kasneb

CIFA PART III SECTION 6

DERIVATIVES ANALYSIS

FRIDAY: 3 September 2021. **Time Allowed: 3 hours.**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

QUESTION ONE

(a) Summarise six lessons that financial institutions could learn from recent derivatives mishaps. (6 marks)

(b) Distinguish between "hedgers" and "arbitrageurs' as used in derivatives markets. (4 marks)

(c) A financial manager is considering hedging against possible decrease in short term interest rates in the country. He decides to hedge his risk exposure by going short on a forward rate agreement (FRA) that expires in 90 days based on the 90-day London interbank offered rate [LIBOR].

The current term structure for the LIBOR is as follows:

Term (days)	Interest rate (%)
30	5.83
90	6.00
180	6.14
360	6.51

Required:

(i) Identify the type of FRA used by the financial manager. (2 marks)

(ii) The interest rate that the financial manager would receive on the FRA identified in (c) (i) above. (3 marks)

(iii) It is now 30 days since the financial manager took a short position in the FRA. Interest rates have shifted down and the new term structure for the LIBOR is as follows:

Term (days)	Interest rate (%)
60	5.50
150	5.62

Required:

Calculate the market value of the FRA using a notional principal of Sh.15,000,000. (5 marks)

(Total: 20 marks)

QUESTION TWO

(a) Explain four reasons for regulation of the derivatives market. (4 marks)

(b) Explain the following types of hedging:

(i) Carrying charge hedging. (2 marks)

(ii) Operational hedging. (2 marks)

(iii) Selective hedging. (2 marks)

(c) The gold futures contract on the Globex Trading System covers 100 ounces of gold. An investor decides to enter into two contracts. The initial futures price per ounce is Sh.1,000. The initial margin requirement is Sh.6,000 per contract and the maintenance margin is Sh.4,000. The price of gold in the following 6 days is as follows:

Day	Price per ounce of gold (Sh.)
1	990
2	980
3	970
4	960
5	970
6	980

Required:
The margin account balance at the end of day 6. (6 marks)

(d) Brian Masaku works for an investment firm which is exposed to movement in the Uganda shilling. Brian desires to hedge the currency exposure. He prices one year fixed cash for fixed currency swap involving the Uganda shilling and Kenya shilling with a quarterly reset. He uses the interest rate data below to price the currency swap:

Days to maturity	Uganda shilling Spot interest rates (%)	Kenya shilling Spot interest rates (%)
90	0.05	0.20
180	0.10	0.40
270	0.15	0.55
360	0.25	0.70

Required:
The annualised equilibrium fixed swap rate for Uganda shilling. (4 marks)
(Total: 20 marks)

QUESTION THREE

(a) Discuss four applications of swaps. (8 marks)

(b) The following information relates to the shares of XYZ Ltd.:
1. The current price of each share is Sh.35.
2. The expected continuously compounded rate of return is 8%.
3. XYZ Ltd. pays semi-annual dividends of Sh.0.32 per share, with the next dividend expected to be paid two months from now.
4. The continuously compounded risk-free interest rate is 4%.

Required:
The current one-year forward price of XYZ Ltd.'s share. (4 marks)

(c) Martin Orwa, a client of a derivative consulting firm, is planning to acquire a competing firm in 109 days. The acquisition will initially be financed by a Sh.80 million bridge loan with a term of 180 days at an interest rate of 180 day LIBOR plus 300 basis points. Principal and interest will be paid at the end of the loan term. Martin is concerned about a potential increase in interest rates before the initiation of the loan and asks for advice on fully hedging this interest rate risk.

A derivative analyst at the consulting firm advises Martin to buy an interest rate call option on 180 day LIBOR with an exercise rate of 2.0% for a premium of Sh.86,000. The call expires in 109 days and any payoff occurs at the end of the loan term. Current 180 day LIBOR is 2.2%. The client can finance the call option premium at a current 180 day LIBOR plus 300 basis point. At initiation of the loan 109 days later, 180 LIBOR is 3.5%.

Required:
The effective annual rate in basis point on the loan. (8 marks)
(Total: 20 marks)

QUESTION FOUR

(a) Explain the following terms as used in option trading:

(i) Calendar spread. (2 marks)

(ii) Implied volatility. (2 marks)

(b) Describe two uses of implied volatility in option trading. (4 marks)

(c) The price of an asset will either rise by 25% or fall by 40% in 1 year, with equal probability.

A European put option on this asset matures after 1 year.

Additional information:

1. The price of the asset today is Sh.100.
2. The strike price of the put option is Sh.130.
3. Put option premium is Sh.7.
4. Annual effective risk free rate is 3%.

Required:

The expected profit of the put option. (4 marks)

(d) Samla Investment Ltd. uses different strategies in investment. One of its popular strategies is to invest when it does not have money but expects to receive it later. The company expects to receive Sh.6 million at a later date, but would like to proceed and take a position of Sh.3 million in equity and 3 million in bonds. The desired equity Beta is 1.0 and the desired bond duration is 6.2. A stock index futures contract is priced at Sh.195,000 with a Beta of 0.97. Bond futures contract goes for Sh.110,000 and it has an implied modified duration of 6.0.

At expiration, share prices goes down by 5% and the stock index futures is down to Sh.185,737.50. Bonds are up 2% and bonds futures price is up to Sh.112,090.

Required:

(i) The profit (loss) using futures contract. (3 marks)

(ii) The profit (loss) using direct investment in the actual securities. (2 marks)

(iii) Compare your results in (d) (i) and (d) (ii) above. (1 mark)

(iv) Explain the term "pre-investing" investment approach. (2 marks)

(Total: 20 marks)

QUESTION FIVE

(a) In relation to options markets:

(i) Explain the term "market markers". (2 marks)

(ii) Highlight two roles played by market markers in options markets. (2 marks)

(b) The current market price per share of Flamingo Ltd. is Sh.55. A one year call option with an exercise price of Sh.55 is trading at Sh.4.92. The share price can increase by 20% or decrease by 15% over the next year.

The risk free rate is 5%.

Required:

(i) Using suitable computations, determine whether any arbitrage profit exists in trading the company's shares. (4 marks)

(ii) Describe the transaction necessary to earn the arbitrage profit (if any) in (b) (i) above. (2 marks)

(c) A pension fund has accumulated Sh.10 million worth of Ndovu Limited's shares. The market price per share is Sh.50. The following information on options on both Ndovu Limited shares and NSE index is provided below:

	Ndovu Limited	**NSE index**
	Sh.	**Sh.**
European call	6.31	6.31
European put	4.83	4.83
American call	6.28	6.28
American put	4.96	4.96

Ndovu Limited share option sensitivities:

	Delta
European call	0.5977
European put	–0.4023
American call	0.5973
American put	–0.4258

The pension fund would like to consider neutralising its Ndovu Limited's equity position from changes in the share price of Ndovu Limited.

As a consultant, the fund has approached you to assist in creating a delta-neutral portfolio.

Required:

(i) The number of standard Ndovu Limited's European call option to be sold or bought. (3 marks)

(ii) The number of standard Ndovu Limited's European put options to be bought or sold. (3 marks)

(d) A derivatives specialist uses a strategy that involves creating a synthetic call from other instruments at a cost less than the market value of the call itself and then selling the call. During the course of his research, he observes that ABC Limited's share is currently priced at Sh.56 while a European style put option with a strike price of Sh.55 is trading at Sh.0.40 and a European-style call option with the same strike price is trading at Sh.2.50. Both options have 6 months remaining until expiration. The risk free rate is currently 4%.

Required:

The arbitrage profit he would earn if he were to establish a long protective put position. (4 marks)

(Total: 20 marks)

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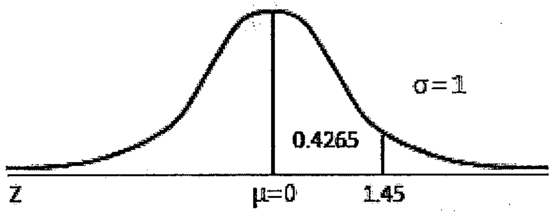
Areas Under the One-Tailed Standard Normal Curve

This table provides the area between the mean and some Z score.
For example, when Z score = 1.45 the area = 0.4265.



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000