



STRUCTURED DERIVATIVES: A TOOL FOR HEDGING RISK OR POTENTIAL FINANCIAL BOMB?

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ABSTRACT

In today's Indian Financial Markets we generally come across typical kind of products / Financial Instruments which are being sold in the market. These instruments are the outcome of so called Financial Engineering / Financial Innovation and are often quite complex in nature to understand. These products are typically referred as "structured products" in case of derivatives.

There is no standard definition of these products as they are customized products and tailored to meet specific requirements. Almost all such products are traded over the counter. In a typical setup of a bank, these products are framed by Derivative Structuring Desk and sold by the Dealers – Derivative Sales. There are Relationship Managers (RM) who interact with the clients to know their requirements and explain them the various risks involved in these products. Normally, these products are combination of call and put options with various added features such as knock-in, knock-out, barrier levels which are included to adjust / restrict the payoff.

These products can be sold by the Bank keeping in mind the various legal requirements which may be imposed by RBI, FIMMDA and other regulators. Each product is unique in its own and has its own special features. Normally, what can be observed from Financial Market products is that they are named by the Bank who develops the product. If the product becomes widely acceptable to and meets requirement of customers at large, it then becomes tradable and the volumes increase. In case the Bank is not granted option license by RBI, the Bank cannot sell the

product individually and take positions in market. In such a case, the Bank covers its position with off setting trade with different counterparty.

Typical examples would include products with name and style as “Target Redemption Notes (TARN)”, “Range Accruals”, “No Touch option (NT)”, “Double No Touch option (DNT)”, “Knock-in / Knock Out Options (KIKO)”, “Principal Only Swap with option protection (POS)”, “Double Barrier Options”, etc.

In this paper, we have tried to establish certain kind of relationships and validated some of the relationships along with forecasts. The researcher has used sensitivity analysis, scenario analysis and pay-off diagrams to support the conclusions drawn. These methods are scientific and well accepted in Financial Markets to analyze any structure deals.

The paper attempts to analyze in depth a particular structured derivative known as Seagull Option with reference to USD/INR currency pair.

1. Introduction to Derivatives and Definition of Terms used in this research paper

Various authorities have defined “derivatives” from their own perspective. Below are listed few of them to get an idea about what exactly is meant by derivatives. On observing the below mentioned definitions, one can conclude that the definition have quite a bit of common elements in them.

1.1 Derivatives – As defined generally / known commonly:

Derivatives are financial contracts, or financial instruments, whose values are derived from the value of something else (known as the underlying). The underlying on which a derivative is based can be an asset (e.g., commodities, equities (stocks), residential mortgages, commercial real estate, loans, bonds), an index (e.g., interest rates, exchange rates, stock market indices), or other items (e.g., weather conditions, or other derivatives).

Credit derivatives are based on loans, bonds or other forms of credit.

The main types of derivatives are: forwards (which if traded on an exchange are known as futures); options; and swaps.

Derivatives can be used to mitigate the risk of economic loss arising from changes in the value of the underlying. This activity is known as hedging. Alternatively, derivatives can be used by investors to increase the profit arising if the value of the underlying moves in the direction they expect. This activity is known as speculation.

Because the value of a derivative is contingent on the value of the underlying, the notional value of derivatives is recorded off the balance sheet of an institution, although the market value of derivatives is recorded on the balance sheet.

1.2 Derivatives – As defined by RBI Act:

For regulatory purposes, derivatives have been defined in the Reserve Bank of India Act, as follows:

"derivative" means an instrument, to be settled at a future date, whose value is derived from change in interest rate, foreign exchange rate, credit rating or credit index, price of securities (also called "underlying"), or a combination of more than one of them and includes interest rate swaps, forward rate agreements, foreign currency swaps, foreign currency-rupee swaps, foreign currency options, foreign currency-rupee options or such other instruments as may be specified by the Bank from time to time.

1.3 Knock-In Option

Part of the Barrier Option family, any option which does not exist until the underlying index breaches the defined barrier level during the life of the transaction. Generally, the index level is defined as breached in one of two ways:

- (a) The index is measured at a fixed time each day (say 12.00 London time), and defined as breached only if it breaches at that particular time of day, or
- (b) The index is monitored 24 hours a day and can be breached at any time.

1.4 Knock-Out Option

Part of the Barrier Option family, any option which ceases to exist when the underlying index breaches the defined barrier level during the life of the transaction. Generally, the index level is defined as breached in one of two ways:

- (a) The index is measured at a fixed time each day (say 12.00 London time), and defined as breached only if it breaches at that particular time of day, or
- (b) The index is monitored 24 hours a day and can be breached at any time.

2. Research Methodology

2.1 Population for Research:

Derivative segment of Financial Markets of Banks in India comprises the population.

2.2 Sample Selected: USD/INR Seagull Option

2.3 Data Study and Analysis: Study of Structured Deals

The structured deal was studied in detail to understand the nature and concept of the deal. The study included the following:-

- (a) Nature of product
- (b) Type of product
- (c) Description of product
- (d) Term Sheet of the product
- (e) Advantages and disadvantages of entering the product

2.4 Purpose of Entering into Transaction

The structure was studied to understand the purpose behind entering in to the transaction. The different purposes of entering into any transaction can be broadly divided as under:-

- (a) Hedging
- (b) Speculation
- (c) Arbitrage

As per the RBI regulations, the purpose of entering into derivative market segment by corporate can be only to hedge a genuine foreign currency exposure. The research paper focuses on to

analyze the product to identify whether the intention of hedging is met. Purpose can be identified by looking into the underlying exposure of the client.

The clients can have different type of exposures in different currency segments. The foreign currency exposure arises due to exports / imports / remittances. To cover the exchange risk, the corporate may enter into derivative segments. The product and purpose selection would also depend on type of exposure such as interest rate risk, exchange risk, etc.

2.5 Performing Scenario Analysis

Definition of 'Scenario Analysis'

“The process of estimating the expected value of a portfolio after a given period of time, assuming specific changes in the values of the portfolio's securities or key factors that would affect security values, such as changes in the interest rate, exchange rate, etc.”

Scenario analysis commonly focuses on estimating what a portfolio's value would decrease to if an unfavorable event, or the "worst-case scenario", were realized. Scenario analysis involves computing different reinvestment rates for expected returns that are reinvested during the investment horizon.

The sample was analyzed by performing scenario analysis. In scenario analysis, every situation which could occur on maturity was analyzed to know the various possible scenarios and outcomes of the structure. A typical scenario analysis would cover every possible exchange rate that may prevail on maturity date. It would then analyze for each pay off which would result due to each type of maturity and exchange rate combination. One may call this as permutation and combination analysis.

The primary purpose of doing scenario analysis is to understand payoff for each case possible in future. It gives better clarity of the product and its nature. Further it also gives clarity of the maximum risk exposure / maximum profit and loss which can occur in entering the transaction.

2.6 Collection of Data for Foreign Exchange

The rates for foreign exchange were obtained from historic data from foreign exchange websites. There are several websites which offer historic data of various currency pairs such as oanda, fxtop, global-rates, etc. The rates can be obtained for any past period. Researcher has included the rates to calculate payoff profiles and to perform scenario analysis. For projections and forecasting the forward rates were used which is the most accurate method to derive rates for forecasting.

2.7 Calculation of Payoff

Payoff analysis in simple terms means to calculate the profit / loss pattern. It is profit v/s exchange rate diagram on X-Y axis. In each structure analysis, payoffs were calculated from client side and / or bank side. The payoff diagrams give a better clarity to understand the profit / loss profile of the structure in different conditions. The dependent variable in such case is the exchange rate.

Instead of testing a particular hypothesis / hypothesizes various deals using financial techniques have been analyzed to draw general conclusions. One may say that in the analysis of various deals how general conclusions could be drawn. Researcher answer to this is that every deal represents a situation which is an outcome of the interaction of the firm / environment and the regulatory provisions.

So, within the boundary of the nature of the firm / environment and regulatory provisions, pertinent conclusions can be arrived at. At the end of the work the researcher has discussed these issues and all such questions have been addressed.

3. Illustration of Structured Derivative: USD/INR Seagull Option: Transaction in Brief:-

FINAL TERMS OF THE TRANSACTION

Notional Amount	: USD 5,000,000
Underlying	: USD 5,000,000 receivables
Trade Date	: January 22, 2010
Expiry Date	: April 28, 2010

Settlement Date : April 30, 2010
Cut : Tokyo
Option Style : European
Business Day Calendar : New York, Mumbai

Option Structure:

Party B buys USD put/INR call at 46.30, notional USD 5 Mio for expiry date

Party B sells USD call/INR put at 47.00, notional USD 5 Mio for expiry date

Party B sells USD put/INR call at 45.30, notional USD 5 Mio for expiry date

Payoff Profile:

On expiry date,

If USD/INR Exchange Rate fixes below 45.30, Party B has the right to sell USD 5 mio against INR at 100 paisa better than market rate for settlement at Settlement Date

Else if USD /INR Exchange Rate fixes at or above 45.30 and below 46.30, Party B has the right to sell USD 5 mio against INR at 46.30 for settlement at Settlement Date

Else if USD/INR Exchange Rate fixes at or above 46.30 and below 47.00, Party B sells USD 5 mio against INR at market rate

Else if USD/INR Exchange Rate fixes at or above 47.00, Party B has an obligation to sell USD 5 mio against INR at 47.00 for settlement at Settlement Date

ADVANTAGES OR UPSIDE:

On expiry date, Party B is able to sell USD/INR at better rate than prevailing market rate if USD/INR is below 46.30 and is also open to participate in the depreciation of INR against USD till 47.00

RISKS OR DOWNSIDE:

On expiry date, if USD/INR fixes below 47.00, Party B would be obliged to sell USD/INR at rated worse off than prevailing market rate

MAJOR VARIABLES AFFECTING THE TRADE: USD/INR Exchange Rate

4. Data Collection, Discussions and Interpretations:-

1. The dependent variables were identified as under:-
 - a. USD / INR Exchange Rate
2. This structure is referred to as USD/INR Seagull Option. In this structure, the client buys one put option and sells one call & put options at different strike prices.
3. As can be seen the client has entered into the following:-
 - a. Party B buys USD put/INR call at 46.30
 - b. Party B sells USD call/INR put at 47.00
 - c. Party B sells USD put/INR call at 45.30
4. Client has committed to the following based on above:-
 - a. Party B has right to sell USD at 46.30 (will be exercised if the market rate is less than 46.30)
 - b. Party B has obligation to sell USD at 47.00 (will be exercised if the market rate is more than 47.00)
 - c. Party B has obligation to buy USD at 45.30 (will be exercised if the market rate is less than 45.30)

5. Scenario Analysis:-

- a. For all levels below 45.30 the client was in a fixed profitable position of Rs. 50.00 Lacs. This is because there were two options being exercised. One put option where the client had profits and another put option by bank. This lead to difference of 46.30-45.30 which is 1.00 and hence a fixed profit of Rs. 50 Lacs.
- b. The clients profit started reducing and became zero at 46.30 level.
- c. For all levels between 46.30 and 47 the client was in no profit and no loss position as none of the options were exercised.
- d. For levels above 47 the client was in loss position due to option number 2 where the client had obligation to buy USD at 45.30.

6. **Actual Market Data Analysis:-**

- a. Spot Rate Fixation of USD / INR on Maturity Date i.e. 28/04/2010 was observed to be 44.60
 - b. Therefore, the client will be getting a profit of Rs. 50 Lacs in the structure.
7. Structure calculations with graphs showing pay-off has been shown ahead in this paper as Annexure-1.
8. Historic Rates data for USD/INR were taken from acceptable websites.

5. Conclusions:-

1. **Scenario Analysis:-**

- a. For all levels below 45.30 the client was in a fixed profitable position of Rs. 50.00 Lacs. This is because there were two options being exercised. One put option where the client had profits and another put option by bank. This lead to difference of 46.30-45.30 which is 1.00 and hence a fixed profit of Rs. 50 Lacs.
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2. **Actual Market Data Analysis:-**

- a. Spot Rate Fixation of USD / INR on Maturity Date i.e. 28/04/2010 was observed to be 44.60
 - b. Therefore, the client will be getting a profit of Rs. 50 Lacs in the structure.
3. On a close analysis based on sample selected, we can conclude that the structured products are used for speculative purposes rather than hedging (risk management) against potential future losses.
4. Options help clients to reap the extra benefit when the rates turn out to be better exchange rates. In case of forwards the rates are locked and locking does not allow client to reap extra benefits. Locking of rates has intentions that no matter what the market conditions prevail, the client will transact in the pre-determined exchange rate. This is an example of true spirit of hedging. Options lure clients for extra benefits. Embedded options with

complex structure, barriers and leverage inclusions simply add up to the speculation intentions.

6. Recommendations:-

1. There should be adequate product suitability checks on each product so that each product is validated in the light of regulatory norms.
2. There needs to be a check on selling of these products and such checks should test the validity of underlying exposure in foreign exchange as well as the genuine requirements of the purchaser
3. The motive of the client should be well defined and well analyzed before selling these structured products.
4. The post deal monitoring should be done rigorously so that each deal is checked for and analyzed for the sole purpose of hedging.
5. A detailed and comprehensive pre-deal check up needs to be done to understand exact client requirements and based on the same the deal / structure should be designed.
6. The relationship manager / authorized person from bank should inform client about the intricacies of the structure in detail and in true letter and spirit before entering in the structure.
7. Clients should be given access to monitor its structure position. Client should be informed very frequently about rate movements and adverse situations.

Annexure-1
USD/INR Seagull Option

Trade Date 1/22/2010
 Expiration Date 4/28/2010
 Delivery Date 4/30/2010

USD Notional 5,000,000

Strike Price-1 46.30
 Strike Price-2 47.00
 Strike Price-3 45.30

Party A Bank
 Party B Client

Option Structure:

- 1 Party B buys USD put/INR call at 46.30, notional USD 5 Mio for expiry date
- 2 Party B sells USD call/INR put at 47.00, notional USD 5 Mio for expiry date
- 3 Party B sells USD put/INR call at 45.30, notional USD 5 Mio for expiry date

Interpretation of Option Structure:

- 1 Party B has right to sell USD at 46.30 (will be exercised if the market rate is less than 46.30)
- 2 Party B has obligation to sell USD at 47.00 (will be exercised if the market rate is more than 47.00)
- 3 Party B has obligation to buy USD at 45.30 (will be exercised if the market rate is less than 45.30)

Possibilities	Options Exercised	Options Expired
Rates<45.30	1,3	2
Rates>45.30 but less than 46.30	1	2,3
Rates>46.30 but less than 47.00	0	1,2,3

Rates>47

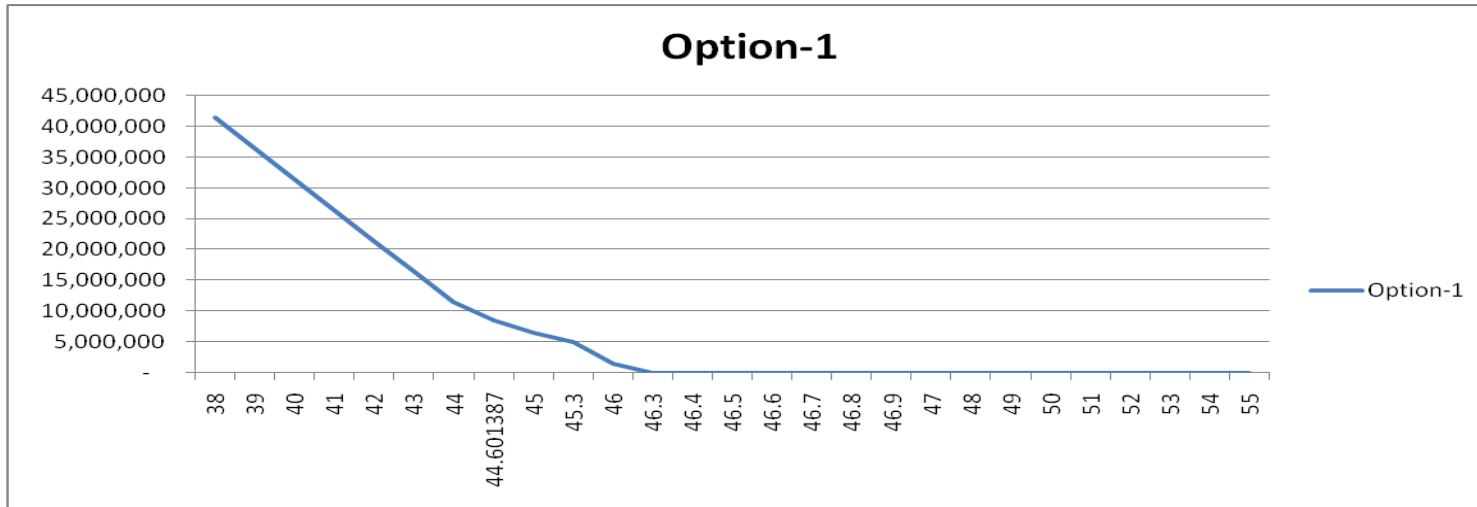
2

1,3

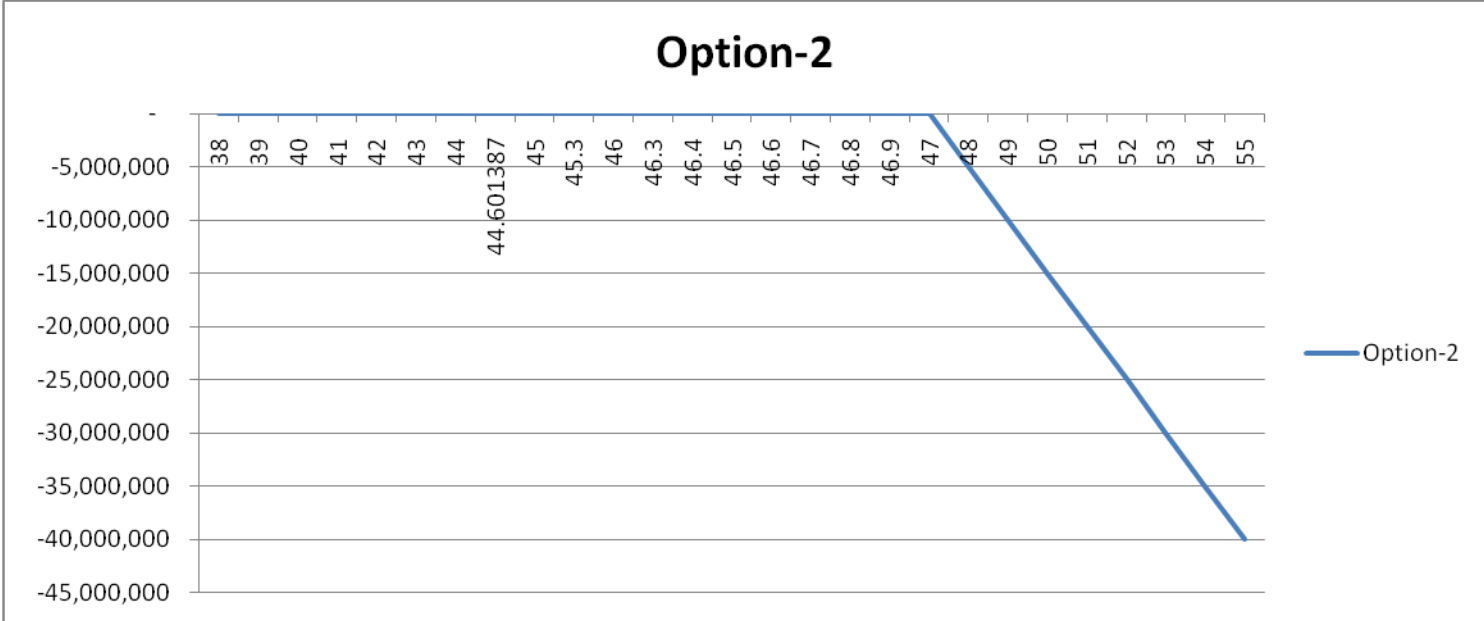
Scenario Analysis:

Spot Rate	Option-1	Option-2	Option-3	Net Profit / (Loss)
			-	
38	41,500,000	-	36,500,000	5,000,000
			-	
39	36,500,000	-	31,500,000	5,000,000
			-	
40	31,500,000	-	26,500,000	5,000,000
			-	
41	26,500,000	-	21,500,000	5,000,000
			-	
42	21,500,000	-	16,500,000	5,000,000
			-	
43	16,500,000	-	11,500,000	5,000,000
			-	
44	11,500,000	-	6,500,000	5,000,000
			-	
44.601387	8,493,065	-	3,493,065	5,000,000
			-	
45	6,500,000	-	1,500,000	5,000,000
			-	
45.3	5,000,000	-	-	5,000,000
			-	
46	1,500,000	-	-	1,500,000
			-	
46.3	-	-	-	-
			-	
46.4	-	-	-	-
			-	
46.5	-	-	-	-

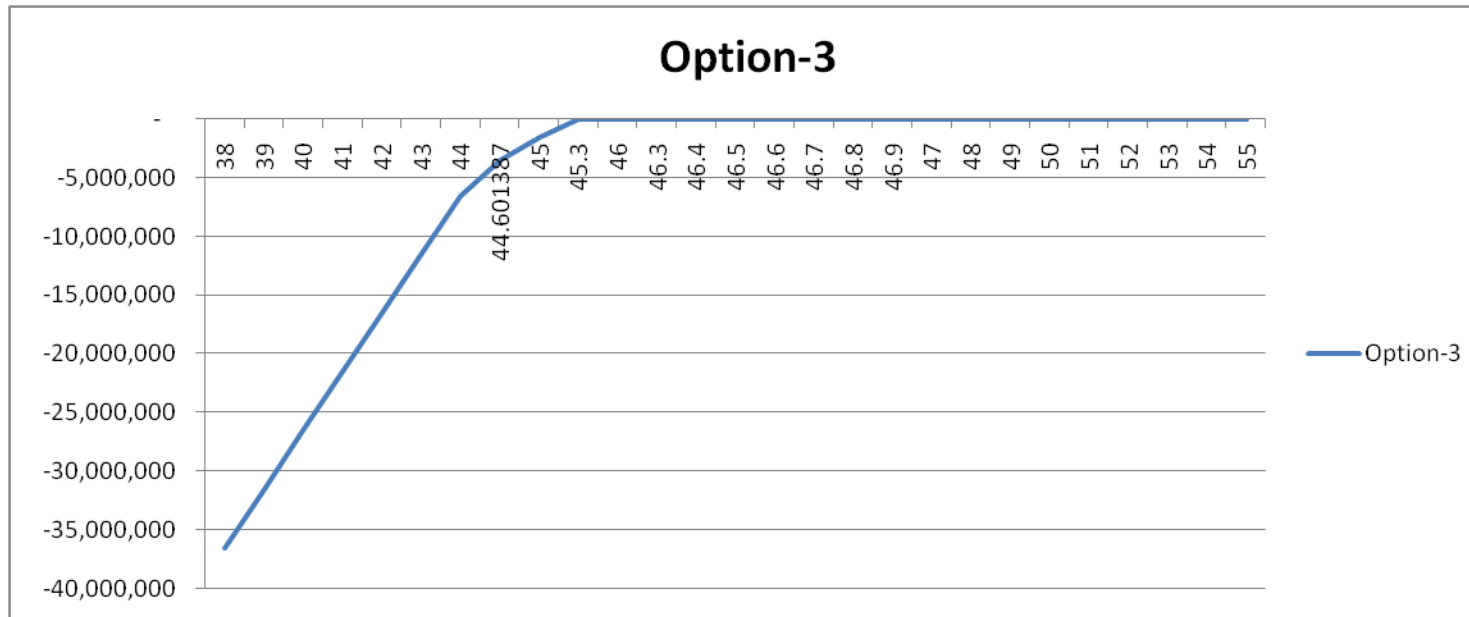
46.6	-	-	-	-
46.7	-	-	-	-
46.8	-	-	-	-
46.9	-	-	-	-
47	-	-	-	-
48	-	-5,000,000	-	5,000,000
49	-	-10,000,000	-	10,000,000
50	-	-15,000,000	-	15,000,000
51	-	-20,000,000	-	20,000,000
52	-	-25,000,000	-	25,000,000
53	-	-30,000,000	-	30,000,000
54	-	-35,000,000	-	35,000,000
55	-	-40,000,000	-	40,000,000



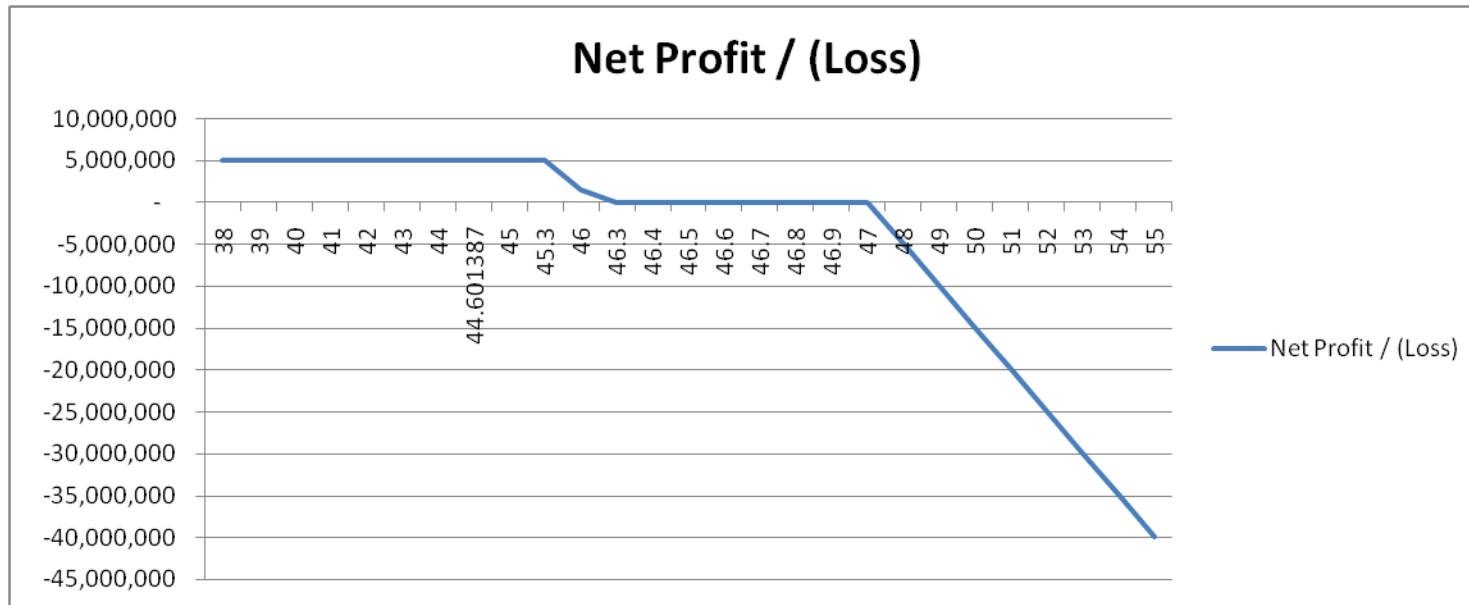
Payoff from Option-1 Only



Payoff from Option-2 Only



Payoff from Option-3 Only



Net Profit and Loss of the client (For all the three options)

Actual Market Data Analysis of the structure

Spot Rate Fixation of USD / INR on Maturity Date i.e. 28/04/2010

44.601387

As can be seen from above scenario analysis and interpretations, Client will be in a profit of Rs. 50 Lacs