kasneb

CIFA PART III SECTION 5

FIXED INCOME INVESTMENTS ANALYSIS

TUESDAY: 26 November 2019. **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) Fixed income securities provide investors with a return in form of periodic payments and eventual return of the principal at maturity.

With reference to the above statement, identify four types of fixed income securities available to investors in your country. (4 marks)

(b) Explain the following terms as used in the global bonds markets:

(i) Supranational bonds. (1 mark)

(ii) Euroyen bonds. (1 mark)

(iii) Offshore bond market. (1 mark)

(iv) Yankee bonds. (1 mark)

(c) As a fixed income analyst at a renowned investment bank, you have been presented with the following details regarding a five-year convertible bond issued by Bamboo Limited.

Par value	Sh.1,000
Coupon rate	8.5%
Market price of convertible bond	Sh.900
Conversion ratio	30
Estimated straight value of the bond	Sh.700

The market price of Bamboo Limited's ordinary shares is Sh.25 and the divided per share (DPS) is Sh.1 per annum.

Required:

Compute the following:

(i) Conversion value of the bond. (1 mark)

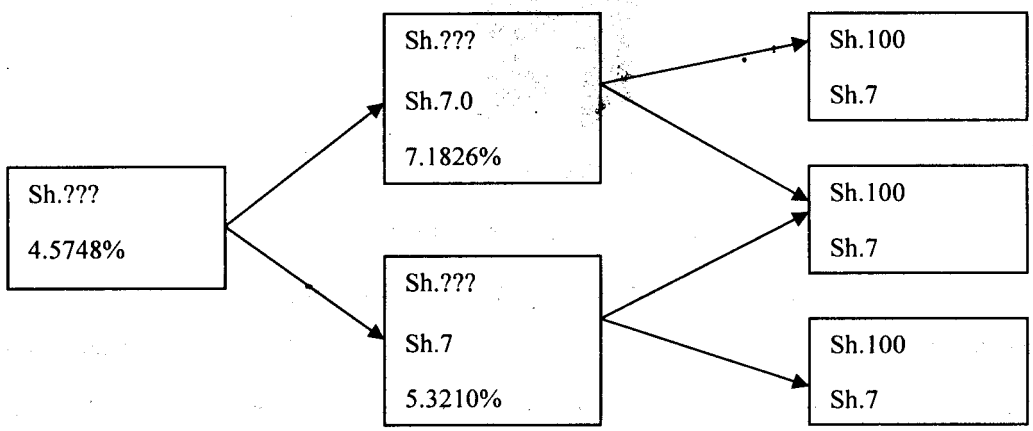
(ii) Market conversion price. (1 mark)

(iii) Conversion premium ratio. (1 mark)

(iv) Premium over straight value. (1 mark)

(v) Favourable income differential per share. (2 marks)

(d) A 7% annual coupon bond has two years to maturity. The interest rate tree is illustrated below:



The bond has a par value of Sh.100

Required:
Determine the value of the bond today. (6 marks)

(Total: 20 marks)

QUESTION TWO

(a) Highlight five properties of duration as used in fixed income securities. (5 marks)

(b) A bond dealer provides the following information on a portfolio of fixed income securities:

Bond	Par value Sh.(million)	Market price (Sh.)	Coupon rate (%)	Modified duration	Effective duration	Effective convexity
W	2	100	6.5	8	8	154
X	3	93	5.5	6	1	50
Y	1	95	7	8.5	8.5	130
Z	4	103	8	9	5	-70

Required:

(i) The effective duration for the portfolio. (2 marks)

(ii) The price value of a basis point (PVBP) for the portfolio. (2 marks)

(iii) Giving reason(s), identify the bond(s) with no embedded options. (2 marks)

(iv) Giving reason(s), identify the callable bond(s). (2 marks)

(v) Giving reason(s), identify the putable bond(s). (2 marks)

(vi) Determine the approximate price change for the 7% bond assuming that the yield-to-maturity (YTM) increases by 25 basis points. (2 marks)

(c) The following information relates to a 6% annual coupon treasury note with 1.5years to maturity:

Maturity	Spot rate
6 months	5%
1 year	6%
1.5 years	7%

The par value of the treasury note is Sh.1,000.

Required:
The arbitrage profit assuming that the treasury note is selling for Sh.992. (3 marks)

(Total: 20 marks)

QUESTION THREE

(a) Explain four reasons why fixed income analysts prefer to use London Interbank Offered Rate (LIBOR) curve as a benchmark for valuing fixed income securities. (4 marks)

(b) An analyst gathers the following data relating to a 3% coupon corporate bond that matures in 2 years:

Period	Years to maturity	Spot rate (%)	Corporate spread (%)
1	0.5	3.00	0.50
2	1.0	3.30	0.50
3	1.5	3.50	0.50
4	2.0	4.00	0.50

The par value of the bond is Sh.100

Required:
Determine the bond's price. (4 marks)

(c) The bond equivalent yield (BEY) spot rates for treasury yields are provided below:

Period	Maturity	Spot rate (%)
1	0.5	1.20
2	1.0	2.10
3	1.5	2.80
4	2.0	3.30

Required:
The 6-month forward rate one year from now using bond equivalent yield (BEY). (4 marks)

(d) Four non-convertible bonds have the yield spreads to treasury securities as shown below:

Bond	Maturity (years)	Nominal spread (bps)	Zero volatility spread (bps)	Option adjusted spread (OAS) (bps)
W	2	156	155	130
X	3	173	174	199
Y	5	188	189	164
Z	10	202	201	226

Required:
Analyse the bonds based on the above spreads. (4 marks)

(e) A bond with a coupon rate of 8% and a full price of Sh.908 has a yield-to-maturity (YTM) of 9%. The bond duration is 9.42 and its convexity is 68.33.

Required:
Estimate the change in the full price of the bond for a 30 basis point increase in yield-to-maturity. (4 marks)
(Total: 20 marks)

QUESTION FOUR

(a) Analyse five factors that could affect the repurchase agreement (repo) margin. (5 marks)

(b) (i) In the context of bond pricing, explain the term "matrix pricing". (2 marks)

(ii) Geoffrey Musomi is estimating the value of a non traded 4% annual pay, BB rated bond that has five years remaining to maturity. He has obtained the following yield-to-maturity (YTM) on similar corporate bonds:

- BB rated, 4 year annual pay 5% coupon bond YTM = 4.738%
- BB rated, 6 year annual pay 4% coupon bond YTM = 5.232%
- BB rated, 6 year annual pay 6% coupon bond YTM = 5.284%

Required:
The value of the non traded bond. (4 marks)

(c) Highlight two strengths and two weaknesses of structural models in credit analysis. (4 marks)

(d) Neta Ltd. is a high yield bond issuer with a credit rating of Ba2/BB. The company has presented the following financial information:

	Sh."million"		Sh."million"
Cash	10	Accounts payable	10
Accounts receivable	15	Short term debt	5
Inventories	55	Current portion of long-term debt	3
Land	10	Long-term bank loans	30
Property, plant and equipment	85	Secured bonds	10
Good will	25	Unsecured bonds	20
		Net pension liability	22
		Paid-in-capital	10
		Retained earnings	90
Total assets	200	**Total liabilities and equity**	200

Additional information:

1. For the year ended 30 September 2019, Neta Ltd.'s earnings before interests, taxes, depreciation and amortisation (EBITDA) were Sh.45 million.
2. For firms in Neta Ltd.'s industry, credit rating standards for an investment grade (Baa3/BBB) credit rating include a debt to EBITDA ratio of less than 1.8x and a debt to capital ratio based on all sources of financing less than 40%.
3. On an investors briefing, Neta's management states that they believe Neta Ltd. should be upgraded to investment grade based on its debt to EBITDA ratio of 1.5x and its debt to capital ratio of 34%.

Requited:
Using relevant financial ratios, explain why a credit analyst might disagree with the management's assessment.
(5 marks)
(Total: 20 marks)

QUESTION FIVE

(a) (i) Explain the term "riding the yield curve strategy" as used in active bond portfolio management. (2 marks)

(ii) Summarise three applications of yield curve. (3 marks)

(b) Johnstone Mwau is the portfolio manager of fixed income securities at Alpha Bank Limited and is examining the term structure of credit spread for one of the bank's holdings. He has obtained the following data on Mbuni Corporate's 5 year, 3% senior unsecured bond issued three years ago:

Payment date	Risk-free rate (%)	Credit spread (%)
30 September 2021	0.15	0.01
31 March 2022	0.22	0.02
30 September 2022	0.25	0.03
31 March 2023	0.27	0.04

The rates given above are continuously compounded annual rate:

The bond has a par value of Sh.1,000

Required:
The present value of expected loss for the bond. (5 marks)

(c) You are analysing three bonds; A, B, and C each with a face value of Sh.10,000, 12% coupon rate and five years maturity. Bond A pays interest annually while bond B and C pay interest semi-annually and quarterly respectively.

Required:

(i) The price for bond A, B and C assuming yield-to-maturity (YTM) is 10%, 12% and 16% respectively.
(9 marks)

(ii) Comment on the relationship between bond price, coupon payments and the yield-to-maturity from the computations in (c) (i) above. (1 mark)
(Total: 20 marks

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Present Value of 1 Received at the End of n Periods:

$$PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	.9901	.9804	.9709	.9615	.9524	.9434	.9346	.9259	.9174	.9091	.8929	.8772	.8696	.8621	.8475	.8333	.8065	.7813	.7576	.7353
2	.9803	.9612	.9426	.9246	.9070	.8900	.8734	.8573	.8417	.8264	.7972	.7695	.7561	.7432	.7182	.6944	.6504	.6104	.5739	.5407
3	.9706	.9423	.9151	.8890	.8638	.8396	.8163	.7938	.7722	.7513	.7118	.6750	.6575	.6407	.6086	.5787	.5245	.4768	.4348	.3975
4	.9610	.9238	.8885	.8548	.8227	.7921	.7629	.7350	.7084	.6830	.6355	.5921	.5718	.5523	.5158	.4823	.4230	.3725	.3294	.2923
5	.9515	.9057	.8626	.8219	.7835	.7473	.7130	.6806	.6499	.6209	.5674	5194	.4972	.4761	.4371	.4019	.3411	.2910	.2495	.2149
6	.9420	.8880	.8375	.7903	.7462	.7050	.6663	.6302	.5963	.5645	.5066	.4556	.4323	.4104	.3704	.3349	.2751	.2274	.1890	.1580
7	.9327	.8706	.8131	.7599	.7107	.6651	.6227	.5835	.5470	.5132	.4523	.3996	.3759	.3538	.3139	.2791	.2218	.1776	.1432	.1162
8	.9235	.8535	.7894	.7307	.6768	.6274	.5820	.5403	.5019	.4665	.4039	.3506	.3269	.3050	.2660	.2326	.1789	.1388	.1085	.0854
9	.9143	.8368	.7664	.7026	.6446	.5919	.5439	.5002	.4604	.4241	.3606	.3075	.2843	.2630	.2255	.1938	.1443	.1084	.0822	.0628
10	.9053	.8203	.7441	.6756	.6139	.5584	.5083	.4632	.4224	.3855	.3220	.2697	.2472	.2267	.1911	.1615	.1164	.0847	.0623	.0462
11	.8963	.8043	.7224	.6496	.5847	.5268	.4751	.4289	.3875	.3505	.2875	.2366	.2149	.1954	.1619	.1346	.0938	.0662	.0472	.0340
12	.8874	.7885	.7014	.6246	.5568	.4970	.4440	.3971	.3555	.3186	.2567	.2076	.1869	1685	.1372	.1122	.0757	.0517	.0357	.0250
13	.8787	.7730	.6810	.6006	.5303	.4688	.4150	.3677	.3262	.2897	.2292	.1821	.1625	.1452	.1163	.0935	.0610	.0404	.0271	.0184
14	.8700	.7579	.6611	.5775	.5051	.4423	.3878	.3405	.2992	.2633	.2046	.1597	.1413	.1252	.0985	.0779	.0492	.0316	.0205	.0135
15	.8613	.7430	.6419	.5553	.4810	.4173	.3624	3152	.2745	.2394	.1827	.1401	.1229	.1079	.0835	.0649	.0397	.0247	.0155	0099
16	.8528	.7284	.6232	.5339	.4581	.3936	.3387	.2919	.2519	.2176	.1631	.1229	1069	.0930	.0708	.0541	.0320	.0193	.0118	.0073
17	.8444	.7142	.6050	.5134	.4363	.3714	.3166	.2703	.2311	.1978	.1456	.1078	.0929	.0802	.0600	.0451	.0258	.0150	.0089	.0054
18	.8360	.7002	.5874	.4936	.4155	.3503	.2959	.2502	.2120	.1799	.1300	.0946	.0808	.0691	.0508	.0376	.0208	.0118	.0068	.0039
19	.8277	.6864	.5703	.4746	.3957	.3305	.2765	.2317	.1945	.1635	.1161	.0829	.0703	.0596	.0431	.0313	.0168	.0092	.0051	.0029
20	.8195	.6730	.5537	.4564	.3769	.3118	.2584	.2145	.1784	.1486	1037	.0728	.0611	.0514	.0365	.0261	.0135	.0072	.0039	.0021
25	.7798	.6095	.4776	.3751	.2953	.2330	.1842	.1460	.1160	.0923	.0588	.0378	.0304	.0245	.0160	.0105	.0046	.0021	.0010	0005
30	.7419	.5521	.4120	.3083	.2314	.1741	.1314	.0994	.0754	.0573	.0334	.0196	.0151	.0116	.0070	.0042	.0016	.0006	.0002	.0001
40	.6717	.4529	.3066	.2083	.1420	.0972	.0668	0460	.0318	.0221	.0107	.0053	.0037	.0026	.0013	.0007	.0002	.0001	.	.
50	.6080	.3715	.2281	.1407	.0872	.0543	.0339	.0213	.0134	.0085	.0035	.0014	.0009	.0006	.0003	.0001	.	.	.	.
60	.5504	.3048	.1697	.0951	.0535	.0303	.0173	.0099	.0057	.0033	.0011	.0004	.0002	.0001	.	.	.	.	.	.

* The factor is zero to four decimal places

Present Value of an Annuity of 1 Per Period for n Periods:

$$PVIF_{r,t} = \sum_{t=1}^{n} \frac{1}{(1+r)^t} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

Number of payments	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.8929	0.8772	0.8696	0.8621	0.8475	0.8333	0.8065	0.7813	0.7576
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.6901	1.6467	1.6257	1.6052	1.5656	1.5278	1.4568	1.3916	1.3315
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4018	2.3216	2.2832	2.2459	2.1743	2.1065	1.9813	1.8684	1.7663
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.0373	2.9137	2.8550	2.7982	2.6901	2.5887	2.4043	2.2410	2.0957
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6048	3.4331	3.3522	3.2743	3.1272	2.9906	2.7454	2.5320	2.3452
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.1114	3.8887	3.7845	3.6847	3.4976	3.3255	3.0205	2.7594	2.5342
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.5638	4.2883	4.1604	4.0386	3.8115	3.6046	3.2423	2.9370	2.6775
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	4.9676	4.6389	4.4873	4.3436	4.0776	3.8372	3.4212	3.0758	2.7860
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.3282	4.9464	4.7716	4.6065	4.3030	4.0310	3.5655	3.1842	2.8681
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.6502	5.2161	5.0188	4.8332	4.4941	4.1925	3.6819	3.2689	2.9304
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	5.9377	5.4527	5.2337	5.0286	4.6560	4.3271	3.7757	3.3351	2.9776
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.1944	5.6603	5.4206	5.1971	4.7932	4.4392	3.8514	3.3868	3.0133
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.4235	5.8424	5.5831	5.3423	4.9095	4.5327	3.9124	3.4272	3.0404
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.6282	6.0021	5.7245	5.4675	5.0081	4.6106	3.9616	3.4587	3.0609
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	6.8109	6.1422	5.8474	5.5755	5.0916	4.6755	4.0013	3.4834	3.0764
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126	7.8237	6.9740	6.2651	5.9542	5.6685	5.1624	4.7296	4.0333	3.5026	3.0882
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436	8.0216	7.1196	6.3729	6.0472	5.7487	5.2223	4.7746	4.0591	3.5177	3.0971
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556	8.2014	7.2497	6.4674	6.1280	5.8178	5.2732	4.8122	4.0799	3.5294	3.1039
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.3658	6.5504	6.1982	5.8775	5.3162	4.8435	4.0967	3.5386	3.1090
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285	8.5136	7.4694	6.6231	6.2593	5.9288	5.3527	4.8696	4.1103	3.5458	3.1129
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226	9.0770	7.8431	6.8729	6.4641	6.0971	5.4669	4.9476	4.1474	3.5640	3.1220
30	25.8077	22.3965	19.6004	17.2920	15.3725	13.7648	12.4090	11.2578	10.2737	9.4269	8.0552	7.0027	6.5660	6.1772	5.5168	4.9789	4.1601	3.5693	3.1242
40	32.8347	27.3555	23.1148	19.7928	17.1591	15.0463	13.3317	11.9246	10.7574	9.7791	8.2438	7.1050	6.6418	6.2335	5.5482	4.9966	4.1659	3.5712	3.1250
50	39.1961	31.4236	25.7298	21.4822	18.2559	15.7619	13.8007	12.2335	10.9617	9.9148	8.3045	7.1327	6.6605	6.2463	5.5541	4.9995	4.1666	3.5714	3.1250
60	44.9550	34.7609	27.6756	22.6235	18.9293	16.1614	14.0392	12.3766	11.0480	9.9672	8.3240	7.1401	6.6651	6.2402	5.5553	4.9999	4.1667	3.5714	3.1250