

UNIVERSITY OF PORTSMOUTH

FACULTY OF TECHNOLOGY

Department of Electronic and Computer Engineering

M591 – Technology Exploration Project

U13127

Date: 26 January 2009

Time: 16:15 - 18:15

INSTRUCTIONS

Write your student ID number clearly on page 2.

Write your answers to all 5 questions within the spaces provided in this examination paper.

Handwritten notes are permitted with this examination.

Calculators permitted are:

Casio FX 85WA

Casio FX 83WA

Casio FX 85MS

Examiner:

Professor Zhili Sun, Mr Chi Nguyen

Student ID Number

****SOLUTIONS****

QUESTION 1

a) Place an "X" in the box next to the **3 most common statistical indicators** of financial risk.

[6 Marks]

<input type="checkbox"/>	frequency
<input type="checkbox"/>	power
<input type="checkbox"/>	trend
<input checked="" type="checkbox"/>	mean
<input type="checkbox"/>	mode

<input type="checkbox"/>	index
<input checked="" type="checkbox"/>	variance
<input type="checkbox"/>	logarithms
<input type="checkbox"/>	standard error
<input checked="" type="checkbox"/>	standard deviation

b) Monthly returns are provided for the following 2 equity stocks. **Calculate the statistical indicators selected in part (a) for each stock and explain which one is more risky.**

[14 Marks]

RedCo 4.0%, 0.4%, 9.5%, 0.5%, 7.0%, 3.7%, 12.4%, -3.7%, -4.8%, 3.5%, -5.4%, 0.8%

BlueCo 3.8%, 5.1%, 9.4%, -5.3%, 5.5%, -9.3%, 2.7%, -5.5%, -2.6%, -14.8%, -6.5%, 13.9%

	mean	
RedCo	2.3%	[1]
BlueCo	-0.3%	[1]
	variance	
RedCo	0.3%	[2]
BlueCo	0.7%	[2]
	standard deviation	
RedCo	5.5%	[2]
BlueCo	8.4%	[2]
BlueCo is more risky because it has much more volatility as indicated by its higher variance and standard deviation.		
		[4]

QUESTION 2

a) Place an "X" in the box next to **3 terms** that are most directly related to the **historical method of calculating value at risk**. [6 Marks]

2	cumulative frequency	2	average return
	cumulative value		absolute return
	coefficient of variation		internal return
	confidence score		risk premium
2	confidence level		risk index

b) **Calculate the value at risk** for an equity stock using the following parameters and historical daily returns. **Indicate values for terms selected in part (a)**. [14 Marks]

Daily VaR for £1000 at 5%

3.8%, -2.6%, -5.1%, 6.6%, -3.2%, -0.1%, -0.4%, -2.4%, 13.8%, -1.3%,
-5.4%, -1.0%, -2.5%, -5.8%, 5.9%, 0.9%, 7.1%, -10.6%, -3.8%, 11.8%

daily **average returns** arranged in increasing order to calculate **cumulative frequency**: [6]

-10.6% = 5% **confidence level** [4]

-5.8%

-5.4%

-5.1%

-3.8%

-3.2%

-2.6%

-2.5%

-2.4%

-1.3%

-1.0%

-0.4%

-0.1%

0.9%

3.8%

5.9%

6.6%

7.1%

11.8%

13.8%

£1000 x -10.6% = -£106 VAR [4]

QUESTION 3

a) Place an "X" in the box next to **3 terms** that are most directly related to **mean-variance theory of portfolio analysis**. [6 Marks]

	regression coefficient		risk adjusted frontier
2	correlation coefficient		risk free frontier
	quadratic coefficient	2	covariance
	arithmetic average		kurtosis
2	weighted average		skew

b) Calculate the expected return and risk of the portfolio containing the following 2 equity stocks. Indicate values for terms selected in part (a). [14 Marks]

$$\begin{array}{llll}
 x_1 = 0.4 & \mu_1 = -0.069066342 & \sigma_1 = 0.13075377 & \rho_{1,2} = -0.041841417 \\
 x_2 = 0.6 & \mu_2 = -0.013619198 & \sigma_2 = 0.094981137 & \rho_{1,2} = -0.041841417
 \end{array}$$

Expected return uses a **weighted average** formula: [2]

$(0.4 \times -0.069066342) + (0.6 \times -0.013619198) = -0.035798056$ [3]

The **correlation coefficient** is, -0.041841417 [2]

The **covariance** is: $-0.041841417 \times 0.13075377 \times 0.094981137 = -0.000519634$ [3]

Expected risk is:

$\text{SQRT}((0.4^2 \times 0.13075377^2) + (0.6^2 \times 0.094981137^2) + (2 \times 0.4 \times 0.6 \times 0.13075377 \times 0.094981137 \times -0.041841417)) = 0.075721418$ [4]

QUESTION 4

a) Place an "X" in the box next to **3 terms** that are most directly related to the **beta value** in the **single factor Capital Asset Pricing Model**. [6 Marks]

<input type="checkbox"/>	determinant	<input type="checkbox"/>	intercept
<input type="checkbox"/>	derivative	<input type="checkbox"/>	constant
<input type="checkbox"/>	integral	<input checked="" type="checkbox"/>	slope
<input type="checkbox"/>	inverse	<input checked="" type="checkbox"/>	index
<input type="checkbox"/>	rank	<input type="checkbox"/>	base

b) Calculate the **beta** for the following equity stock and **indicate the values for all terms selected in part (a)**. [14 Marks]

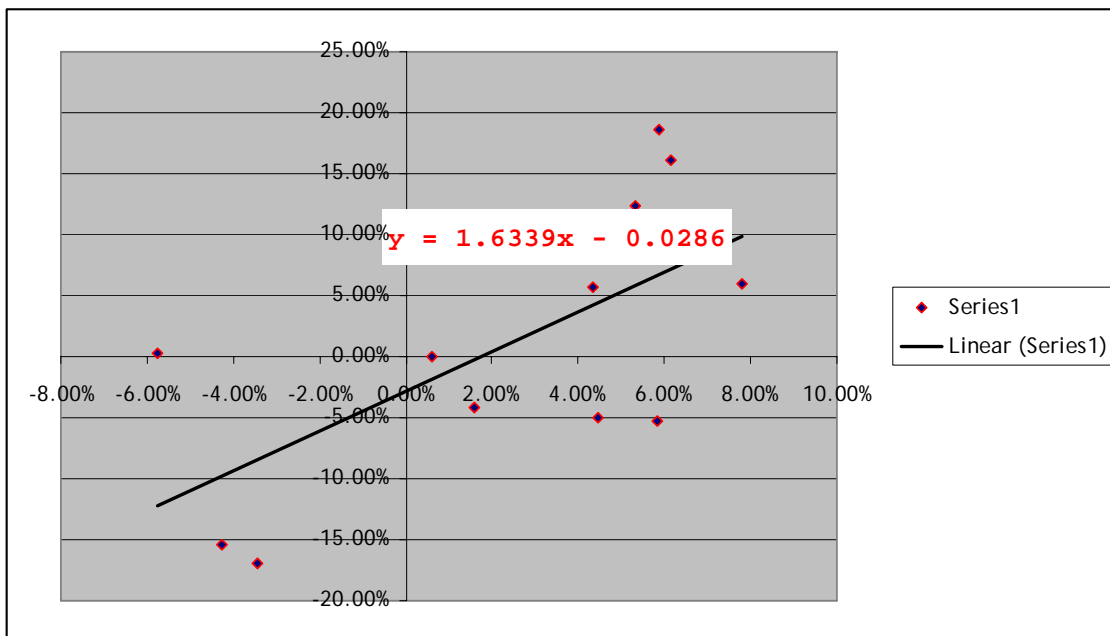
GreenCo 16.18%, 0.00%, -15.42%, -5.29%, 18.63%, 5.76%, 5.94%, 0.23%, 12.35%, -17.01%, -5.00%, -4.21%

S&P 500 6.13%, 0.59%, -4.26%, 5.84%, 5.86%, 4.35%, 7.81%, -5.75%, 5.32%, -3.45%, 4.46%, 1.57%

The S&P 500 is the **index** value that provides an approximation of the market performance. [3]

Using linear regression, beta is the **slope**, 1.63 [8]

and the **intercept** is, -0.03 [3]



QUESTION 5

a) Place an "X" in the box next to **3 terms** that are most directly related to **financial risk measurements**. [6 Marks]

2	volatility over time
2	volatility relative to benchmark
	volatility relative to prime rate
	diversified volatility
	market volatility

	cumulative value
2	expected value
	standard value
	critical value
	z value

b) Provide sample values of each term selected in part (a) for 3 hypothetical equity stocks. Compare and explain which stock has the most financial risk. [14 Marks]

Expected value is the basis for average return calculations (show examples). [3]

Volatility over time is the basis for variance and standard deviation calculations (show examples). [3]

Volatility relative to benchmark is the basis for beta calculations (show examples). [3]

Examples with the most financial risk would have the highest variance, standard deviation and beta values. [5]