UNIVERSITY EXAMINATIONS

UNIVERSITEITSEKSAMENS

UNISA university of south africa

MNK301S (480445) May/June 2009
Mei/Junie 2009

FINANCIAL RISK MANAGEMENT (BUSINESS MANAGEMENT 301)
FINANSIELE RISIKOBESTUUR (SAKEBESTUUR 301)

Duration 2 Hours
Tydsduur 2 Uur

40 Marks
40 Punte

EXAMINERS / EKSAMINATORE

FIRST / EERSTE	MR/MNR JS DE BEER	MS/ME E BOTHA
SECOND / TWEEDE	PROF J YOUNG	
EXTERNAL / EKSTERNE	MS/ME E LOUW (PRETORIA - UP)	

Use of a non-programmable pocket calculator is permissible
Gebruik van 'n nie-programmeerbare sakrekenaar is toelaatbaar

This paper consists of 16 pages including the Standard Normal Distribution table (p 10) and 6 sheets of paper for rough work (pp 11-16) and the instructions for completing a mark-reading sheet All 40 questions must be answered on a mark-reading sheet
Please make use of an HB pencil to complete the mark-reading sheet
Indicate your student number and the unique number on the mark-reading sheet

Unique number **480445**

Hierdie vraestel bestaan uit 16 bladsye ingesluit die Standaard Normaal Verdelingstabel (p 10) en 6 velle papier vir rofwerk (pp 11-16) en die instruksies vir die voltooiing van 'n merkleesblad Al 40 vrae moet op 'n merkleesblad beantwoord word
Maak asseblief gebruik van 'n HB potlood om die merkleesblad te voltooi
Toon u studentenommer en die unieke nommer op die merkleesblad aan

Unieke nommer **480445**

NB PLEASE COMPLETE THE ATTENDANCE REGISTER ON THE BACK PAGE, TEAR OFF AND HAND TO THE INVIGILATOR

NB VOLTOOI ASSEBLIEF DIE BYWONINGSREGISTER OP DIE AGTERBLAD, SKEUR AF EN OORHANDIG AAN DIE TOESIGHOUER

Although the instructions for this paper are also presented in Afrikaans, all multiple-choice questions are in English only (like the assignments) in accordance with the CFA® Level I format

Hoewel die instruksies vir hierdie vraestel ook in Afrikaans gegee word is die veelvuldige-keuse vrae slegs in Engels (soos die werkopdragte) in ooreenstemming met die CFA® Level I formaat

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1 Identify the correct statement from the following alternatives

1 Credit risk in a forward contract arises when the counterparty that owes the lesser amount is unable to pay at expiration or declares bankruptcy prior to expiration
2 The seller of a put option contract is obliged to deliver the underlying asset and accept payment at the strike price when the option is exercised
3 The swap spread is the difference between the fixed rate on a swap and the yield on a default-free security of the same maturity and indicates the credit risk in a given swap
4 An off-market forward contract is established with a nonzero value and will therefore have a positive or negative value and require a cash payment at the start

2 Suppose that a party wanted to enter into a forward rate agreement (FRA) that expires in 42 days and is based on 137-day LIBOR The dealer quotes a rate of 4 25 percent on this FRA Assume that at expiration, the 137-day LIBOR is 5 percent and the notional principal is $20,000,000 The FRA payoff to a long positon would represent a

1 $57,083 33 gain
2 $56,017 45 loss
3 $57,083 33 loss
4 $56,017 45 gain

3 Consider a security that sells for $1,100 today A forward contract on this security that expires in nine months is currently priced at $1,200 The annual rate of interest is 6 85 percent Assume that this is an off-market forward contract Calculate the value of the forward contract today, $V_0(0,T)$, and indicate whether payment is made by the long to the short or vice versa

1 $41 83 long to short
2 $23 07 short to long
3 $41 83 short to long
4 $23 07 long to short

4 A portfolio manager expects to purchase a portfolio of stocks in 90 days In order to hedge against a potential price increase over the next 90 days, she decides to take a long position on a 90-day forward contract on the S&P 500 stock index The index is currently at 1130 The continuously compounded dividend yield is 1 75 percent The discrete risk-free rate is 4 25 percent Calculate the value of the forward contract 28 days into the contract with the index value at 1225

1 $92 63 gain to long
2 $96 26 gain to short
3 $92 63 gain to short
4 $96 26 gain to long

5 The euro currently trades at $1 0331 The dollar risk-free rate is 4 percent, and the euro risk-free rate is 7 percent Six-month forward contracts are quoted at a rate of $1 0125 A risk-free profit is earned by engaging in a forward contract and undertaking the following steps

1 Borrow Dollars at 4%, exchange for Euros, and invest at 7%
2 Borrow Dollars at 7%, exchange for Euros, and invest at 4%
3 Borrow Euros at 4%, exchange for Dollars, and invest at 7%
4 Borrow Euros at 7%, exchange for Dollars, and invest at 4%

6 Calculate the price for a T-bill with a face value of $10,000, 153 days to maturity, and a discount yield of 1 68 percent Also, calculate the asked discount yield for a T-bill that has 104 days to maturity, a face value of $10,000, and a price of $9,950

1	$9,918 60	1 78%
2	$9,928 60	1 73%
3	$9,938 60	1 78%
4	$9,938 60	1 73%

7 The spot exchange rate for the British pound is $1 4390 The U S interest rate is 5 8 percent, and the British interest rate is 6 3 percent A futures contract on the exchange rate for the British pound expires in 50 days Calculate the appropriate futures price

1 $1 1943
2 $1 2399
3 $1 3934
4 $1 4381

8 A gold futures contract requires the long trader to buy 100 troy ounces of gold The initial margin requirement is $1,800, and the maintenance margin requirement is $1,200 When could a long contract holder (June futures price $320) and a short contract holder (August futures price $323) receive a maintenance margin call respectively?

1	Price falls below $314	Price rises above $329
2	Price falls below $312	Price falls below $326
3	Price rises above $314	Price rises above $328
4	Price falls below $312	Price rises above $328

9 A speculator has purchased a March Eurodollar futures contract at a price of 92 35 Determine the speculator's gain or loss in dollar terms should the interest rate have changed to 7 0 percent a month later

1 $1,625 loss
2 $1,650 loss
3 $1,625 gain
4 $1,650 gain

10 A copper futures contract requires the long trader to buy 25,000 lbs of copper One November copper futures contract trades at a price of $0 69/lb Theoretically, the maximum loss to the long position and the short position respectively to a contract would be

1	$18,750	$18,750
2	$17,250	$17,250
3	$18,750	Unlimited
4	$17,250	Unlimited

11 The IMM index price in yesterday's newspaper for a September Eurodollar futures contract is 94 28 The IMM index price in today's newspaper for the contract mentioned above is 95 25 How much is the change in the actual futures price of the contract since the previous day?

1 $2,425 decrease
2 $2,245 increase
3 $2,245 decrease
4 $2,425 increase

12 Which of the following statements about European and American options is most accurate?

1 There will always be some price difference between American and European options because of the time value of money
2 American options are more widely traded and are thus easier to value
3 European options allow for exercise on or before the option expiration date
4 Prior to expiration, an American option may have a higher value than an equivalent European option

13 Calculate the payoff at expiration for a call and a put option on a futures contract in which the underlying is at 1134 76 at expiration, the options are on a futures contract for $1,000, and the exercise price is 1140 (call option) and 1130 (put option) respectively

1	$4,760	–$5,240
2	$0	$0
3	$5,240	$4,760
4	–$4,760	$0

14 Assume that you own a security currently worth $500 You plan to sell it in two months To hedge against a possible decline in price during the next two months, you enter into a forward contract to sell the security in two months The risk-free rate is 3 5% Suppose the dealer offers to enter into a forward contract at $498 Indicate how you could earn an arbitrage profit

1 Buy the forward contract, borrow money and buy the security to earn an arbitrage profit
2 Sell the forward contract, invest the proceeds and buy the security to earn an arbitrage profit
3 Buy the forward contract, sell the security and invest the proceeds to earn an arbitrage profit
4 Sell the forward contract, borrow money and buy the security to earn an arbitrage profit

Question 15-16 An investor purchased a newly issued bond with a maturity of 10 years 200 days ago The bond carries a coupon rate of 9 percent paid semi-annually and has a face value of $1,000 The price of the bond with accrued interest is currently $1,146 92 The investor plans to sell the bond 365 days from now The schedule of coupon payments over the first two years, from the date of the purchase, is as follows

Coupon	Days after Purchase	Amount
First	181	$45
Second	365	$45
Third	547	$45
Fourth	730	$45

15 Calculate the no-arbitrage price at which the investor should enter the forward contract Assume that the risk-free rate is 6 percent

1 Short the forward contract at $1,106 74
2 Short the forward contract at $1,124 15
3 Long the forward contract at $1,106 74
4 Long the forward contract at $1,124 15

16 The forward rate is now 180 days old Interest rates have fallen sharply, and the risk-free rate is 4 percent The price of the bond with accrued interest is now $1,302 26 Determine the value of the forward now and indicate whether the investor has accrued a gain or loss on his position

1 $151 13 loss to the long position
2 $156 04 loss to the long position
3 $156 04 loss to the short positon
4 $151 13 loss to the short position

17 Consider a stock index option that expires in 75 days The stock index is currently at 1240 89 and makes no cash payments during the life of the option Assume that the stock index has a multiplier of 1 The risk-free rate is 8 percent Calculate the lowest and highest possible prices for European-style put options on the above stock index with an exercise price of 1255

1	1255 00	0
2	1255 00	14 11
3	1235 31	0
4	1235 31	– 5 58

18 A futures contract on a T-bill expires in 30 days The T-bill matures in 120 days The discount rates on T-bills are as follows 30-day bill = 5 0 percent and 120-day bill = 5 8 percent Find the appropriate futures price by using the prices of the 30-day and 120-day T-bills

1 0 9848
2 0 9851
3 1 0121
4 1 0151

19 Consider the following information on put and call options on a stock and identify the possible arbitrage transaction using a synthetic call

Call price, c_0	$4 50
Put price, p_0	$6 80
Exercise price, X	$70
Days to expiration	139
Current stock price, S_0	$67 32
Risk-free rate, r	5%

1 Buy call, buy put, buy stock, issue bond
2 Sell call, buy put, buy stock, issue bond
3 Buy call, sell put, sell stock, buy bond
4 Buy call, sell put, buy stock, buy bond

Question 20-21 Consider a two-period binomial model in which a stock currently trades at a price of $70 The stock price can go up 15 percent or down 15 percent each period The risk-free rate is 5 percent

20 Calculate the price of a European call option expiring in two periods with an exercise price of $65

1 $12 50
2 $13 30
3 $14 60
4 $15 40

21 Calculate the price of a European put option expiring in two periods with a $75 strike

1 $1 45
2 $2 09
3 $5 11
4 $7 50

22 A decrease in the market rate of interest will

1 Increase call and put prices
2 Decrease call and put prices
3 Decrease put prices and increase call prices
4 Increase put prices and decrease call prices

23 Consider a two-period binomial model in which a stock currently trades at a price of $65 The stock price can go up 20 percent or down 17 percent each period The risk-free rate is 5 percent A put option on this stock expiring in two periods has an exercise price of $64 Calculate the number of units of the underlying stock that would be needed at time 0 in the binomial tree in order to construct a risk-free hedge Use 10,000 puts

1 Long position in 3,086 shares of the underlying stock
2 Short position in 3,086 shares of the underlying stock
3 Long position in 4,219 shares of the underlying stock
4 Short position in 4,219 shares of the underlying stock

The Black-Scholes-Merton model

$$c = S_0 N(d_1) - Xe^{-r^c T} N(d_2)$$

$$p = Xe^{-r^c T}\left[1 - N(d_2)\right] - S_0\left[1 - N(d_1)\right]$$

Where

$$d_1 = \frac{\ln(S_0/X) + \left[r^c + (\sigma^2/2)\right]T}{\sigma\sqrt{T}}$$

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

Question 24-25 Consider an asset that trades at $95 today Call and put options on this asset are available with an exercise price of $100 The options expire in 275 days, and the volatility is 0 425 The continuously compounded risk-free rate is 3 percent

24 Calculate $N(d_1)$ and $N(d_2)$ using the Black-Scholes-Merton model, assuming that the present value of cash flows on the underlying asset over the life of the option is $4 50

1	0 5080	0 6517
2	0 4920	0 3483
3	0 5438	0 3974
4	0 4562	0 6026

25 Calculate the values of European call and put options using the Black-Scholes-Merton model, assuming that the present value of cash flows on the underlying asset over the life of the option is $4 50

1	$12 809	$15 574
2	$12 809	$17 740
3	$10 474	$15 574
4	$10 474	$17 740

The Black model

$$c = e^{-r^c T}\left[F_0 N(d_1) - XN(d_2)\right]$$

$$p = e^{-r^c T}\left(X\left[1 - N(d_2)\right] - F_0\left[1 - N(d_1)\right]\right)$$

Where

$$d_1 = \frac{\ln(F_0/X) + (\sigma^2/2)T}{\sigma\sqrt{T}}$$

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

Question 26-27 An Interest rate call option and put option based on a 90-day underlying rate both have an exercise rate of 7 5 percent and expire in 180 days The forward rate is 8 00 percent, and the volatility is 0 04 The continuously compounded risk-free rate is 5 percent

26 Calculate d_1 and d_2 using the Black model

1 1 1814 1 1533
2 2 3116 2 2835
3 2 7678 2 7397
4 3 0740 3 0529

27 Calculate the price (periodic rate) of the interest rate call option using the Black model

1 0 00000371
2 0 00002743
3 0 00119944
4 0 00479776

Question 28-29 A forward contract is priced at 140 European options on the forward contract have an exercise price of 150 and expire in 65 days The continuously compounded risk-free rate is 3 75 percent, and volatility is 0 33

28 Calculate the price of the underlying asset

1 $138 59
2 $139 09
3 $139 39
4 $139 79

29 Calculate the price of a put option on the underlying asset using the Black model or the Black-Scholes-Merton model

1 $10 476
2 $11 894
3 $12 928
4 $13 965

30 A British company enters into a currency swap in which it pays a fixed rate of 6 percent in dollars and the counterparty pays a fixed rate of 6 percent in pounds The notional principals are £75 million and $105 million Payments are made semi-annually and on the basis of 30 days per month and 360 days per year Calculate the semi-annual payments

1 $3,105,000 £2,250,000
2 $3,150,000 £1,875,000
3 $3,150,000 £2,250,000
4 $3,105,000 £1,875,000

Question 31-32 Consider a two-year interest rate swap with semi-annual payments Assume a notional principal of $25 million

31 Calculate the semi-annual fixed payment and the annualized fixed rate on the swap if the current term structure of LIBOR interest rates is as follows

$L_0(180)$ = 0 0715, $L_0(360)$ = 0 0705
$L_0(540)$ = 0 0695, $L_0(720)$ = 0 0685

1 $817,500 6 54%
2 $866,250 6 54%
3 $817,500 6 93%
4 $866 250 6 93%

32 Calculate the market value of the swap 120 days later from the point of view of the party paying the fixed rate and receiving the floating rate if the term structure 120 days later is as follows

$L_{120}(60)$ = 0 0697, $L_{120}(240)$ = 0 0653
$L_{120}(420)$ = 0 0629, $L_{120}(600)$ = 0 0613

1 –$180,000
4 $117,500
3 –$117,500
4 $180,000

Question 33-34 Assume an asset manager enters into a one-year equity swap in which he will receive the return on the Nasdaq 100 Index in return for paying a floating interest rate The swap calls for quarterly payments The Nasdaq 100 is at 1561 27 at the beginning of the swap Ninety days later, the rate $L_{90}(90)$ is 0 0555 The notional principal of the swap is $50 million, and the term structure is

$L_{100}(80)$ = 0 0554
$L_{100}(170)$ = 0 0481
$L_{100}(260)$ = 0 0427

33 Calculate the value of the floating payments

1 1 0221
2 1 0139
3 1 0077
4 1 0015

34 Calculate the market value of the swap 100 days from the beginning of the swap if the Nasdaq 100 is at 1595 72

1 –$1,530,000
2 $1,030,000
3 –$1,030,000
4 $1,530,000

35 Consider an equity swap in which the asset manager receives the return of the Russel 2000 Index in return for paying the return on the DJIA At the inception of the equity swap, the Russel 2000 is at 490 12 and the DJIA is at 9687 33 Calculate the market value of the swap a few months later when the Russel 2000 is at 542 92 and the DJIA is at 9976 54 The notional principal of the swap is $15 million

1 $1,024,500
2 $1,167,000
3 $1,176,700
4 $1,245,000

36 An asset manager wishes to reduce his exposure to large-cap stocks and increase his exposure to small cap stocks He seeks to do so using an equity swap He agrees to pay a dealer the return on a large-cap index, and the dealer agrees to pay the manager the return on a small-cap index The value of the small-cap index starts off at 689 40, and the large-cap index starts at 1130 20 In six months, the small-cap index is at 652 60 and the large-cap index is at 1251 83 Calculate the first overall payment and indicate which party makes the payment Assume that payments are made semi-annually The notional principal is $100 million

1 $16,099,787 by the dealer to the asset manager
2 $20,016,236 by the asset manager to the dealer
3 $16,099,787 by the asset manager to the dealer
4 $20,016,236 by the dealer to the asset manager

Question 37-38 Consider a European receiver swaption that expires in two years and is on a one-year swap that will make quarterly payments The swaption has an exercise rate of 7 5 percent The notional principal is $100 million At expiration, the term structure of interest rates is as follows

$L_0(90)$ = 0 0373, $L_0(180)$ = 0 0429
$L_0(270)$ = 0 0477, $L_0(360)$ = 0 0538

37 Calculate the annualized fixed payment per $1 of notional principal

1 0 0132
2 0 0374
3 0 0526
4 0 0748

38 Calculate the market value at expiration of the receiver swaption based on the notional principal

1 $2,160,000
2 $1,930,000
3 $1,690,000
4 $1,200,000

39 A company has most of its liabilities in the form of floating-rate notes with a maturity of two years and quarterly reset The company is not concerned with interest rate movements over the next four quarters but is concerned with potential movements after that Identify the most appropriate strategy that will allow the company to hedge the expected change in interest rates

1 Enter into a 2-year, quarterly pay-floating, receive-fixed swap
2 Enter into a 2-year, quarterly pay-fixed, receive floating swap
3 Go long a payer swaption with a 1-year maturity
4 Go long a receiver swaption with a 1-year maturity

40 Identify the correct statement from the following alternatives

1 A fiduciary call, consisting of a European call and a zero-coupon bond, produces the same payoff as a protective put
2 The maximum value of a European put is the exercise price while the maximum value of an American put is the present value of the exercise price
3 Interest rate options exist in the form of caps, which are put options on interest rates and floors, which are call options on interest rates
4 Floors consist of a series of call options, called caplets, on an underlying rate, with each option expiring at a different time

[40]

Cumulative Probabilities for a Standard Normal Distribution

P(X ≤ x) = N(x) for x ≥ 0 or 1 – N(– x) for x < 0

x	0.00	0 01	0 02	0 03	0 04	0 05	0 06	0.07	0.08	0.09
0 00	0 5000	0 5040	0 5080	0 5120	0 5160	0 5199	0 5239	0 5279	0 5319	0 5359
0 10	0 5398	0 5438	0 5478	0 5517	0 5557	0 5596	0 5636	0 5675	0 5714	0 5753
0 20	0 5793	0 5832	0 5871	0 5910	0 5948	0 5987	0 6026	0 6064	0 6103	0 6141
0.30	0 6179	0 6217	0 6255	0 6293	0 6331	0 6368	0 6406	0 6443	0 6480	0 6517
0.40	0 6554	0 6591	0 6628	0 6664	0 6700	0 6736	0 6772	0 6808	0 6844	0 6879
0.50	0 6915	0 6950	0 6985	0 7019	0 7054	0 7088	0 7123	0 7157	0 7190	0 7224
0 60	0 7257	0 7291	0 7324	0 7357	0 7389	0 7422	0 7454	0 7486	0 7517	0 7549
0 70	0 7580	0 7611	0 7642	0 7673	0 7704	0 7734	0 7764	0 7794	0 7823	0 7852
0 80	0 7881	0 7910	0 7939	0 7967	0 7995	0 8023	0 8051	0 8078	0 8106	0 8133
0 90	0 8159	0 8186	0 8212	0 8238	0 8264	0 8289	0 8315	0 8340	0 8365	0 8389
1 00	0 8413	0 8438	0 8461	0 8485	0 8508	0 8531	0 8554	0 8577	0 8599	0 8621
1.10	0 8643	0 8665	0 8686	0 8708	0 8729	0 8749	0 8770	0 8790	0 8810	0 8830
1.20	0 8849	0 8869	0 8888	0 8907	0 8925	0 8944	0 8962	0 8980	0 8997	0 9015
1.30	0 9032	0 9049	0 9066	0 9082	0 9099	0 9115	0 9131	0 9147	0 9162	0 9177
1.40	0 9192	0 9207	0 9222	0 9236	0 9251	0 9265	0 9279	0 9292	0 9306	0 9319
1 50	0 9332	0 9345	0 9357	0 9370	0 9382	0 9394	0 9406	0 9418	0 9429	0 9441
1.60	0 9452	0 9463	0 9474	0 9484	0 9495	0 9505	0 9515	0 9525	0 9535	0 9545
1 70	0 9554	0 9564	0 9573	0 9582	0 9591	0 9599	0 9608	0 9616	0 9625	0 9633
1 80	0 9641	0 9649	0 9656	0 9664	0 9671	0 9678	0 9686	0 9693	0 9699	0 9706
1.90	0 9713	0 9719	0 9726	0 9732	0 9738	0 9744	0 9750	0 9756	0 9761	0 9767
2 00	0 9772	0 9778	0 9783	0 9788	0 9793	0 9798	0 9803	0 9808	0 9812	0 9817
2.10	0 9821	0 9826	0 9830	0 9834	0 9838	0 9842	0 9846	0 9850	0 9854	0 9857
2.20	0 9861	0 9864	0 9868	0 9871	0 9875	0 9878	0 9881	0 9884	0 9887	0 9890
2.30	0 9893	0 9896	0 9898	0 9901	0 9904	0 9906	0 9909	0 9911	0 9913	0 9916
2.40	0 9918	0 9920	0 9922	0 9925	0 9927	0 9929	0 9931	0 9932	0 9934	0 9936
2.50	0 9938	0 9940	0 9941	0 9943	0 9945	0 9946	0 9948	0 9949	0 9951	0 9952
2 60	0 9953	0 9955	0 9956	0 9957	0 9959	0 9960	0 9961	0 9962	0 9963	0 9964
2 70	0 9965	0 9966	0 9967	0 9968	0 9969	0 9970	0 9971	0 9972	0 9973	0 9974
2 80	0 9974	0 9975	0 9976	0 9977	0 9977	0 9978	0 9979	0 9979	0 9980	0 9981
2 90	0 9981	0 9982	0 9982	0 9983	0 9984	0 9984	0 9985	0 9985	0 9986	0 9986
3 00	0 9987	0 9987	0 9987	0 9988	0 9988	0 9989	0 9989	0 9989	0 9990	0 9990

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