

**NATIONAL UNIVERSITY OF SCIENCE AND
TECHNOLOGY
FACULTY OF COMMERCE
DEPARTMENT OF BANKING
BACHELOR OF COMMERCE HONOURS DEGREE IN
BANKING
DERIVATIVE SECURITIES
CBA 4204**

FINAL EXAMINATION

AUGUST 2009

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

Answer any FOUR (4) questions.

Indicate on your answer booklet whether you are in the conventional or parallel programme.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

Questions may be written in any order, but must be legibly numbered.

The businesses in this question paper are intended to be fictitious.

This paper consists of 4 printed pages
Copyright: National University of Science and Technology

[Turn over]

QUESTION 1

a) The 30-month interest rates in South Africa and Botswana are 3% and 8% per annum, respectively, with continuous compounding. The spot price of the South African Rand (ZAR) is Botswana Pula (BWP) 0.6500. A Botswana trader has entered into a 30-month foreign exchange forward contract. Assume that the trader can either borrow BWP 1000 or ZAR 1000.

- i. Calculate the 30-month forward exchange rate. **[3 marks]**
- ii. Suppose the agreed forward price for a contract deliverable in 30 months is BWP 0.800. Outline an arbitrage strategy that can be used by the trader, showing the amount of riskless profit available. **[8 marks]**
- iii. Suppose the agreed forward price for the contract is BWP 0.6800. Outline an arbitrage strategy that can be used by the trader in this case. Show the maximum profit from the strategy. **[8 marks]**

b) Explain how the “Cost of Carry Model works in the pricing of forward contracts. **[6 marks]**

TOTAL [25 MARKS]

QUESTION 2

Congratulations on your appointment as Chairperson of the Stirring Committee on establishment of a financial derivatives exchange in Zimbabwe! The Governor of the Reserve Bank of Zimbabwe (RBZ) now requires a report on your preliminary findings. With the aid of examples from international financial markets, write the report detailing the need, if any, for a derivatives exchange in Zimbabwe, the necessary preconditions for establishment of such an exchange, and the risks associated with the use of derivative securities. **[25 marks]**

TOTAL [25 MARKS]

QUESTION 3

- a) State and explain 5 issues that make the Binomial Model more attractive than the Black-Scholes Model in the pricing of options. **[5 marks]**
- b) A stock price is currently \$40. Over the next six months, it is expected to either go up by 6.25% or down by 5%. The risk-free interest rate is 8% per annum with continuous compounding.

- i. What is the value of a six-months European call option with a strike price of \$39? **[8 marks]**
 - ii. What is the value of a six-months European put option with a strike price of \$39? **[6 marks]**
- c) Critically evaluate the assumptions underlying the Black-Scholes option-pricing model. **[6 marks]**

TOTAL [25 MARKS]

QUESTION 4

- a) State and explain 4 major differences between a forward contract and a futures contract. **[6 marks]**
- b) Futures contracts are largely credited with the ability to eliminate problems of illiquidity and counter-party risk. Identify and explain 4 mechanisms used to achieve this. **[8 marks]**
- c) Suppose that on 1 February 2009, you enter into a short futures contract to sell July silver for \$1.40 per ounce on the South African Futures Exchange. The size of the contract is 100 ounces. The initial margin is set at 10% and the maintenance margin at 5% of the futures price. Suppose the futures prices on the silver from the end of 1 February 2009 to 5 February 2009 are \$1.38; \$1.30; \$1.28; \$1.40 and \$1.50 per ounce, respectively. Calculate the gain (loss), cumulative gain (loss), margin account balance, and variation margin on a daily basis. Tabulate your answers. **[11 marks]**

TOTAL [25 MARKS]

QUESTION 5

- a) With the aid of examples, explain the differences amongst hedging, speculation, arbitrage and investment in derivative markets. **[12 marks]**
- b) Consider two portfolios, **M** and **N**. Portfolio **M** contains a European call option plus cash amount equal to the present value of the strike price. Portfolio **N** contains a European put option plus one non-dividend paying share. Assume an option on the share with current price \$41 and the strike price for both call and put options of \$40. Both options expire in six months and the risk-free interest rate is 10% per annum, with continuous compounding. The call and put premiums are \$3 and \$2.25, respectively.
 - i. Are there any arbitrage opportunities in this case? **[3 marks]**

- ii. Construct a strategy to profit from a share price of \$50 at the end of six months. **[5 marks]**
- iii. Construct a strategy to profit from a share price of \$32 at the end of six months. **[5 marks]**

TOTAL [25 MARKS]

QUESTION 6

With the aid of clearly labeled pay-off diagrams, explain each of the following concepts. Briefly comment on the meaning of each of the concepts on the derivatives market.

- a) Long forward position **[5 marks]**
- b) Short forward position **[5 marks]**
- c) Long put option **[5 marks]**
- d) Short put option **[5 marks]**
- e) Bull spreads **[5 marks]**

TOTAL [25 MARKS]