

KASNEB

CIFA PART III SECTION 5

FIXED INCOME INVESTMENTS ANALYSIS

WEDNESDAY: 24 May 2017.

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) Highlight three sources of return on a fixed-rate bond purchased at par. (3 marks)
- (b) In the context of bond duration, explain the following terms:
- (i) Yield duration. (1 mark)
 - (ii) Curve duration. (1 mark)
 - (iii) Macaulay duration. (1 mark)
 - (iv) Modified duration. (1 mark)
 - (v) Key rate duration. (1 mark)
 - (vi) Money duration. (1 mark)
- (c) Assess two effects of change in volatility on a callable convertible bond. (2 marks)
- (d) A treasury bond pays a 12% coupon annually. The bond has 80 days to the next coupon payment and there are 285 days since the last coupon payment. After the next coupon payment, the bond will have six years to maturity. The current market yield for the bond is 10%.

Required:

The bond's clean price. (5 marks)

- (e) A corporate bond with a coupon rate of 4% and a par value of Sh.1,000 was purchased for Sh.840 one year ago. The bond was sold for Sh.894. The inflation rate during the year was 5%.

Required:

The real return for the corporate bond. (4 marks)

(Total: 20 marks)

QUESTION TWO

- (a) Daniel Mutiso is a fixed income analyst with Bidii Investment Bank Ltd. The Chief Investment Officer has instructed him to value a 30-year bond using Monte Carlo simulation method.

Required:

Assuming that the bond has monthly coupon payments, enumerate five steps that Daniel Mutiso would follow when valuing the bond. (5 marks)

- (b) Maxica Ltd. is a listed company based in Nairobi. The market value of the company's assets is Sh.100 million. The company also has a 1-year debt with a par value of Sh.70 million. The risk-free rate is 5% and the volatility of asset value is 40%. The company uses Black-Scholes model to estimate the probability of default.

Required:

The probability of default for the 1-year debt. (6 marks)

Hint: Probability of default = $1 - N(d_2)$

$$\text{Where: } d_1 = \frac{\ln\left(\frac{S_0}{E}\right) + \left(r_f + \frac{1}{2}\sigma^2\right)t}{\sigma\sqrt{t}}$$

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

S_0 is the market price of underlying stock.

E is the exercise price

r_f is the risk-free rate.

σ is the volatility of security prices.

t is the maturity period.

- (c) In March 2016, Double Communications Ltd. (DCL) issued Sh.575 million senior convertible bond with 6.25% annual coupon and a 5-year maturity period. Each Sh.1,000 par value bond could be converted into 16.1421 (dividend adjusted for a 2:1 split that occurred in July 2016) shares of DCL ordinary shares.

In March 2017, the bond traded at 121% (bond points in percent of the par amount) and the DCL ordinary shares traded at Sh.65 per share. The share pays no dividend.

Required:

The premium payback period.

(3 marks)

- (d) Samuel Kyalo is considering purchasing one of the following newly issued 10-year AAA rated corporate bonds on 30 April 2017 whose characteristics are shown below:

Bond description	Coupon rate (%)	Price (Sh.)	Call option	Call price (Sh.)
Bond X due 30 April 2027	6.00	100	Non-callable	Not applicable
Bond Y due 30 April 2027	6.20	100	Currently callable	102.00

Samuel Kyalo notes that the yield curve is currently flat and assumes that the yield curve shifts in an instantaneous and parallel manner.

Required:

- (i) Contrast the effect on the price of bond X and bond Y assuming yields decline more than 100 basis points. (3 marks)
- (ii) Explain two interest rate forecasts under which Samuel Kyalo would prefer bond Y over bond X. (3 marks)
- (Total: 20 marks)**

QUESTION THREE

- (a) Propose three limitations of Macaulay and modified durations. (3 marks)
- (b) Explain three areas considered in the credit analysis of asset backed securities (ABS) and corporate bonds. (3 marks)
- (c) A 3-year bond has a coupon of 12% and a yield-to-maturity (YTM) of 9%. The bond pays interest on an annual basis.

Required:

Compute the bond convexity.

(7 marks)

- (d) A fund manager has the following three bond portfolio:

Bond description	Price (Sh.)	Yield (%)	Par amount owed (Sh.)	Duration
10%, 5 year	100	10	4 million	3.86
8%, 15 year	84.63	10	5 million	8.05
14%, 30 year	137.86	10	1 million	9.17

The three bonds are option-free.

Required:

- (i) The bond portfolio duration. (6 marks)
- (ii) Interpret the result obtained in (d)(i) above. (1 mark)
- (Total: 20 marks)**

QUESTION FOUR

- (a) Describe two advantages of a bond sinking fund from the bondholders perspective. (2 marks)
- (b) Explain how the following factors could be used to describe the yield curve movements as postulated by Litterman and Scheinkman (1991).
 - (i) Level of the yield curve. (1 mark)
 - (ii) Slope of the yield curve. (1 mark)
 - (iii) Curvature of the yield curve. (1 mark)
- (c) Outline three disadvantages of a bond call provision from the investors perspective. (3 marks)
- (d) The yield curve of a bond portfolio shifts such that 2-year rates increase by 50 basis points, 10-year rates increase by 100 basis points, 20-year rates increase by 80 basis points and 25-year rates decline by 120 basis points. The key rate duration for the 2-year, 10-year, 20-year and 25-year bonds are 0.5, 2.5, 9 and 10 respectively.

Required:

Calculate the effect of this non-parallel shift in the yield curve on the bond portfolio. (4 marks)

- (e) The spot rates for year 1, year 2 and year 3 are 3.5%, 4% and 4.5% respectively. There is a 3-year zero-coupon bond and a 3-year coupon bond that pays a 5% coupon annually.

Required:

(i) The bonds yield-to-maturity (YTM). (3 marks)

(ii) The realised return of the two bonds over the next one year if the yield curve remains constant. (5 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) (i) Evaluate six methods of classifying global fixed income markets. (6 marks)
- (ii) Examine two mechanisms for issuing bonds in the primary markets. (2 marks)
- (b) (i) Describe three ways of using forward rates in yield curve trade. (3 marks)
- (ii) A leading business publication gives the following prices for STRIPS with a principal of Sh.100:

Bond	Maturity year	Price (Sh.)
A	1	95.92
B	2	92.01
C	3	87.00

Required:

The annual forward rate from year two to year three. (5 marks)

- (c) The annual coupon for a bond is Sh.9. This is paid on a semi-annual basis. A bond is purchased on a coupon payment date for Sh.95.20 and sold exactly two years later for Sh.101.50. The rollover rates for the first three coupons are 9.00%, 9.50% and 10.00% respectively.

Required:

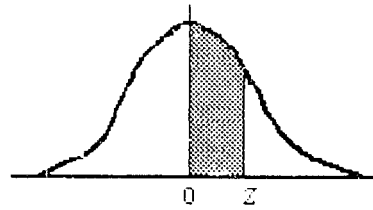
The holding period yield of the bond. (4 marks)

(Total: 20 marks)

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AREAS
under the
STANDARD
NORMAL CURVE
from 0 to z



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z	0	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.201	.2051	.2088	.2123	.2157	.2190	.2224
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000