Question Paper
Derivatives: Analysis & Valuation (CFA630): July 2008

Section A : Basic Concepts (30 Marks)

- This section consists of questions with serial number 1 - 30.
- Answer all questions.
- Each question carries one mark.
- Maximum time for answering Section A is 30 Minutes.

1. Which of the following risks is also known as 'Price risk'? <Answer>

(a) Interest rate risk
(b) Exchange rate risk
(c) Market risk
(d) Inflation risk
(e) Liquidity risk.

2. Mr. Aman, an Indian importer of cotton apparel, imported apparel worth 10,00,000 GBP in April 2008, for which payment has to be made in December 2008. Mr. Aman is of the opinion that GBP will appreciate and he wants to hedge himself against this appreciation. What can be the best strategy for Mr. Aman? <Answer>

(a) Sell December Future of GBP
(b) Sell December Forward of GBP
(c) Buy December Future of GBP
(d) Buy a Put option on GBP for December
(e) Sell a Call option on GBP for December.

3. If the initial margin is $5,000, the maintenance margin is $3,500 and your balance in margin account is $3,100, amount to be deposited by you is <Answer>

(a) 0
(b) $400
(c) $1500
(d) $1900
(e) $5400.

4. Which of the following statements is/are **not true** with respect to commodity derivatives? <Answer>

I. Commodity forward contracts are standardized contract which are traded on a recognized stock exchanges.
II. Commodity swaps are of two types – fixed-floating or commodity-for-interest.
III. Call option on commodity obliges the buyer to buy the underlying commodity when prices decline.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (II) above
(e) Both (I) and (III) above.

5. An investor wants to invest in fixed income securities three months from now and is concerned that interest rates may go down in the mean time. In this scenario, he should <Answer>

(a) Buy interest rate futures of three-month maturity and sell the futures of six-month maturity
(b) Sell interest rate futures of three-month maturity and buy the futures of six-month maturity
(c) Buy interest rate futures of three-month maturity
(d) Sell interest rate futures of three-month maturity
(e) Sell interest rate futures of six-month maturity.

6. Which of the following participants help in feeding information and analysis of a company into the derivatives markets leading to market efficiency? <Answer>

(a) Speculators
(b) Hedgers
(c) Arbitrageurs
(d) Banks
(e) Financial institutions.

7. Which of the following statements is/are **true** with respect to forward contract strategies? <Answer>

I. The cost of a forward hedge can be measured by the opportunity cost.
II. The idea behind entering in the currency forward market is to lock-in the rate at which the foreign currency transactions take place.
III. Most of the times when the transaction exposure is hedged, the translation exposures get automatically hedged.

(a) Only (I) above
(b) Only (II) above
(c) Both (I) and (II) above
(d) Both (II) and (III) above
(e) All (I), (II) and (III) above.

8. Selling stock short and simultaneously buying a call is similar to <Answer>

(a) Writing a naked call
(b) Writing a naked put
(c) Buying a put
(d) Buying two calls
(e) Buying asset.

9. A trader is likely to prefer buying a call options contract to a futures contract on an asset if <Answer>

(a) He thinks the price of the asset will certainly rise
(b) He is uncertain but thinks it more likely that the price of the asset will fall than rise
(c) He is uncertain but thinks it more likely that the price of the asset will rise than fall
(d) He thinks the price of the asset will remain unchanged
(e) He thinks the price of the asset in the underlying market will certainly fall.

10. Following information pertains to a swap deal between Arvind mills and Alok textiles. <Answer>

Firm	Objective	Fixed Interest rate	Floating interest rate
Arvind mills	Floating	8 %	LIBOR + 0.5 %
Alok Textiles	Fixed	10 %	LIBOR + 1.0%

The benefit from the deal is shared by Arvind mills and Alok textiles in the ratio of 1:2. Gain from the swap deal to Alok textiles is

(a) 0.50%
(b) 1.00%
(c) 1.50%
(d) 2.00%
(e) 2.50%.

11. Nath Brothers Ltd. has covered dollar receivable by purchasing put options on dollar at Rs.41.50 by paying a premium of 75 paise per dollar. If on the date of realization the spot price turned out to be Rs.41.65/$ then, the net rupee amount realized per dollar is <Answer>

(a) Rs.39.95
(b) Rs.40.50
(c) Rs.40.75
(d) Rs.40.90
(e) Rs.42.25.

12. If you buy a share of RK Ltd. at Rs.49, and simultaneously write a July 50 straddle for Rs.6, the maximum possible loss from the strategy will be <Answer>

(a) Rs. 49
(b) Rs. 50
(c) Rs. 93
(d) Rs.133
(e) Rs.145.

13. The spot price of cotton – 'Gujarat V-797' grade – in Mumbai on 01.06.2008 was Rs.3881 per quintal. The annualized borrowing rate on the same day was 12%. The cost of storing one quintal of cotton is Rs.50 per month. What is the probable future quote of Gujarat V-797 with a maturity at the end of August 2008? <Answer>

(a) Rs.3997
(b) Rs.4031
(c) Rs.4058
(d) Rs.4147
(e) Rs.4396.

14. The 'backwardation' in a futures market refers to <Answer>

I. When the futures prices are higher than cash prices.
II. When the futures prices are lower than cash prices.
III. When the basis is positive.
IV. When the basis is negative.

(a) Only (II) above
(b) Both (I) and (III) above
(c) Both (I) and (IV) above
(d) Both (II) and (III) above
(e) Both (II) and (IV) above.

15. Which of the following are characteristics of the intrinsic value of a call option? <Answer>

I. The intrinsic value is obtained by subtracting the per-share exercise price of an option from the market price of a stock.
II. The intrinsic value is obtained by subtracting the market price of a stock from the per-share exercise price of an option.
III. The intrinsic value is the maximum price that an option will command when a stock's market price is below the exercise price.
IV. The market price of an option will approach its intrinsic value at expiration.

(a) Both (I) and (III) above
(b) Both (I) and (IV) above
(c) Both (II) and (III) above
(d) Both (II) and (IV) above
(e) (I), (III) and (IV) above.

16. In a strangle strategy the break-even prices are given by <Answer>

I. Lower strike price + Initial outflow.
II. Lower strike price – Initial outflow.
III. Higher strike price + Initial outflow.
IV. Higher strike price – Initial outflow.

(a) Both (I) and (II) above
(b) Both (I) and (III) above
(c) Both (I) and (IV) above
(d) Both (II) and (III) above
(e) Both (II) and (IV) above.

17. Which of the following strategies is most appropriate for an investor who wants to participate in the bull market but limit his downside risk in bear market? <Answer>

(a) A covered call
(b) A protective put
(c) A bullish spread
(d) A short straddle
(e) A short strangle.

18. If two options are bought at two extreme prices, and two options are sold at two intermediate strike prices, it is known as <Answer>

(a) Bullish spread
(b) Ratio spread
(c) Box spread
(d) Condor spread
(e) Gamma spread.

19. Which of the following is **not** an assumption of the Black and Scholes model of option valuation? <Answer>

(a) Return are lognormally distributed
(b) Early exercise of option is possible
(c) No transaction costs and taxes
(d) Short selling of securities is possible
(e) No arbitrage opportunity is available.

20. The measure of sensitivity of an option price to expiration time is called <Answer>

(a) Gamma
(b) Rho
(c) Vega
(d) Theta
(e) Delta.

21. An equity swap can be described as <Answer>

(a) A swap in which the payments include only capital gains
(b) A swap in which the total return on a stock index is swapped for the total return on a bond
(c) A swap in which the return on one bond is swapped for some other payment
(d) A swap designed to substitute for a basis swap
(e) A swap in which the payments include dividends and capital gains.

22. Which of the following statements is/are **correct** with respect to Swaption? <Answer>

I. Buyer of a call swaption has the right to enter into a swap as a floating rate payer.
II. Buyer of a put swaption has the right to enter into a swap as a floating rate payer.
III. Buyer of a put swaption has the right to enter into a swap as a fixed rate payer.
IV. Writer of a call swaption becomes the fixed rate payer.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (III) above
(e) Both (I) and (IV) above.

23. The process of conversion of illiquid assets to liquid assets by converting longer duration cash flows into shorter duration ones is known as <Answer>

(a) Conversion
(b) Swap
(c) Securitization
(d) Convergence
(e) Arbitrage.

24. Which of the following is **not** the advantage of asset-backed securities? <Answer>

(a) Better yield
(b) Better credit quality
(c) Diversity and internal diversification
(d) Predictability of cash flow
(e) Reduced inflation risk.

25. Which of the following statements is **not true** with respect to future markets? <Answer>

(a) Scalpers suck out liquidity from the market
(b) Floor brokers are normally self-employed individual member of the exchange
(c) Floor traders execute the trades on their own account
(d) Generally future contracts are not settled with physical delivery
(e) Clearing house can either be a part of the same exchange or can be a separate entity.

26. Which of the following statements is/are **not true** with respect to currency swap? <Answer>

I. A plain vanilla currency swap is a fixed-floating currency swap.
II. In currency swaps, termination of contract can be done if one party defaults the other party and can claim damages.
III. Currency swaps give greater liquidity.

(a) Only (I) above
(b) Only (II) above
(c) Only (III) above
(d) Both (I) and (II) above
(e) Both (II) and (III) above.

27. Credit enhancement encompasses a variety of provisions that may be used to reduce the credit risk of an obligation. Which of the following is **not** the technique involved in credit enhancement? <Answer>

(a) Collateralization
(b) Credit insurance
(c) Netting
(d) Letters of credit
(e) Special purpose vehicle.

28. A standard normal distribution has a <Answer>

(a) Mean of one
(b) Mean of zero
(c) Mean of the distribution
(d) Mean equal to the standard deviation
(e) Mean equal to the variance.

29. A trader is long in the spot market and short in the futures market. The basis is positive and it widens. In this situation, the trader would <Answer>

(a) Always lose
(b) Always gain
(c) Gain/lose depending on the size of the basis
(d) Neither gain nor lose
(e) Insufficient information.

30. Which of the following positions has the same exposure to interest rates as the receiver of floating rate on a standard interest rate swap? <Answer>

(a) Long a floating rate note with same maturity
(b) Long a fixed rate note with same maturity
(c) Short a floating rate note with same maturity
(d) Short a fixed rate note with same maturity
(e) Long a floating rate note and short a fixed rate note with same maturity.

END OF SECTION A

Section B : Problems (50 Marks)

- This section consists of questions with serial number 1 – 5.
- Answer all questions.
- Marks are indicated against each question.
- Detailed workings should form part of your answer.
- Do not spend more than 110 - 120 minutes on Section B.

1. The stock of Aegis logistic is currently quoted in the market at Rs.254. The company has declared a dividend of Rs.8 per share recently, which will be distributed to the shareholders after two months. <Answer>

The volatility of Aegis's stock price is 15% annually. The risk-free interest rate prevailing in the economy is 7.5% p.a.

a. Using Black-Scholes option valuation model, you are **required** to calculate the price of a 6 month put option on the company's stock at an exercise price of Rs.275. **(8 marks)**

b. State the advantages of using Black-Scholes model in option valuation. **(2 marks)**

<Answer>

2. The following information is taken from the books of Corporation Bank relating to an interest rate swap:

Remaining term to maturity	3 years
Fixed rate paid by bank	10%
Floating rate received by bank	6m Libor
Current 6m Libor	9%
Market quote for 3 year swap	10.5% semi-annual vs. Libor

Find out the value of the swap, if the bank has received the latest interest payment. **(10 marks)**

<Answer>

3. For the past few months, the market has been experiencing significant volatility due to various global and domestic concerns like US recession, rise in crude oil prices, fluctuations in FII investments, etc. Mr. Gaurav, a speculator in the market expects that this volatility in the stock prices will continue in the near future. He wants to gain from this view; however, he is not sure in which direction market will move. He wants to trade in the option on stock of Reliance Communication. Each share of Reliance Communication is currently trading at Rs.575. The following call and put options are available in the market for Reliance Communication stock:

Options	Expiration Date	Exercise price (Rs.)	Premium (Rs.)
Call	May	540	67
Call	May	520	82
Put	May	540	3

You are **required** to suggest the speculator a suitable option strategy, so that he can gain from his view. Also, prepare the payoff profile of the strategy showing breakeven point, maximum possible profit and maximum possible loss, assuming, at expiration stock price ranges between Rs.450-Rs.630 (taking the difference of Rs.10). **(10 marks)**

<Answer>

4. On May 9, 2008, the following prices are observed on the IMM and the interbank foreign exchange market:

	$/Euro	$/Yen
Spot	1.5350	0.0096
Futures:		
June	1.5346	0.0097
August	1.5326	0.0098
November	1.5273	0.0099

A speculator is looking at the above prices and arrived at the conclusion that in long-term Euro will move against Yen in the opposite direction of what cross-market quotes are implying. So he is planning to adopt some spread strategies to profit from this view.

You are **required** to

a. Find the market's long-term view of euro's prospect against yen. **(3 marks)**

b. Explain what spread strategy the speculator will adopt to profit from his view. **(4 marks)**

c. If in July, the futures prices are turned out as

	$/Euro	$/Yen
August	1.5310	0.00987
November	1.5397	0.00976

Calculate the profit/loss of the speculator. **(3 marks)**

5. On April 10, 2008, Black Berry Inc. (BBI), a US based firm is expecting $20 million from a foreign subsidiary in the month of June. BBI intends to invest the funds in three month US T-bills. Looking at the present economic scenario BBI expects the interest rates to decline further in the near future. Therefore it decides to hedge through 3-month T-bill futures contracts. The June T-bill futures are quoting at 96.24 at the time of entering into the hedge. <Answer>

You are **required** to

a. Explain how BBI can hedge using T-bill futures. **(3 marks)**

b. Calculate the annualized yield, if in June T-bills futures are quoted at

i. 95.65 and

ii. 96.74. **(7 marks)**

END OF SECTION B

Section C : Applied Theory (20 Marks)

- This section consists of questions with serial number 6 - 7.
- Answer all questions.
- Marks are indicated against each question.
- Do not spend more than 25 -30 minutes on Section C.

6. As the futures contract requires the delivery of some good at a particular time in future, we can make it sure that the expectations of the market participants assist to determine the future prices. In the light of this statement, discuss the various factors determining the futures contract price. <Answer> **(10 marks)**

7. Credit enhancement of an asset-backed security implies the existence of support for one or more of the bondholders in the structure. In this context, discuss the various types of credit enhancements. <Answer> **(10 marks)**

END OF SECTION C

END OF QUESTION PAPER

Suggested Answers
Derivatives: Analysis & Valuation (CFA630): July 2008

Section A: Basic Concepts

	Answer	Reason	
1.	C	Market risk is the risk of the value of a firm's investments going down as a result of market movements. It is also referred to as price risk.	< TOP >
2.	C	To hedge against the appreciation of GBP, Mr. Aman should buy a December Future contract of GBP. By doing so, he can lock the price of GBP. If GBP appreciate in the spot market than loss in spot market can be offset by gain in futures market.	< TOP >
3.	D	Margin call =5000 – 3100 = $1900.	< TOP >
4.	E	Commodity forward contracts are not standardized contracts and are not traded on recognized stock exchanges. There are two types of commodity swaps: fixed-floating or commodity-for-interest. The call option gives the holder the right, but not the obligation, to buy the underlying commodity from the option writer at a specified price on or before the option's expiration date. This option helps the buyer when price escalates. Hence, (I) and (III) option are not true and correct answer is option (e).	< TOP >
5.	C	If he buys interest rate futures of three-month maturity, he makes a profit when interest rate goes down because price of the interest rate future and interest rate are inversely related and price will increase when interest rate falls. So, he will buy interest rate future at lower price and sell at higher price. This compensates the investors for the expected decrease in the interest rate.	< TOP >
6.	A	Speculators perform a valuable economic function be feeding information and analysis about a company into the derivatives markets. A market that rapidly translates company knowledge into stock price is an efficient market. Speculation makes the market efficient.	< TOP >
7.	E	According to forward contract strategies I. The cost of a forward hedge can be measured by the opportunity cost. II. The idea behind entering the currency forward market is to lock-in the rate at which the foreign currency transactions take place. III. Most of the times when the transaction exposure is hedged, the translation exposures get automatically hedged. Therefore, correct answer is option (e).	< TOP >
8.	C	Selling stock short and simultaneously buying a call is similar to buying a put option.	< TOP >
9.	C	A trader is likely to prefer buying a call options contract to a future contract on an asset if he is uncertain but thinks it more likely that the price of the asset will rise than fall because option gives the right whereas future is a obligation and when he is uncertain he would prefer to have right rather than obligation.	< TOP >
10.	B	The cost of borrowing for Arvind mills is lower than that of Alok textiles in both the markets. This difference is called quality spread, which can be quantified for both fixed and floating rate markets as below. Fixed market 10.00% - 8.00% = 2.00 % Floating market (LIBOR+1.00 %) – (LIBOR+ 0.50 %) = 0.50% The difference in the quality spreads is 1.50 % (i.e. 2.00% - 0.50 %) Gain to Alok textiles = $1.50 \times \frac{2}{3} = 1.00\%$	< TOP >
11.	D	Put option is not exercised Net rupee amount realized per dollar is = (spot market – premium) = (41.65 – 0.75) = Rs.40.90	< TOP >

12. C Maximum loss from the strategy could be when price of the stock falls to zero. Then the put will be exercised and loss from put will be Rs.50, and call will not be exercised. So, total loss will be = – 49 – 50 + 6 = Rs.-93. < TOP >

13. D < TOP >

$$F_{t,T} = C_t + C_t \times i \times \frac{m}{12} + S_{t,T}$$

Where,

i = annualized borrowing rate = 12%

m = months to mature = 3 months

s = storing cost = Rs.50/month i.e., Rs.150.

C_t = cash price = Rs.3881

$$\therefore \text{Future quote} = 3881 + 3881 \times \frac{3}{12} \times 0.12 + 150$$

$$= \text{Rs.4147.43.}$$

14. D The backwardation in a futures market refers to < TOP >

(i) when the futures prices are lower than cash prices and

(ii) When the basis is positive. The difference between the cash price and futures price of a commodity is referred to as 'basis'.

15. B The intrinsic value of a call option is zero until the market price of the underlying stock reaches the strike price; after that point, the intrinsic value is computed by subtracting the strike price from the market price of the stock. At expiration, the option can no longer have a time premium, so its value is equal to its intrinsic value. < TOP >

16. D In strangle strategy break-even points are given by < TOP >

i. Lower strike price – initial outflow

ii. Higher strike price + initial out flow

17. B A protective put consists of a long position in stock and a long put position. If the market declines, the investor can exercise the put, thereby setting a floor for the portfolio value equal to the put strike price. < TOP >

18. D In a condor spread, two options are bought at two extreme prices, and two options are sold at two intermediate strike prices. < TOP >

19. B European exercise terms are used in the derivation of Black-Scholes formula. In this term the option cannot be exercised before maturity. < TOP >

20. D Theta is defined as a measure of option or derivative sensitivity with respect to expiration time. < TOP >

21. E An equity swap is described as a swap in which the dividends earned is exchange for capital gains on a portfolio. < TOP >

22. B A call swaption gives its buyer the right to enter into a swap as a fixed rate payer. The writer of the call swaption will be floating rate payer if the option is exercised. < TOP >

In put swaption the buyer gets the right to enter into a swap as a floating rate payer. The writer becomes the fixed rate payer when the option is exercised.

Hence, statement (II) is correct and the answer is option (b).

23. C
- Conversion is an arbitraging strategy by buying a put and selling a call option at the same time. A long position is taken against the underlying asset to lock the profit.
- Swap is a agreement through which a series of exchanges of periodic payments is done with a counterparty.
- Securitization refers to conversion of illiquid assets to liquid assets by converting longer duration cash flows into shorter duration ones.
- As the futures contract approaches maturity, the cash and futures prices come closer and ultimately, on maturity, both coincide to a particular price. This process is called as convergence.
- Arbitrage is the process of simultaneous purchase and sale of the same financial asset in an attempt to profit by exploiting price differences on different markets or in different forms.

< TOP >

24. E Asset backed securities reduces event risk not inflation risk. Event risk arises because of several unforeseen and unpredictable events, which are out of the control of the investors. < TOP >

25. A Scalpers add to the liquidity of the market as they are market makers. Therefore, option (a) is the answer. < TOP >

26. A A plain vanilla currency swap is a fixed-fixed currency swap in which each party pays a fixed payment on the loan taken by them. In currency swaps, termination of contract can be done if one party defaults the other party and can claim damages. Currency swaps give greater liquidity. Due to this many banks agree to take risk in swap transaction. < TOP >

27. C. Netting is not the technique of credit enhancement. < TOP >

28. B A standard normal distribution has a mean of zero. < TOP >

29. B Let the present spot and futures price be S_1 and F_1 respectively and spot and futures price on a later date be S_2 and F_2 respectively Gain in futures market is $(F_1 - F_2)$; gain in cash market is $(S_2 - S_1)$. < TOP >

$\therefore$ Net gain $= (F_1 - F_2) + (S_2 - S_1)$

Rearranging,

$(F_1 - S_1) + (S_2 - F_2) = (S_2 - F_2) - (S_1 - F_1)$

$(S_2 - F_2)$ is more than $(S_1 - F_1)$ as basis is widening. So the trader will always gain.

30. D Paying fixed on the swap is same as being short a fixed rate note. < TOP >

Section B : Problems

1. a. Let S_0 = Dividend adjusted current stock price < TOP >

$= 254 - 8e^{-0.075 \times \frac{2}{12}}$

$= 254 - 8 \times 0.9876$

$= 254 - 7.9008 = \text{Rs. } 246.10$

X = Rs.275

r = 0.075

t = 0.50 year

σ = 0.15

Value of put, $p = Xe^{-rt} N(-d_2) - S_0 N(-d_1)$

Where, $d_1 = \dfrac{\ln\left(S_0 / x\right) + \left(r + \dfrac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$

$$= \frac{\ln\left(246.10/275\right) + \left(0.075 + \frac{0.15^2}{2}\right)0.50}{0.15\sqrt{0.50}}$$

$$= \frac{-0.11103 + 0.04312}{0.10607} = -0.6402$$

$d_2 = d_1 - \sigma\sqrt{t}$

$= -0.6402 - 0.15\sqrt{0.50}$

$= -0.6402 - 0.10607 = -0.7463$

$N(-d_1) = N(0.6402) = 0.7389$

$N(-d_2) = N(0.7463) = 0.7723$

$\therefore \quad P = 275 \times e^{-0.075 \times 0.50} \times 0.7723 - 246.10 \times 0.7389$

$= 275 \times 0.9632 \times 0.7723 - 181.84$

$= 204.57 - 181.84 = \text{Rs.}22.73$

b. **Advantages of Black and Schole's model**

The Black and Schole's option pricing model presents a number of advantages. The most prevalent advantage is its ease of use. It tells the user what is important. In other words, it includes the very factors that market analysts look for. Secondly, it does not promise to produce the exact prices that show up in the market, but it does a remarkable job of pricing options that meet all of the assumptions of the model. In fact, it is safe to say that virtually all option pricing models, even the extremely complex ones, have much in common with the Black and Scholes model.

2. Let the notional principal be Rs.1,00,000 < TOP >

Present value of floating leg

$$= \frac{1{,}00{,}000 \times \left(1 + \frac{0.09}{2}\right)}{\left(1 + \frac{0.09}{2}\right)}$$

= Rs.1,00,000

This is the present value of principal and interest to be paid six months hence.

Present value of fixed leg:

6 months	5000
12 months	5000
18 months	5000
24 months	5000
30 months	5000
36 months	105000

Present value of above cash flows using discount rate of 10.5% is

$= 5000 \times \text{PVIFA}(5.25\%, 5) + 1{,}05{,}000 \times \text{PVIF}(5.25\%, 6)$

$= 5000 \times 4.300 + 1{,}05{,}000 \times 0.736$

$= 21{,}500 + 77280$

$= \text{Rs.}98{,}780$

$\therefore$ Value of the swap = 1,00,000 – 98,780

= Rs.1220

3. Appropriate strategy is long straddle. Here, to make profit, the speculator should buy a call and a put of same expiration date and same exercise price. As speculator is not sure of the direction, through long straddle he can make unlimited upside gain while limiting his downside risk. Another best strategy can be long Strangle. But, it is a combination of a call and a put with the same expiration date and different strike prices. If the strike prices of the call and put options are X_1 and X_2, then a strangle is chosen in such a way that $X_1 > X_2$. However, in the given < TOP >

options the speculator do not have such combination. So, he will adopt long Straddle and buy a call and a put of Strike price of Rs.540.

Initial outflow = Rs. (67 + 3) = 70

Spot	Long C = 540	Long P = 540	Initial Outflow	Net Inflow/ Outflow
450	0	90	70	20
460	0	80	70	10
470	0	70	70	0
480	0	60	70	-10
490	0	50	70	-20
500	0	40	70	-30
510	0	30	70	-40
520	0	20	70	-50
530	0	10	70	-60
540	0	0	70	-70
550	10	0	70	-60
560	20	0	70	-50
570	30	0	70	-40
580	40	0	70	-30
590	50	0	70	-20
600	60	0	70	-10
610	70	0	70	0
620	80	0	70	10
630	90	0	70	20

Breakeven = Rs.470 and Rs.610

Maximum loss = Rs.70 at price of Rs.540

Maximum gain = Unlimited

4. a. < TOP >

Market rates	$/Euro	$/Yen	Implied Yen/Euro
Spot	1.5350	0.0096	159.89
Futures:			
June	1.5346	0.0097	158.21
August	1.5326	0.0098	156.39
November	1.5273	0.0099	154.27

The market's long-term view of euro against yen is that the yen will appreciate against euro.

b. As the market is expecting that yen will appreciate, the speculator's view is that the yen will depreciate. This means according to him yen is overpriced and euro is underpriced. So he will buy November Euro futures and sell November Yen futures. He will trade in November futures, since the chances that his view will be reflected in the prices is in long term.

c. Gain from euro futures = 1.5397 – 1.5273

= $ 0.0124

Gain from yen futures = 0.0099 – 0.00976

= $0.00014

Total gain = $ (0.0124 + 0.00014) = $0.01254.

5. Investment = $20,000,000.00 < TOP >

Investment period = 3 months

June T- Bill future contract = 96.24

Number of contracts required = 20

a. As the company will invest funds for a period of 3 – months, so it will buy T-bill future contract to lock – up a yield of (100 – 96.24) = 3.76%. If the yield on date of investment i.e.

in June declines, the loss in the spot market will be offset by gain in the future market. In case the interest rate rises, profit on spot market will be offset in the loss in the future market. Thus, by buying T-bill future contract BBI will be able to lock up in a discount yield of 3.76%.

b. If June future is at 95.65

Price of cash T – bill = $\$20,000,000 \times \left(1 - 0.0435 \times \frac{3}{12}\right) = \$19{,}782{,}500$

Loss in future = (96.24 – 95.65) $\times 20 \times 25 \times 100 = \$29{,}500.$

Effective purchase price = \$19,782,500 + \$29,500 = \$19,812,000

Annualized yield = $\frac{20{,}000{,}000 - 19{,}812{,}000}{19{,}812{,}000} \times \frac{12}{3} \times 100 = 3.80\%$

If March future is at 96.74

Price of cash T-bill = $\$20,000,000 \times \left(1 - 0.0326 \times \frac{3}{12}\right) = \$19{,}837{,}000$

Gain in future = (96.74 – 96.24) $\times 20 \times 25 \times 100 = \$25{,}000$

Effective purchase price = \$19,837,000 – \$25,000 = \$19,812,000

Annualized yield = $\frac{20{,}000{,}000 - 19{,}812{,}000}{19{,}812{,}000} \times \frac{12}{3} \times 100 = 3.80\%$

Section C: Applied Theory

6. Futures market prices bear economically important relationships to other significant observable factors. As the futures contract requires the delivery of some good at a particular time in future, we can make it sure that the expectations of the market participants assist to determine the future prices. Similarly, the cost of storing the goods underlying the futures contract helps to determine the relationship between the future prices and the cash prices. < TOP >

The basis and spreads

The relationship between two prices can be analyzed by using basis and spreads. The basis is the relationship between the cash price of a product and the futures price of that product. A spread is the difference between two futures prices.

Basis represents the difference between the cash price and the future price of a single product.

Basis = Current cash price - Futures price

Here, the cash price is for a specific location, time and quality of product. The futures price is for a contract for the same time the cash price represents. Generally, the basis is calculated as the difference between the cash price and the nearby (closest to expiration) futures contract.

A spread can be either intracommodity spread or an intercommodity spread. For the same underlying good, if there are two different prices on two different expiration dates, the underlying spread is referred as 'intracommodity' spread (also known as a 'time spread'). If the spread is between two futures prices for two different but related commodities, such as corn oil futures and cottonseed oil futures, it is referred to as 'intercommodity spread'. If the price difference is between two markets for the same commodity, it is known as 'inter-market spread'. The spread relationships are significant due to the act of speculation.

Future prices and expected spot prices

While examining the futures prices, the concept of relationship between futures prices and expected spot prices is very significant. To understand this concept, let's consider the relationship between spot prices and expected spot prices. Consider an asset which incurs carrying costs but does not involve any risk. At time 0, the investor will purchase the asset with certainty that he will surely cover his opportunity cost and carrying cost. If not, he would not purchase the asset at all. Thus, at time 0, the spot price is the present value of the total of the spot price at time T less costs minus benefits.

However, in case the future price is uncertain, some adjustments are mandatory. In general, futures prices are biased predictors of future spot prices as risk premium can be transferred from holders of the asset to buyers of futures.

Forward prices and future prices

Determining the appropriate price available in the market with regard to the financial instruments is a very significant factor. To understand the relationship between futures and forward prices, let's assume that the forward contract participants are prime credit risks. On the day prior to expiration, the futures contract as well as forward contract have one day to go. At expiration both contracts are settled. Hence, in this aspect both the contracts are similar. However, at any other point of time prior to expiration, futures and forward prices can be same or may differ.

7. Credit enhancement of an asset-backed security implies the existence of support for one or more of the bondholders in the structure. Credit enhancement levels vary based on the credit rating provided by each rating agency to the issuer. Hence, the level of credit enhancement is decided by the rating agency. There are two types of credit enhancement structures, namely, < TOP >

- External credit enhancement.
- Internal credit enhancement.

External Credit Enhancement

It is in the form of third-party guarantees which protect against losses up to a particular fixed level. This is available in the form of a corporate guarantee, a letter of credit from a bank or bond insurance. Though the third-party guarantee is referred to as "first loss protection", it is generally not used as a primary protection. Thus, we see that an asset-backed security which has an external credit support is prone to credit risk of the third-party guarantor. If the third-party guarantor undergoes a downward change in credit rating, then the rating of the issue also will be lowered even if the performance of the entire structure is intact. This is because of the general practice followed by the rating agencies by which the credit quality of the issue is assessed to be only as good as the lowest link in credit enhancement.

Internal Credit Enhancement

Various forms of internal credit enhancements are:

- Reserve Funds
- Over Collateralization
- Senior/Subordinated Structures

Reserve Funds: Two forms of reserve funds are cash reserve funds and excess servicing spread accounts. Of these, cash reserve funds are nothing, but cash deposits that are generated from issue proceeds. They find their utility in combination with external credit enhancements. A portion of the underwriting profits from the deal is normally used to invest in money market instruments and they form a separate fund.

Any excess cash left after paying the net coupon, service charges and all other expenses on a monthly basis is deposited in a separate reserve account, which is termed excess servicing spread accounts.

Over Collateralization: Values of all the tranches put together are the total liabilities of the structure. Value of the asset offered as collateral should be at least equal to the value of the liability. If the value of the collateral is greater than the value of the liability, then the deal is said to be over collateralized. The extent to which collateral is overvalued can be used to absorb future losses and hence 'over collateralization' represents a form of internal credit enhancement.

Senior/Subordinated Structures: This is the most popular form of credit enhancement. In this structure, there are two tranches: One is senior tranche and the other one is junior/subordinated tranche. Let the value of the collateral of the deal be Rs.125crore. The credit enhancement structure may be as follows.

- Senior tranche: 90%
- Subordinated tranche; 10%

This implies that the first 10% of losses will be met from the funds in the subordinated tranche. There is no hard and fast rule that the investor should have only one subordinated tranche. He can have any number of subordinated tranches. Subordinate tranches are also called non-senior tranches. The issue of concern in this form of credit enhancement is that though the subordinated tranches provide a certain level of credit protection for the senior tranche at the time of closing the deal, the additional risk involved here is the prepayment risk as it changes from time to time.

This problem can be overcome by a mechanism called "shifting interest mechanism". In the first step, the proportion of the mortgage balance of the subordinate tranche to that of the

entire deal is calculated, and it is called the level of subordination or the subordinate interest. When this proportion is higher, the level of protection is also higher for senior tranches. This subordinate interest changes after the deal is closed because of prepayments i.e., this is referred to as shifting of subordinate interests and hence the name. The main objective of a shifting interest mechanism is to allocate prepayments in such a way that the subordinate interest is always maintained at a particular acceptable level so that senior tranche stands protected. However, the presence of a shifting interest mechanism acts as a trade-off between credit risk and contraction risk for the senior tranche i.e., this mechanism results in a reduction of credit risk to the senior tranche, contraction risk is seen to increase because of many prepayments.

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