HEBERT CHITEPO SCHOOL OF LAW AND BUSINESS SCIENCES

DEPARTMENT OF ECONOMICS & FINANCE

BACHELOR OF COMMERCE DEGREE

LEVEL 4 SEMESTER 2

EXAMINATION QUESTION PAPER

MODULE CODE	**HFE 4212**
MODULE NARRATION	**CREDIT DERIVATIVES**
DATE	**2024**
DURATION	**3 HOURS**

INSTRUCTIONS TO CANDIDATES:

1. **Answer any four questions**
2. **All questions carry equal marks**
3. **Start each answer on a fresh page**
4. **Show all workings where applicable**

QUESTION 1

(a) Credit Derivatives are useful instruments for offloading a lender's credit risk to a third party and securing its credit asset. There are two main categories of Credit Derivatives:

State and explain the two main categories of credit derivatives

[4]

(b) Write brief notes on the following derivatives

(i) Credit Default Swap (CDS)

(ii) Credit default swap option

(iii) Credit spread option

(iv) Total-rate-of-return swap

(v) Credit linked note (CLN)

(vi) Constant Proportion Debt Obligation (CPDO)

(vii) Collateralized debt obligation (CDO) [21]

QUESTION 2

(a) Credit derivatives are one of the many specialized derivatives that are used for the purpose of hedging, speculation and arbitrage.

Explain the terms below as they are used in credit derivatives

(i) hedging;

(ii) speculation and

(iii)arbitrage [9]

(b) In a 5- year TRS with a notional principal of $100 million, the payer would exchange the total return on corporate bond for a floating rate plus 25 basis points.

(i) Explain the scenario above in the end. [5]

(c) (i) With reference to credit default swaps, what does the hazard rate defines

[3]

(ii) Assume the constant hazard rate for our reference entity is 1.5% per annum throughout the 5-year duration of the CDS. Using this hazard rate, calculate the survival probability. [8]

QUESTION 3

(a) Critique the Merton Model [10]

(b) To estimate the probability of default and the loss given default (LGD) using the Merton model we have

$$probablity\ of\ default = N\left(\frac{\ln F - \ln V - \mu(T-t) + 0.5\sigma^2(T-t)}{\sigma\sqrt{T-t}}\right)$$

Where

μ is the expected return on the value of the firm.

N is the cumulative normal distribution.

E is the face value of debt

V is the value of the firm

T is the maturity date

σ is the volatility of firm value

$$The\ LGD\ is\ given\ by\ F \times PD - Ve^{\mu(T-t)} \times N\left(\frac{\ln F - \ln V - \mu(T-t) + 0.5\sigma^2(T-t)}{\sigma\sqrt{T-t}}\right)$$

A firm has a current value of \$100 *million*. Its only outstanding debt is a 3- year zero-coupon bond with a face value of \$80 *million*.

Compute

(i) the probability that the firm will default on its debt and

(ii) the expected LGD.

Where

Current interest rate = 5%

Expected return on firm assets = 20%

Volatility of the firm = 30%

[15]

QUESTION 4

(a) Write brief notes about the Vasicek Model [10]

(b) Analyse the following credit risk models

CreditRisk+

CreditMetricsTM

KMV Model

[15]

QUESTION 5

(a) Write brief notes on total rate of return swaps. [15]

(b) Assume two parties A and B enter into a one-year TRS contract, where A is the receiver and B is the payer. The underlying asset, in this case, is ZB Holdings' 500 Index, and the principal amount is $10 million. B's payment will depend on the LIBOR rate plus a margin of 2%. After the end of the year, suppose the LIBOR rate is 2.5% and the ZB Holdings 500 rises by 10%.

(i) Calculate the net income for A. [5]

Now suppose the ZB Holdings 500 drops by 10% after one year and the LIBOR rate is the same at 2%.

(ii) Comment on the positions of A and B. [5]