

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) 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.9.123

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)

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) CF52 Page 1

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QUESTION TWO

Describe three bond covenants available for high yield issuers.

(3 marks)

Summarise three types of securities issued in the Eurobond markets. (b)

(3 marks)

- Distinguish between "modified duration" and "effective duration" in relation to fixed income risk and return. (c) (2 marks)
- Harrison Omeke, a financial analyst at Fanishi Capital has been provided with the following information about bond (d) X for analysis:

Coupon rate

8%

Payments

Annually

Yield

7.634%

Time to maturity: Price

10 years

Sh.1.024.97

Par value

Sh.1,000.

Required:

Macaulay's duration of the bond. (i)

(4 marks)

(ii) Interpret the results obtained in (d) (i) above. (2 marks)

A bond is purchased between coupon periods. The number of days between the settlement date and the next coupon (e) 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:

The dirty price for the bond assuming a 5.6% discount rate. (i)

(4 marks)

The accrued interest for the bond. (ii)

(1 mark)

(iii) The clean price of the bond. (1 mark)

(Total: 20 marks)

OUESTION THREE

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

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

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

Estimated percentage change in price assuming interest rates change by:

Bond

-50 basis points (BPS)

+50 basis points (BPS)

KK

+4%

-8%

ZA

+13%

-10%

Additional information:

- Both bonds have the same maturity period. 1.
- The coupon rate for bond KK is 8% while that of bond ZA is 14%. 2.
- The yield curve for this bond issue is flat at 10%. 3.

Required:

Citing relevant justifications, advise an investor on the bond to invest in.

(4 marks)

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

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:

Plot a yield curve for this day. (i)

(3 marks)

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

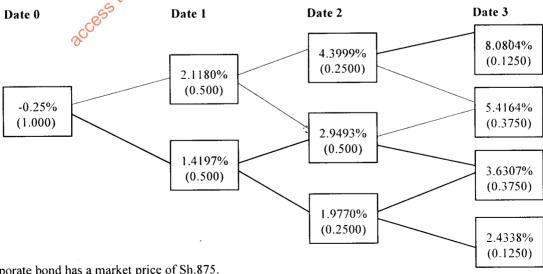
(Total: 20 marks)

QUESTION FOUR

- Examine four factors that could be considered by a credit rating agency when evaluating the credit quality of a local (a) (4 marks) currency debt.
- A financial analysts is valuing a zero coupon, 4-year corporate become with a par value of Sh.1,000. The analyst has (b) 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 wathered the data on annual payment government bond which is used to construct a binomial interest rate tree basecon an assumption of future interest rate volatility of 20%.
 - 1. Par curve for annual payment government bonds:

Maturity	Coupon Rate	Price	Discount factor	Spot rate	Forward rate
	(%)	(Sh.) _Q		(%)	(%)
1	-0.25	100	1.002506	-0.25	- .
2	0.75	100	0.985093	0.7538	1.7677
3	1.50	% 200	0.955848	1.5166	3.0596
4	2.25	100	0.913225	2.2953	4.6674

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



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

Required:

Determine whether the corporate bond is properly priced.

(10 marks)

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

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

- Argue four cases why investors could prefer to use swap curve over a government bond yield curve in evaluating the (a) (4 marks) performance of fixed income securities.
- The annual yield to maturity (YTM) for a 6-month and a 1-year Treasury bond is 5.2% and 6.0% respectively. The (b) 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
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)

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

	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 loams and bonds)	4,899
Senior unsecured bonds	1,948
Subordinated bonds	764
Total debt	7,611

Required:

Gross leverage through each level of debt, including total debt. (i)

(3 marks)

The net leverage for the total debt structure. (ii)

(1 mark)

Explain why the firm has so much secured debt relative to unsecured debt. (iii)

(2 marks)

An investor buys a 4-year, 10% annual coupon bond priced to yield 5%. The investor plans to sell the bond in two (d) 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.

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The investor's realised rate of return.

(4 marks)

(Total: 20 marks)

Present Value of 1 Received at the End of *n* Periods: $PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$

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

eriod	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	.77422	.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
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16	.8528	.7284	.6232	.5339	.4581	.3936	.3387	.2919	.2519	.2176	.1631	.1229	1069	Co	2.0708	.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	.5674	.4936	.4155	.3503	.2959	.2502	.2120	.1799	.1300	.0946	.0808	05691	.0508	.0376	.0208	.0118	.0068	.0039
19	.8277	.6864	.5703	.4746	.3957	.3305	.2765	.2317	.1945	.1635	.1161	.0829	.0703		.0431	.0313	.0168	.0092	.0051	.0029
20	.8195	.6730	.5537	.4564	.3769	.3118	.2584	.2145	.1784	.1486	1037	.0728	0884	.0514	.0365	.0261	.0135	.0072	.0039	.0021
25	.7798	.6095	.4776	.3751	.2953	.2330	.1842	.1460	.1160	.0923	.0588	.0375	.0304	.0245	.0160	.0105	.0046	.0021	.0010	0005
30	.7419	.5521	4120	.3083	.2314	.1741	.1314	.0994	.0754	.0573	.0334	0436	.0151	.0116	.0070	.0042	.0016	.0006	.0002	.0001
40	.6717	4529	.3066	.2083	.1420	.0972	.0668	.0460	.0318	.0221	.0107	3053	.0037	.0026	.0013	.0007	.0002	.0001		
50	.6080	.3715	.2281	.1407	.0872	.0543	.0339	.0213	.0134	.0085	.002	.0014	.0009	.0006	.0003	.0001				٠.
60	.5504	.3048	.1697	.0951	.0535	.0303	.0173	.0099	.0057	.0033	11.69	.0004	.0002	.0001						

* The factor is zero to four decimal places

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

$$PVIF_{rt} = \sum_{l=1}^{n} \frac{1}{(1+r)^{n}}$$

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payments	1%	2%	3%	4%	500	6%	7%	8%	9%	10%	- 12%	14%	15%	16%	18%	20%	24%	28%	32%
1	0.9901	0.9804	0.9709	0.9615	69524	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	0.7670
2	1.9704	1.9416	1.9135	1.88610	1.8594	1.8334	1.8080	1.7833	1,7591	1.7355		1.6467	1.6257	1.6052	1.5656	1.5278	1.4568	1.3916	0.7576
3	2.9410	2.8839	2.8286	2.7754	2.7232	2.6730	2.6243		2.5313			2.3216	2.2832	2.2459	2.1743	2.1065	1.9813	1.8684	1.3315
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397		3.0373	2.9137	2.8550	2.7982	2.6901	2.5887	2.4043	2.2410	1.7663 2.0957
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897				3.3522		3.1272		2.7454		
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	2.5242
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	2.7394	2.5342 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		3.0758	2.7860
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952			4.9464	4.7716	4.6065		4.0310	3.5655		2.7860
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	20770
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607			5.6603	5.4206	5.1971	4.7932	4.4392	3.8514	3.3868	2.9776
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869		6.4235	5.8424	5.5831	5.3423	4.9095	4.5327	3.9124		3.0133
14	13.0037	12,1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442		7.3667		6.0021	5.7245	5.4675		4.6106	3.9616	3.4272 3.4587	3.0404
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			3.4834	3.0609 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	E 1634	4.7296	4 0000		
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	4,0333	3.5026	3.0882
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		4.0591 4.0799	3.5177 3.5294	3.0971
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501	8.3649	7.3658		6.1982				4.0799		3.1039
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		4.8696	,	3.5386 3.5458	3.1090 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		4.9789	4.1601	3.5693	
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		4.9966	4.1659	3.5712	
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	4.9395	4.1666		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		4.9999		3.5714	