

FINANCIAL ECONOMICS AND ASSET PRICING (21ECC004)

Semester 1 2021/22

(1b) Exam paper

Answer ALL THREE questions in SECTION A and TWO questions in SECTION B.

Questions carry the marks shown.

Additional Instructions

This is a (1b) online examination, meaning you have a total of **3 hours plus an additional 30 minutes** to complete and submit this paper. The additional 30 minutes are for downloading the paper and uploading your answers when you have finished. If you have extra time or rest breaks as part of a Reasonable Adjustment, you will have further additional time as indicated on your exam timetable.

It is your responsibility to submit your work by the deadline for this examination. You must make sure you leave yourself enough time to do so.

It is also your responsibility to check that you have submitted the correct file.

Exam Help

If you are experiencing difficulties in accessing or uploading files during the exam period you should contact the exam helpdesk. For urgent queries please call **01509 222900**.
For other queries email examhelp@lboro.ac.uk

For questions requiring quantitative or narrative answers, you are **free to hand-write or type** them, the latter being preferred. A mix of hand-written and typed answers is also acceptable.

For questions requiring graphical answers, you are **free to use a drawing tool** (e.g. the Shapes tool in MS Word) or **hand-draw** them, the latter being preferred.

You may use any calculator (not just those on the University's approved list).

This is an **open book exam** and you may refer to module materials, notes or textbooks when answering. **You may not however copy or reproduce content wholesale from module materials.** Students who do this will be marked down for poor scholarship.

You must clearly identify the question and part as required in your answer. If you wish you may include the relevant exam question and/or part as a heading.

You may include headings, bullet points etc to help with clarity as required. Graphs and

images may also be included and should be appropriately referenced.

In text citations should use the Harvard style in accordance with the School of Business and Economics guidelines. You do not need to include a reference list.

SECTION A

1. You currently own £100,000 worth of AstraZeneca stock. Suppose that AstraZeneca has an expected return of 14% and a volatility of 23%. The market portfolio has an expected return of 12% and a volatility of 16%. The risk-free rate is 5%. Assuming the CAPM assumptions hold, what alternative investment has the lowest possible volatility while having the same expected return as AstraZeneca? What is the volatility of this portfolio?
(8 marks)
2. Answer all parts. Are the following statements True, False or Uncertain. Provide a short justification for your answers.
 - a) If unrestricted borrowing and lending are possible at a single risk-free rate of interest, an efficient portfolio for a lender will contain individual risky assets that are efficient.
(5 marks)
 - b) The CAPM applies to efficient portfolios and efficient individual securities only.
(5 marks)
 - c) Lboro Manufacturing just announced yesterday that its fourth quarter earnings will be 10% higher than last year's fourth quarter. You observe that Lboro Manufacturing had an abnormal return of -1.2% yesterday. This suggests that the market is not efficient.
(5 marks)
 - d) If the value of a UK Gilt was higher than the value of the sum of its parts (STRIPPED cash flows), arbitrage would probably not occur.
(5 marks)
3. As a financial economist at Best Electronic Industries you are asked to estimate the company's cost of capital. You decide to estimate an APT model with the following three factors (i) the return on FTSE 100; (ii) the inflation rate measured by the consumer price index (CPI); and (iii) the price of microprocessors, which is one of the major inputs for the company. You then proceed to estimate the risk premium associated with each exposure factor. Is this a good choice of factors?
(12 marks)

SECTION B

4. Answer **ALL** parts of this question.

- a) Mature Products Corporation produces goods that are very mature in their product life cycles. Mature Products Corporation is expected to pay a dividend in year 1 of £2.00, a dividend of £1.50 in year 2, and a dividend of £1.00 in year 3. After year 3, dividends are expected to decline at a rate of 1% per year. An appropriate required rate of return for the stock is 10%.

- i. What is your estimate of the fair value of a share of the stock? (8 marks)
- ii. Suppose the market price of a share is equal to the value you calculated in (a), what is the expected dividend yield? (3 marks)

- b) The index model has been estimated for stock A and B with the following Results:

$$\begin{aligned} R_A &= 0.01 + 0.5R_M + e_A \\ R_B &= -0.02 + 1.3R_M + e_B \\ \sigma_M &= 0.25, \quad \sigma(e_A) = 0.20, \quad \sigma(e_B) = 0.10 \end{aligned}$$

- i. Calculate the covariance between the returns on stocks A and B. (4 marks)
 - ii. Suppose that you have constructed a portfolio that consists of stocks A, B, and a risk-free asset with equal weights. Compute the standard deviation, beta, and non-systematic standard deviation of the portfolio. (8 marks)
- c) "Risk-averse investors should invest in bonds or money market instruments and risk lovers should invest in equities". Discuss and critically evaluate this statement? (7marks)

5. Returns and variance-covariance for two stocks, Barclays Plc and Royal Dutch Shell Plc are shown in the table below. Suppose investors only have access to these stocks and the risk free T-bill with a return of 5%.

$$\Sigma = \begin{bmatrix} 0.0256 & 0.015 \\ 0.015 & 0.0484 \end{bmatrix}, \quad E(r) = \begin{bmatrix} r_{Barclays} \\ r_{Shell} \end{bmatrix} = \begin{bmatrix} 0.09 \\ 0.15 \end{bmatrix}$$

Answer the following questions using the formulas in the formula sheet.

- a) Calculate the weights for the optimal portfolio that combines these two stocks and delivers a 17% return. What is the variance of this portfolio? (Assuming there is no access to the risk free asset). (6 marks)
- b) Suppose that investors now can also invest in the risk free asset. Calculate the tangency portfolio, its return and variance. What is the Sharpe ratio at the tangency

portfolio? (5 marks)

- c) What efficient portfolio (with risk free asset) delivers a 29% return? Demonstrate your answer graphically. (5 marks)
- d) Suppose that the market portfolio consists of these two stocks only. The market cap of Barclays is £50B and Shell £50B. Discuss whether a market with these characteristics is consistent with CAPM. (4 marks)
- e) Outline a methodology to study the impact of merger attempts on the stock prices of targeted firms and discuss how this is related to the EMH. (10 marks)

6. Below is a list of prices for zero-coupon bonds of various maturities:

Year	Price of £1000 Par Bond (zero-coupon)
1	£950
2	£ 880
3	£ 815
4	£ 730

In addition to the zero-coupon bond, investors also may purchase a 4-year bond making annual payments of £70 with par value £1000.

- a) What should the yield to maturity on the 4 year coupon bond be? (8 marks)
- b) If at the end of the first year the yield curve flattens out at 7%, what will be the 1-year holding-period return on the coupon bond? (7 marks)
- c) If the expectations theory of the yield curve is correct, what is the market expectation of the price that the bond will sell for next year? (9 marks)
- d) Explain and critically evaluate the two-pass methodology for testing the capital asset pricing model. (6 marks)

ALI MOGHADDAI KELISHOMI

Formula Sheet:

List of equations that you may need to answers some of the questions.

$w = \Sigma^{-1}(\lambda \bar{r} + \mu \mathbf{1})$	$\lambda = \frac{C \bar{r}_p - B}{AC - B^2}$ $\mu = \frac{A - B \bar{r}_p}{AC - B^2}$
$A = \bar{r}' \Sigma^{-1} \bar{r} \quad B = \bar{r}' \Sigma^{-1} \mathbf{1}$ $C = \mathbf{1}' \Sigma^{-1} \mathbf{1}$	$w_{tp} = \frac{\Sigma^{-1} \bar{r}^e}{\mathbf{1}' \Sigma^{-1} \bar{r}^e}$
$F = \begin{bmatrix} e & f \\ g & h \end{bmatrix} \Rightarrow$ $F^{-1} = \frac{1}{e * h - f * g} \begin{bmatrix} h & -f \\ -g & e \end{bmatrix}$	