The Co-operative University of Kenya

END OF SEMESTER EXAMINATION DECEMBER-2019

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN FINANCE

UNIT CODE: CMFI 2302

UNIT TITLE: FIXED INCOME SECURITIES

DATE: NOVEMBER, 2019 **TIME:**

INSTRUCTIONS:

- Answer question **ONE (compulsory)** and any other **TWO** questions

QUESTION ONE

(a) Explain why a callable bond's price would be expected to decline less than an otherwise comparable option-free bond when interest rates rise? (3marks)

(b) Identify the difference in the major risks associated with the following investment alternatives:

i) For an investor who plans to hold a security for one year, purchasing a Treasury security that matures in one year versus purchasing a Treasury security that matures in 30 years. (1 mark)

ii) For an investor who plans to hold an investment for 10 years, purchasing a Treasury security that matures in 10 years versus purchasing an AAA corporate security that matures in 10 years. (1 mark)

iii) For an investor who plans to hold an investment for two years, purchasing a zero-coupon Treasury security that matures in one year versus purchasing a zero-coupon Treasury security that matures in two years. (1 mark)

iv) For an investor who plans to hold an investment for five years, purchasing an AA sovereign bond (with dollar denominated cash flow payments) versus purchasing a U.S. corporate bond with a B rating. (1 mark)

v) For an investor who plans to hold an investment for four years, purchasing a less actively traded 10-year AA rated bond versus purchasing a 10-year AA rated bond that is actively traded. (1 mark)

vi) For a U.S. investor who plans to hold an investment for six years, purchasing a Treasury security that matures in six years versus purchasing an Italian government security that matures in six years and is denominated in lira. (1 mark)

(c) A financial corporation with a BBB rating has a consumer loan portfolio. An investment banker has suggested that this corporation consider issuing an asset-backed security where the collateral for the security is the consumer loan portfolio. What would be the advantage of issuing an asset-backed security rather than a straight offering of corporate bonds? (3marks)

(d) An investor has purchased a floating-rate security with a 5-year maturity. The coupon formula for the floater is 6-month LIBOR plus 200 basis points and the interest payments are made semiannually. The floater is not callable. At the time of purchase, 6-month LIBOR is 7.5%. The investor borrowed the funds to purchase the floater by issuing a 5-year note at par value with a fixed coupon rate of 7%.

i) Ignoring credit risk, what is the risk that this investor faces? (2marks)

ii) Explain why an interest rate swap can be used to offset this risk? (2marks)

iii) Suppose that the investor can enter into a 5-year interest rate swap in which the investor pays LIBOR (i.e., the investor is the fixed-rate

receiver). The swap rate is 7.3% and the frequency of the payments is semiannual. What annual income spread can the investor lock in? (3marks)

(e) Suppose that a bond is purchased between coupon periods. The days between the settlement date and the next coupon period is 115. There are 183 days in the coupon period. Suppose that the bond purchased has a coupon rate of 7.4% and there are 10 semiannual coupon payments remaining.

i) What is the dirty price for this bond if a 5.6% discount rate is used? (2marks)

ii) What is the accrued interest for this bond? (2marks)

iii) What is the clean price? (2marks)

f) Suppose that an investor invests $108.32 in a 5-year certificate of deposit that pays 7% annually (on a bond-equivalent basis) or 3.5% semiannually and the interest payments are semiannual.

i) What are the total future dollars of this investment at the end of 5 years (i.e., ten 6-month periods)? (2marks)

ii) How much total interest is generated from the investment in this certificate of deposit? (1marks)

iii) Suppose an investor can purchase any investment for $108.32 that offers a 7% yield on a bond-equivalent basis and pays interest semiannually. What are the total future dollars and the total dollar return from this investment? (2marks)

QUESTION TWO

a) Suppose that the annual yield to maturity for the 6-month and 1-year Treasury bill is 4.6% and 5.0%, respectively. These yields represent the 6-month and 1-year spot rates. Also assume the following Treasury yield curve (i.e., the price for each issue is $100) has been estimated for 6-month periods out to a maturity of 3 years:

Years to maturity	Annual yield to maturity (BEY)
1.5	5.4%
2.0	5.8%
2.5	6.4%
3.0	7.0%

i) Compute the 1.5-year, 2-year, 2.5-year, and 3-year spot rates. (6marks)

ii) Given the spot rates computed in the previous question and the 6-month and 1-year spot rates, compute the arbitrage-free value of a 3-year Treasury security with a coupon rate of 8%. (2marks)

b) Explain how a Treasury yield curve is constructed even though there are only a limited number of on-the-run Treasury issues available in the market. (3marks)

c) Assume the following Treasury spot rates:

Period	Years to maturity	Sport rate
1.	0.5	5.0%
2.	1.0	5.4%
3.	1.5	5.8%
4.	2.0	6.4%
5.	2.5	7.0%
6.	3.0	7.2%
7.	3.5	7.4%

8.	4.0	7.8%

Compute the following forward rates:

i) the 6-month forward rate six months from now. (1marks)

ii) the 6-month forward rate one year from now. (1marks)

iii) the 6-month forward rate three years from now. (1marks)

iv) the 2-year forward rate one year from now. (1marks)

v) the 1-year forward rate two years from now. (1marks)

d) Using information from question 2(c), demonstrate that the 6-month forward rate six month from now is the rate that will produce at the end of one year the same future dollars as investing either (1) at the current 1-year spot rate of 5.4% or (2) at the 6-month spot rate of 5.0% and reinvesting at the 6-month forward rate six months from now. (4marks)

QUESTION THREE

Consider the following information for two bonds that are assumed to be trading to yield 5%

Price information for two bonds and assuming that the two bonds are trading to yield 5%

Yield	Coupon maturity	5.0% 4	5.0% 25
3.00%		107.4859	134.9997
4.00%		103.6627	115.7118
4.50%		101.8118	107.4586
4.75%		100.9011	103.6355
4.90%		100.3593	101.4324
5.00%		100.0000	100.0000
5.10%		99.6423	98.5959
5.25%		99.1085	96.5416
5.50%		98.2264	93.2507
6.00%		96.4902	87.1351
7.00%		93.1260	76.5444

Percentage price change based on an initial yield of 5%

Yield	Coupon maturity	5.0% 4	5.0% 25
3.00%		7.49%	35.00%
4.00%		3.66%	15.71%
4.50%		1.81%	7.46%
4.75%		0.90%	3.64%
4.90%		0.36%	1.43%
5.00%		0.00%	0.00%
5.10%		−0.36%	−1.40%
5.25%		−0.89%	−3.46%
5.50%		−1.77%	−6.75%
6.00%		−3.51%	−12.86%
7.00%		−6.87%	−23.46%

a) Assuming all two bonds are selling to yield 5%, compute the following for each bond:

i) Duration based on a 25-basis point rate shock (y = 0.0025). (5marks)

ii) Duration based on a 50-basis point rate shock (y = 0.0050). (5marks)

b) Assuming all two bonds are selling to yield 5%, compute the value for C in the convexity equation for each bond using a 25-basis point rate shock (y = 0.0025). (5marks)

c) Using the duration computed in question 3(a):

i) Compute the approximate percentage price change using duration for the 8% coupon bond assuming that the yield changes by 10 basis points (y^* = 0.0010). (3marks)

ii) How does the estimated percentage price change compare to the actual percentage price change? (2marks)

QUESTION FOUR

a) Answer the following questions on covenants and credit analysis

i) Why is the analysis of covenants important in credit analysis? (4marks)
ii) What is a negative covenant? (2marks)
iii) Why is covenant analysis particularly important for assessing the credit worthiness of high-yield corporate issuers? (4marks)

b) You and a friend are discussing the savings and loan (S&L) crisis in the United States. She states that ‘‘the whole mess started in the early 1980s. When short-term rates increased dramatically, S&Ls were adversely affected their spread income went from positive to negative. They were borrowing short and lending long.’’

i) What does she mean by ‘‘borrowing short and lending long’’? (3marks)
ii) Do increasing or decreasing interest rates adversely affect an institution that borrows short and lends long? (4marks)
iii) How would you restate the risk exposure of S&Ls in terms of duration? (3marks)

QUESTION FIVE

a) There are two forms of the ‘‘biased’’ expectations theory. Why are these two forms referred to as ‘‘biased’’ expectations? (3marks)
b) At its quarterly meeting, the trustees of the CUK Pension Fund reviewed the status of its bond portfolio. The portfolio is managed by CIC Management Company. The portfolio consists of 20% Treasury bonds, 10% corporate bonds that are noncallable for the life of the bonds, 30% callable corporate bonds, and 40% mortgage-backed securities. The report provided CIC Management Company includes the following information for each bond in the portfolio: (1) modified duration and (2) effective duration. The portfolio’s modified duration and effective duration were reported to be 5 and 3, respectively. Juma attended the board meeting to answer any questions that the trustees might have. Nancy, one of the trustees for the fund, prepared the following list of questions:
   i) What does the duration of a bond mean and how should the board interpret the portfolio duration? (4marks)
   ii) Why is the modified duration and effective duration for each Treasury bond and noncallable corporate bond the same? (4marks)
   iii) What is the appropriate duration measure, effective duration or modified duration? (3marks)
   iv) How were the effective duration measures obtained? (3marks)
   v) What are the limitations in using duration? (3marks)