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05MBAFM427

Fourth Semester MBA Degree Examination, June–July 2009
Risk Management

Time: 3 hrs.

Max. Marks:100

Note:1. *Answer any FOUR full questions, from Q1 to Q7,*
Q8 is compulsory.
2. *Standard normal distribution tables can be provided.*

1   a. How do option contracts differ from both forward and futures contracts?   **(05 Marks)**
    b. A company enters into a short future contract to sell gold for Rs.1420 per gram on MCDEX. The size of contract is 10 kg. The initial margin is Rs. Ten lakh and maintenance margin is Rs. Eight lakh. What change in future price will lead to a margin call? Under what circumstances Rs.Two lakh can be withdrawn from the margin account.   **(05 Marks)**
    c. Describe the rationale for retention of risk. What are the factors that determine risk retention?   **(10 Marks)**

2   a. Write a detailed note on contract specifications for futures on S and P CNX NIFTY50.   **(05 Marks)**
    b. A stock is expected to pay a dividend of Re.1 per share in 2 months and again in 5 months. The stock price is currently Rs.50 and risk free rate of interest is 6% per annum. What is the stock's forward price for a 6-month contract?   **(05 Marks)**
    c. On September 28th, the cash price of a quintal of pepper is Rs.10010 per quintal. Full carry cost of pepper till December 28th is Rs.10288/Q. A 3-month futures contract maturing in December end is now trading at Rs.10355/Q. Can the merchant holding the stock of pepper exploit any arbitrage opportunity? Assume risk free rate of interest with continuous compounding as 7%. Calculate the arbitrage profit. What is the arbitrage strategy adopted by him. Alternatively, if the merchant wants to hedge against falling prices, what information he needs to gather from NCDEX.   **(10 Marks)**

3   a. A share is currently selling for Rs.120. There are 2 possible prices of the share after 1 year Rs.132 or Rs.105. Assume that risk free rate of return is 9% per annum. What is the value of one-year call option with an exercise price of Rs.125.   **(05 Marks)**
    b. "Call holders and put writers exhibit bullish sentiments" - Explain.   **(05 Marks)**
    c. Company AKR wishes borrow u.s. Dollars at a fixed rate of interest. Company RAK wishes to borrow Japanese Yen at a fixed rate of interest. The amounts required by the two companies are roughly the same at current exchange rate.

	Yen	Dollars
Company AKR	4.0%	8.6%
Company RAK	5.5%	9.0%

Design a swap that will net a bank, acting as intermediary, 50 basis points per annum. Make the swap equally attractive to the 2 companies and ensure that all foreign exchange risk is assumed by the bank.   **(10 Marks)**

4   a. State the assumptions underlying the black and scholes model.   **(05 Marks)**
    b. Suppose that 1-year, 2-year, 3-year, 4-year and 5-year zero rates are 3%, 4%, 4.6%, 5% and 5.3% per annum respectively. Calculate the forward rates for the second, third, fourth and fifth years.   **(05 Marks)**
    c. The current stock price for ACG Ltd is Rs.85. A European call option with an exercise price of Rs.85, will expire in 160 days. The yield on a 160-day Treasury bill is 5.18%. The standard deviation of annual returns on ACG's stock is 44%. Compute premium for a call option and also a put option on this stock.   **(10 Marks)**

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5 a. Describe the characteristics of a forward rate agreement with its working arrangement.

(05 Marks)

   b. A portfolio manager plans to use a treasury bond futures contract to hedge a bond portfolio over next 3 months. The portfolio is worth Rs.100 million and will have duration of 4.0 years in 3 months. The futures price is Rs.122 and each futures contract is on Rs.100000 of bonds. The bond that is expected to be cheapest to deliver will have duration of 9 years at the maturity of the futures contract. Why should the manager hedge and what position in futures contracts is required.

(05 Marks)

   c. How can a butterfly spread be created by using the following 3 call options (with same expiry dates). One contract involves 1100 shares.

Strike price	Premium
Rs.170	Rs.21.10
Rs.180	Rs.14.00
Rs.190	Rs.8.00

Determine the range of stock prices within which losses would be made by the buyer of options.

(10 Marks)

6 a. Explain the working of a credit default swap.   (05 Marks)

   b. Discuss the difference between credit risk and market risk as applicable to financial markets.

(05 Marks)

   c. Compute the delta of a At-the-money call and put European options with a volatility of 35% and interest rate of 7% p.a with 90 days to maturity. Provide a brief interpretation of delta.

(10 Marks)

7 a. Define value at risk and explain historical simulation method.   (05 Marks)

   b. Distinguish between pure risks and financial risks by providing examples.   (05 Marks)

   c. Differentiate between:
       i)   OTC contracts and exchange traded contracts.
       ii) MTM margin and initial margin.

(10 Marks)

8 Case study:

On January 1st, 200X, an investor has a portfolio of 5 shares:

Security	Price	No. of shares	Beta
A	59.50	5000	1.05
B	81.85	8000	0.35
C	101.10	10000	0.80
D	125.15	15000	0.85
E	140.50	1500	0.75

The cost of capital to the investor is 12.5% p.a. currently the index stands at 9000 with a dividend yield of 5% per annum.

i)   Calculate the theoretical value of index futures for February, March in the absence of arbitrage opportunities.

(05 Marks)

ii) If the Index futures have a minimum trade requirement of Rs.50/point, obtain the number of contracts of index futures, he needs to sell to get a full hedge till March if current value is 9156.

(05 Marks)

iii) Calculate the beta of the portfolio, and expected return on portfolio for March using capital asset pricing model if Index turns out to be 8000 in March.   (05 Marks)

iv) Calculate the number of Index future contracts the investor should trade if he desires to reduce the beta of portfolio to 0.7 on January 1, 200X to hedge till March.

(05 Marks)

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Fourth Semester MBA Degree Examination, Dec.09/Jan.10
Risk Management

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FOUR full questions from Q.1 to Q.7*
Question No.8 is compulsory.
2. Use of Tables for N(x) & Statistical tables permitted.

1 a. What is put-call parity?   **(03 Marks)**
   b. What is credit default swap? Explain the features of a credit default swap. **(07 Marks)**
   c. An investor took short position in 10 futures contracts on rice at an exercise price of Rs.22 per kg. The size of one future contract is 1000 kgs. The initial margin requirement on this contract is 12% of the contract value and the maintenance margin is 75% of the initial margin. The futures price for the first 10 days of the contract are given below. Prepare a margin account for first 10 days assuming that all margin calls are honoured immediately and money in excess of the initial margin is withdrawn immediately.   **(10 Marks)**

Day	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Price per kg. in Rs.	21.50	22.25	22.75	22.40	22.70	22.50	23.75	23.25	22.80	23.00

2 a. A financial institution quotes an interest rate of 14% per annum with quarterly compounding. What is the equivalent rate with i) Continuous and ii) Annual compounding?   **(03 Marks)**
   b. The stocks of XYZ Ltd. is currently quoted in the market at Rs.250 on 1st Jan 2009. The continuously compounded risk free rate of interest is 14% p.a. The stock is likely to pay dividend on 31st March 2009 and 30th June 2009 to the extent of Rs.30 on each time. What is the forward price of the stock on 1st Jan 2009 if the forward contract expires on 31st July 2009?   **(07 Marks)**
   c. What is risk management? Explain in detail the various steps involved in risk management process.   **(10 Marks)**

3 a. Differentiate between pure risk and speculative risk.   **(03 Marks)**
   b. The current price of a share is Rs.50 and it is believed that at the end of one month the price will be either Rs.55 or Rs.45. What will be an European call option with an exercise price of Rs.53 on this share be valued at, if the risk free rate of interest is 15% p.a.? Also calculate the hedge ratio, applying binominal formulation.   **(07 Marks)**
   c. The spot price of a share is Rs.450. The exercise price of a six month option on the share is Rs.425. The risk free rate of return continuously compounded is 10% per annum. The standard deviation of the returns of the stock is 0.40. The value of d_1 and d_2 are 0.52 and 0.24 respectively. Comment on the sensitivity of option price by computing Delta, Gamma, Theta, Vega and Rho.   **(10 Marks)**

4 a. What is currency swap?   **(03 Marks)**
   b. Distinguish between Futures and Options.   **(07 Marks)**
   c. Consider the following data about call options on Maruthi Udyog Ltd. for which one contract involves 1000 shares.

Strike price Rs.	350	390	425
Call price Rs.	15	11	8

   Help an investor to build a butterfly spread. Also calculate pay-off if call price is Rs.400. Draw a butterfly spread with the given options.   **(10 Marks)**

5 a. The spot price of the Gold is Rs.600 per gram. The storage cost is Rs.25 per gram per month payable at the beginning. If the risk free rate of return continuously compounded is 8% per annum, what is the price of a 3 month future contract on Gold (Size of one future contract = 100 gms)?   **(03 Marks)**
   b. What do you mean by VaR? Describe the three approaches to determine VaR.   **(07 Marks)**

c. Company A wishes to borrow USD at fixed rate. Company B wishes to borrow Japanese Yen at a fixed rate. The amount required by these two companies is same at the current exchange rate. The companies ate quoted the following rates on interest.

Company	Yen	USD
A	4%	8.6%
B	5.5%	9.0%

Design a swap that will net a bank, acting as intermediary 50 basis points p.a. Make the swap equally attractive to both the companies. The foreign exchange risk is assumed by the bank. Also show the swap diagram. **(10 Marks)**

6 a. What is FRA? **(03 Marks)**

b. A call option with a strike price of Rs.50 costs Rs.2. A put option with a strike price of Rs.45 costs Rs.3. How a strangle can be created from these options? What will be the profit pattern if the price of the stock on expiration is Rs.60? **(07 Marks)**

c. The stock of Y Ltd. a non dividend paying stock is currently traded at Rs.72. The risk free rate of return continuously compounded is12% per annum. What is the futures price of the stock of Y Ltd. maturing in 6 months time?

   i)   If a six months future contract on this stock is traded at Rs.75, what action would you take? Is there any arbitrage opportunity here?

   ii) If the six months future contract on this stock is traded at Rs.77, what action would you take? Is there any arbitrage opportunity here? **(10 Marks)**

7 a. Explain with example what do you mean by stress testing of VaR? **(03 Marks)**

b. Firm A is a US based multinational firm whereas firm B is a France based multinational firm. Both companies till now have borrowed exclusively from their base countries. Now both need to raise capital for their new ventures. Due to scarcity firm A can issue five year US $ bond at 7.5% and five year French franc (FFc) bond in French market at 11% fixed. Firm B can issue five year US $ bond in US market at 7% and five year FFc bond in French market at 12%. Firm A requires US $ 100 million whereas firm B needs FFc 550 million. Current exchange rate is FFc 5.5 = US $1.

   i)   What kind of swap can Firm A and B enter into?

   ii) What will be the total cost and saving for each party? **(07 Marks)**

c. Calculate the value of a call option using Black and Scholes model given the following information:

   Current market price of the share is Rs.243.   Volatility (standard deviation) 0.54
   Exercise price Rs.250.   Risk free rate of interest 9% p.a.
   Time to expiry 65 days.

   If the investor wants to buy a Put option with the same exercise price and expiry date as call option, what will be the value of put option? **(10 Marks)**

8 Mr. Tisheel purchased a 3 month call option in the equity share of Revanth engineering company. It has a present market value per share of Rs.120, exercise price of Rs.130. At the end of 3 months, the investor expects the price of the share to be in the range of Rs.90 to Rs.200 with the following probabilities:

Expected Price (Rs.)	90	110	140	175	200
Probability	0.10	0.25	0.30	0.20	0.15

You are required to answer the following :

a. What is the expected value of share price 3 months from now? What is the value of call option at expiry if the expected value of the share prevails at the end of 3 months? **(06 Marks)**

b. Determine the gain or loss to the call option holder and seller if the share price at expiry is Rs.146. Show the pay off diagram. The call option premium is Rs.6/-. **(06 Marks)**

c. Determine the price per share on expiry at which call option buyer and seller will be at break-even point. **(04 Marks)**

d. Determine the maximum gain to the call option buyer and seller. What is its probability? **(04 Marks)**

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Fourth Semester MBA Degree Examination, May/June 2010
Risk Management

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FOUR full questions from Q.1 – Q.7.*
2. Question No. 8 is compulsory.

1 a. Bring out the steps involved in risk management.   **(03 Marks)**
   b. What is hedging? Differentiate between short hedge and long hedge.   **(07 Marks)**
   c. The settlement price of an index future contract on a particular day was 1,760. The multiple associated with the contract is 100. The maximum amount by which the contract can realistically change is 50 points per day. The initial margin is Rs.5000 and the maintenance margin is Rs.4000. The settlement prices on the following four days are as follows:

Day	Settlement price
1	1,800
2	1,752
3	1,780
4	1,824

   Calculate the mark to market cash flows, the daily closing balance and net profit (loss) in the accounts of :
   i)   An investor who has gone long at 1760 ; and
   ii) An investor who has gone short at 1760.   **(10 Marks)**

2 a. Differentiate between forwards and futures.   **(03 Marks)**
   b. Suppose that you enter into a short futures contract to sell July silver for $ 5.20 per ounce on the New York commodity exchange. The size of the contract is 5000 ounces. The initial margin is $ 4,000 and the maintenance margin is $ 3,000. What change in the futures price will lead of a margin call? What happens if you do not meet the margin call?   **(07 Marks)**
   c. Consider the following data relating to KM stock. KM has a beta of 0.7 with Nifty. Each Nifty contract is equal to 200 units. KM now quotes at Rs.150 and the Nifty future is 1400 index points. You expect prices to fall and have gone short on 1200 shares of KM in the spot market.
   i)   How many futures contracts you will have to take?
   ii) Suppose the price in the spot market drops by 10% how are you protected?
   iii) Suppose the price in the spot market jumps up by 5%, what happens?   **(10 Marks)**

3 a. The risk – free rate of interest is 7% per annum with continuous compounding and the divided yield on a stock index is 3.2% per annum. The current value of the index is 150. What is the six month futures price?   **(03 Marks)**
   b. The shares of X Ltd are selling at Rs.104 per share. Mr. Ganesh wants to chip in with buying a three months call option at a premium of Rs.5 per option. The exercise price is Rs.105. Six possible prices per share on the expiration date ranging from Rs.95 to Rs.120, with intervals of Rs.5, are possible.
   i)   What is Ganesh's pay off as call option holder on expiration?
   ii) Draw the pay off graph.
   iii) What is the call writer's pay off on expiration?
   iv) Draw the pay off graph.   **(07 Marks)**

c. Assume that a market capitalization weighted index contains only three stocks A, B and C as shown below :
The current value of the index is 1056

Company	Share Price (Rs.)	Market Capitalization (Rs.crores)
A	120	12
B	50	30
C	80	24

Calculate the price of a futures contract with expiration in 60 days on this index, if it is known that 25 days from today, company A would pay a dividend of Rs.8 per share. Take the risk free rate of interest to be 13.98% per annum continuously compounded. Assume the lot size to be 200 units. **(10 Marks)**

4 a. How are 'naked' calls different from 'covered' calls? **(03 Marks)**
   b. Bring out the factors that determine the option value. **(07 Marks)**
   c. Consider the following information with regard to a call option on the stock of XYZ company.
   Current price of the share = Rs.120
   Exercise price of the option = Rs.115
   Time to expiration = 3 months
   Standard deviation of the distribution of continuously compounded rates of return = 0.6
   Continuously compounded risk free rate = 10%
   Value the call using Black – Scholes method. **(10 Marks)**

5 a. What is forward rate agreement? **(03 Marks)**
   b. A trader buys for Rs.42 a call with a strike price of Rs.610 and sells for Rs.26 a call with a strike price of Rs.690. The possible price range of the underlying stock is :
   Rs.450 ; Rs.560 ; Rs.620 ; Rs.680 ; Rs.750 ; Rs.850
   i) What is the cost of the strategy?
   ii) What is the net pay off for each of the possible price range? **(07 Marks)**
   c. Companies X and Y have been offered the following rates per annum on a $5 million 10 year investment.

	Fixed Rate	Floating Rate
Company X	8%	LIBOR
Company Y	8.8%	LIBOR

Company X requires a fixed rate investment; company Y requires a floating rate investment. Design a swap that will net a bank, acting as intermediary 0.2% per annum and will appear equally attractive to X and Y. **(10 Marks)**

6 a. What is value at risk? **(03 Marks)**
   b. Suppose that the spot (zero) rates with continuous compounding are as follows :

Maturity (years)	Rate (% per annum)
1	12.00
2	13.00
3	13.70
4	14.20
5	14.50

Calculate forward interest rates for the second, third, fourth and fifth year. **(07 Marks)**
   c. Briefly explain credit default swaps, total return swaps and credit spread options. **(10 Marks)**

7   a. What is meant by stress testing and back testing? **(03 Marks)**

     b. Suppose that under the terms of a swap, a financial institution has agreed to pay six – month MIBOR and receive 8% per annum (with semi annual compounding) on a notional principal of Rs.100 million. The swap has a remaining life of 1.75 years. Zero rates for 3 month, 9 month, 15 month and 21 month maturities are 8.5%, 9%, 9.4% and 9.7% respectively. The six month MIBOR rate at the last payment date was 6.2% (with semi annual compounding). Determine the value of interest rate swap. **(07 Marks)**

     c. Explain collateralized debt obligation (CDO) with a hypothetical example. **(10 Marks)**

8   **CASE STUDY**

On January 1, 2010 an investor has a portfolio consisting of 8 securities as shown below :

Security	Price	No. of Shares	Beta
A	29.40	400	0.59
B	318.70	800	1.32
C	660.20	150	0.87
D	5.20	300	0.35
E	281.90	400	1.16
F	275.40	750	1.24
G	514.60	300	1.05
H	170.50	900	0.76

The cost of capital for the investor is given to be 20% per annum. The investor fears a fall in the prices of the shares in the near future. Accordingly he approaches you for advice.

You are required to :

i)   State the options available to the investor to protect his portfolio.

ii)   Calculate the beta of his portfolio.

iii)   Calculate the theoretical value of the futures contracts according expiring in February and March.

iv)   Calculate the number of units of S and P CNX Nifty that he would have to sell if he desires to hedge until March his total portfolio, 90% of his portfolio and 120% of his portfolio.

v)   Determine the number of futures contracts the investor should trade if he desires to reduce beta of his portfolio to 0.7

You can make use of the following information :

i)   The current S and P CNX Nifty value is 986.

ii)   S and P CNX Nifty futures can be traded in units of 200 only.

iii)   The February futures are currently quoted at 1010 and the March futures are being quoted at 1019. **(20 Marks)**

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