclusively in domestic market is suboptimal even if

the spot exchange rate is most unfavorable. Full hedging theorem holds only when it is optimal to sell the entire production in the domestic market. Options introduce non-linearity in the firms' profit when compared with Forwards or Futures. Therefore it was suggested that where a firm exports a part of its production, it should consider hedging through Options.

Kenneth Froot (1993) examined if an international portfolio of investments should be fully hedged. The study mentioned about previous research which argued that hedging the portfolio fully does not lower the returns but reduces the variance of portfolio returns. The researcher argued that a hedge ratio of one may be appropriate for short-term horizon but the same may not be a case for a long-term horizon. In fact, a fully hedged portfolio, over a long-term horizon, may either reduce the variance marginally or increase the variance in some cases. It was found that for equity investments made in a foreign country, the variance of returns increased when the horizon for investment was five years or above, if the portfolio was fully hedged. Similarly for a bond portfolio the variance was found increased for investment horizon of eight years and above if the bond portfolio was fully hedged.

Myrvin L. Anthony (1995) suggested that emerging or developing economies should use hedging instruments like Forwards, Futures and Swaps to hedge commodity price risks, exchange rate fluctuations and interest rate fluctuations. The use of these instruments could help in containing risk for these countries which could enhance their credit rating and reduce the cost of funds that are raised from international markets. It also mentioned that a part of price risk for the international transactions was transferred to developed countries by the use of derivatives. And since, the developed countries may have a comparative advantage in dealing with these risks the cost of hedging may be reduced for the developing countries. However, smaller economies which have a poor credit rating, requiring upfront margins, may find the cost of hedging high enough to impede the use of derivatives instruments. A lack of technical capability may also obstruct the use of derivatives for these countries.

Randall Dodd (2009) studied the exotic options viz. KIKO and TARN, which led to severe economic losses for the users of these instruments. The huge losses due to these exotic options on currencies, not only led to losses and bankruptcy for its users but also had an adverse impact on the country's economy. The study mentioned that it was difficult to ascertain whether they were employed, by non financial corporations, for hedging or speculating. It was also difficult to confirm if the users had sufficient knowledge to understand the outcomes of these Options. Whether the bank officials forced the corporations

to buy these options in lieu of rolling over the loans? Did the bank officials make it appear cheaper than the standard Forwards, thereby enticing the corporations to use these exotic options? These questions are difficult to answer. The underlying characteristic of these options was that the profits were limited for corporations (due to the Knock out feature) but the losses were not capped. This neither served the purpose of hedging nor making speculative profits for corporations and therefore, these products were not suited to the need of the user companies. In order to avoid recurrence of such losses, it was suggested that disclosure norms for derivatives positions be made clear. The price and amount of foreign currency hedged under derivatives should be disclosed by the users so that regulators get an idea of the exposures and can raise an alarm before the situation worsenes. It was also suggested that a list of products be made where “positive” and “negative” products are listed. Negative meant that products in this list should not be allowed to be used by non-financial corporations who lack the sophistication and expertise that financial corporations possessed.