

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF COMMERCE**  
**DEPARTMENT OF FINANCE**  
**BACHELOR OF COMMERCE HONOURS DEGREE IN FINANCE**  
**PART IV – 1<sup>st</sup> SEMESTER FINAL EXAMINATION – DECEMBER 2006**  
**ADVANCED ASSET PRICING THEORY AND PRACTICE [CFI 4101]**  
**TIME ALLOWED: 3 HOURS 10 MINUTES**

**INSTRUCTIONS**

1. The paper is 3 hours 10 minutes.
2. Answer any **FOUR** questions.
3. Start each question on a fresh page.
4. All workings must be shown.

**Question 1** [25 marks]

- 1.1 Discuss, briefly, the critical assumptions of a Capital Market Theory. [10 marks]
- 1.2 Explain the Theorem of two Fund Separation. [10 marks]
- 1.3 What are its limitations? [5 marks]

**Question 2** [25 marks]

The equation for the Capital Market Pricing Model [CAPM] is  $\bar{R} = R_F + \beta_i(\bar{R}_m - R_F)$

Where:

$\bar{R}_i$	=	Expected Return of asset $i$
$R_F$	=	Risk free Return
$\beta_i$	=	Beta of asset $i$
$\bar{R}_m$	=	Expected Return of Market Portfolio.

- 2.1 What do you understand by the Portfolio management strategy called **market timing**. [5 marks]
- 2.2 Demonstrate how the CAPM may be applied in market timing, highlighting any practical problems that may be encountered and how they can be minimized. [12 marks]
- 2.3 Discuss, briefly, the influences on the Beta of the equity of a company. [8 marks]

**Question 3** [25 marks]

- 3.1 Examine the critical assumptions of Arbitrage Pricing Theory. [6 marks]
- 3.2 The variable return of an asset  $i$  is given by

$$R_i = \alpha_i + \beta_A F_1 + \beta_{12} F_2 + \dots + \beta_{ik} F_K + \varepsilon_i$$

Define the variables  $\alpha_1, \beta_{ik}, F_k$  and  $\varepsilon_i$

[7 marks]

3.2.1 The return of the Zimbabwe Stock Market index is given by a three-factor asset pricing model as follows:

$$R_m = 22\% + 3F_1 - 1F_2 - 1.6F_3$$

where  $F_1 =$  unexpected changes in the inflation index.

$F_2 =$  unexpected changes in the level of government spending.

$F_3 =$  Unexpected changes in the level of a political risk indicator.

The returns of three pure factor portfolios are also given by a three-factor asset-pricing model as follows:

$$R_{p^1} = 30\% + F_1$$

$$R_{p^2} = 25\% + F_2$$

$$R_{p^3} = 25\% + F_3$$

The rate of return on 91 day Treasury Bills is 10%

3.2.2 Determine if an Arbitrage opportunity exists.

[12 marks]

#### **Question 4**

[25 marks]

4.1 Derive, from first principles, the formula for the cost of carry, no arbitrage, futures valuation model. [10 marks]

4.2 You are given the following data pertaining to a stock market index on which a futures contract is traded:

- Index futures contract size = 1 000
- Fair Value of index futures contract = 505.88
- Actual Index futures contract price = 510.00
- Actual spot index level = 500.00
- Riskfree Return = 9%
- Suppose, you can borrow or lend \$10 000 000 at the riskfree rate of return and a spot portfolio which is similar to the Spot Index has declared a dividend of \$5.00 per contract size, payable in 3 months time.

4.2.1 Does an opportunity for Index Arbitrage exist? If so, what is the net cashflow if the strategy is adopted and the price of the spot portfolio is \$600 at the end of 3 months.

[10 marks]

4.2.2 Discuss briefly any two other practical uses of index futures in portfolio management. **[5 marks]**

**Question 5** **[25 marks]**

Your company NUST Ltd is considering either to invest in a project now or wait for a year. The project details are given below:

- If investment takes place now, the company expects to sell 100 000 units of product in the first year at a price of \$100 per unit.
- Variable costs are expected to be \$25 per unit for the foreseeable future.
- Annual fixed costs are expected to be \$100 000 for the foreseeable future.
- In one year's time, demand is expected to either rise to 150 000 units per annum at a price of \$120 and remain at this level until the end of its remaining economic life of 14 years, or with equal probability, fall to 30 000 units per annum at a price of \$50 and also remain on this level until end of its life.

The opportunity cost of capital of the project is associated with a beta of 1.2, a riskfree rate of 5% and a market risk premium of 10%.

5.1 What is the value of the project today if no real options exist? **[7 marks]**

The project will operate, in an industry whose current index level is 4 925 and which is forecast to be 10 175 in a year's time if conditions turn out to be favourable for the industry or, 1 350 if conditions turn out to be adverse.

Furthermore, the cost of acquiring the project is \$25 million whether the facility is acquired now or in a year's time and at the end of the first year the company has the option to abandon the project and realize \$10 million from sale of machinery.

5.2 Should NUST Ltd invest now or wait one year? **[18 marks]**