



CIFA PART III SECTION 5

FIXED INCOME INVESTMENTS ANALYSIS

WEDNESDAY: 22 May 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) (i) Outline three factors that could determine the price of convertible bonds. (3 marks)
- (ii) The selected data for a convertible bond is presented below:
- | | |
|---|--|
| Issue price | : Sh.1,000 at par |
| Conversion period | : 13 September 2018 to 12 September 2021 |
| Initial conversion price | : Sh.10 per share |
| Threshold dividend | : Sh.0.50 per share |
| Change of control conversion price | : Sh.8 per share |
| Ordinary share price on issue date | : Sh.8.70 |
| Share price on 17 September 2018 | : Sh.9.10 |
| Convertible bond price on 17 September 2018 | : Sh.1,123 |

Required:

The market conversion premium per share for the convertible bond on 17 September 2018. (3 marks)

- (b) A bond with a face value of Sh.1,000 and a recovery rate of 8.6% has a probability of default of 15%.

Required:

- (i) The loss given default. (2 marks)
- (ii) The expected loss. (2 marks)

- (c) Babito Fund Management Company (BFMC) has an outstanding 3-year, Sh.1,000 par value bond with a 5.7% coupon rate payable annually. The current market price of the bond is Sh. 97.708. The bond has a yield to maturity (YTM) of 6.034%.

Required:

- (i) The price of the bond. (1 mark)
- (ii) The bond's current yield. (1 mark)
- (iii) Explain whether the bond is selling at par, at a discount, or at a premium. (1 mark)
- (iv) Compare the bond's current yield calculated in (c) (ii) above to its YTM. (2 marks)

- (d) Kangaroo Limited's bond which is currently selling at Sh.955, has a 12% coupon interest rate and a Sh.1,000 par value. The bond pays interest annually and has 15 years to maturity.

Required:

- (i) The yield to maturity (YTM) on this bond. (3 marks)
- (ii) Explain the relationship that exists between:
- The coupon interest rate and YTM. (1 mark)
 - The par value and market value of a bond. (1 mark)

(Total: 20 marks)

QUESTION TWO

- (a) Describe three bond covenants available for high yield issuers. (3 marks)
- (b) Summarise three types of securities issued in the Eurobond markets. (3 marks)
- (c) Distinguish between “modified duration” and “effective duration” in relation to fixed income risk and return. (2 marks)
- (d) Harrison Omeke, a financial analyst at Fanishi Capital has been provided with the following information about bond X for analysis:

Coupon rate	:	8%
Payments	:	Annually
Yield	:	7.634%
Time to maturity	:	10 years
Price	:	Sh.1,024.97
Par value	:	Sh.1,000.

Required:

- (i) Macaulay’s duration of the bond. (4 marks)
- (ii) Interpret the results obtained in (d) (i) above. (2 marks)
- (e) A bond is purchased between coupon periods. The number of days between the settlement date and the next coupon payment is 115 days. There are 183 days in the coupon period. The bond has a coupon rate of 7.4% and a par value of Sh.100. There are 10 semi-annual coupon payments remaining.

Required:

- (i) The dirty price for the bond assuming a 5.6% discount rate. (4 marks)
- (ii) The accrued interest for the bond. (1 mark)
- (iii) The clean price of the bond. (1 mark)

(Total: 20 marks)

QUESTION THREE

- (a) Your national government intends to issue a Sh.300 billion bond to finance infrastructural development in the country.

As a certified investment and financial analyst, advise the cabinet secretary in charge of the National Treasury on three distribution methods that the government could use to issue the bond. (6 marks)

- (b) The following information relates to two callable bonds issued by Yellowline Limited:

Bond	Estimated percentage change in price assuming interest rates change by:	
	-50 basis points (BPS)	+50 basis points (BPS)
KK	+4%	-8%
ZA	+13%	-10%

Additional information:

- Both bonds have the same maturity period.
- The coupon rate for bond KK is 8% while that of bond ZA is 14%.
- The yield curve for this bond issue is flat at 10%.

Required:

- Citing relevant justifications, advise an investor on the bond to invest in. (4 marks)

(c) The yields for Treasuries with different maturities on a certain day were as shown in the following table:

Maturity	Yield (%)
3 months	1.41
6 months	1.71
2 years	2.68
3 years	3.01
5 years	3.70
10 years	4.51
30 years	5.25

Required:

- (i) Plot a yield curve for this day. (3 marks)
- (ii) Approximate the rate of return for investors holding a 5-year Treasury note starting from now assuming that the expectation hypothesis holds. (2 marks)
- (iii) Determine the rate of return for investors holding a 1-year Treasury note starting 2 years from now, assuming that the expectation hypothesis holds. (2 marks)
- (iv) Explain the scenario where, even though the yield curve slopes upwards, investors do not expect rising interest rates. (3 marks)

(Total: 20 marks)

QUESTION FOUR

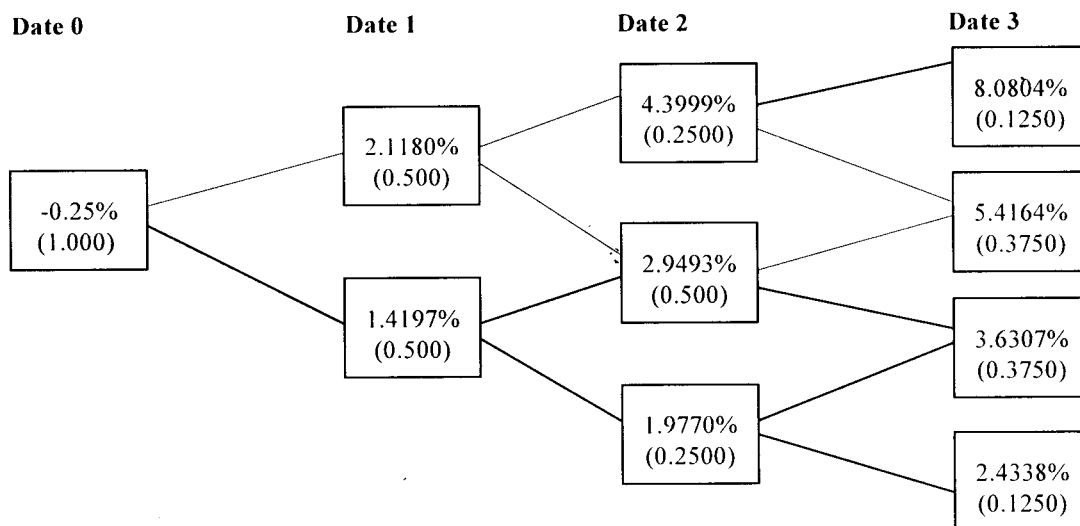
(a) Examine four factors that could be considered by a credit rating agency when evaluating the credit quality of a local currency debt. (4 marks)

(b) A financial analysts is valuing a zero coupon, 4-year corporate bond with a par value of Sh.1,000. The analyst has estimated the risk neutral probability of default for each date for the bond is 1.50% and the recovery rate is 30%. The government bond yield curve is flat at 3%. The analyst has gathered the data on annual payment government bond which is used to construct a binomial interest rate tree based on an assumption of future interest rate volatility of 20%.

1. Par curve for annual payment government bonds:

Maturity	Coupon Rate (%)	Price (Sh.)	Discount factor	Spot rate (%)	Forward rate (%)
1	-0.25	100	1.002506	-0.25	-
2	0.75	100	0.985093	0.7538	1.7677
3	1.50	100	0.955848	1.5166	3.0596
4	2.25	100	0.913225	2.2953	4.6674

2. One year binomial interest rate tree for 20% volatility:



The corporate bond has a market price of Sh.875.

Required:

Determine whether the corporate bond is properly priced.

(10 marks)

- (c) The current forward curve for one year rates is provided below:

Time period (Years)	Forward rate (%)
0	1.88
1	2.77
2	3.54
3	4.12

Martin Wendo, a financial analyst, is considering valuing a 4-year, 3.75% annual coupon payment bond with a par value of Sh.100 which has the same risk as the bonds used to obtain the forward curve illustrated above.

Required:

Advise Martin Wendo on the value of the bond using implied spot rates.

(6 marks)

(Total: 20 marks)

QUESTION FIVE

- (a) Argue four cases why investors could prefer to use swap curve over a government bond yield curve in evaluating the performance of fixed income securities. (4 marks)

- (b) The annual yield to maturity (YTM) for a 6-month and a 1-year Treasury bond is 5.2% and 6.0% respectively. The price of each issue is Sh.100.

The following Treasury yield curve has been estimated for 6-month periods to a maturity of 3 years:

Years to maturity	Annual yield to maturity (%)
1.5	6.2
2.0	6.8
2.5	7.0
3.0	7.2

Required:

The 1.5-year, 2-year and 3-year spot rates.

(6 marks)

- (c) The selected abridged financial data for a large manufacturing firm is presented below:

	Sh. "million"
Cash	1,050
Total debt	7,611
Net debt	6,561
Interest expense	590
Earnings before interest, tax, depreciation and amortisation (EBITDA)	990
Debt structure:	
Secured debt (bank loans and bonds)	4,899
Senior unsecured bonds	1,948
Subordinated bonds	764
Total debt	7,611

Required:

- (i) Gross leverage through each level of debt, including total debt. (3 marks)
- (ii) The net leverage for the total debt structure. (1 mark)
- (iii) Explain why the firm has so much secured debt relative to unsecured debt. (2 marks)
- (d) An investor buys a 4-year, 10% annual coupon bond priced to yield 5%. The investor plans to sell the bond in two years once the second payment is received. The coupon re-investment rate after the bond purchase and the yield to maturity (YTM) at the time of sale is 3%. The par value of the bond is Sh.100.

Required:

The investor's realised rate of return.

(4 marks)

(Total: 20 marks)

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:

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

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