Strathmore UNIVERSITY

STRATHMORE INSTITUTE OF MATHEMATHICAL SCIENCES

BACHELOR OF BUSINESS SCIENCE IN: ACTUARIAL SCIENCE, FINANCIAL ECONOMICS, FINANCIAL ENGINEERING

END OF SEMESTER EXAMINATION

BSF 4230 ADVANCED PORTFOLIO MANAGEMENT

DATE: 2nd December 2024 Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

QUESTION ONE [30 marks]

a) Analyst bias is a key challenge in generating expected returns. Please explain each of the following biases highlighting how they can be mitigated

(i) Time period bias (2 marks)
(ii) Confirmation bias (2 marks)
(iii) Overconfidence bias (2 marks)

b) Explain any two leading economic indicators and how they can be used in developing return expectations. (2 marks)

c) "Bottomline, investment outcomes are inherently linked to the economy." Do you agree? Explain. (2 marks)

d) You are evaluating various investment opportunities currently available, and you have calculated expected returns and standard deviations for five different well-diversified portfolios of risky assets

Portfolio	Expected return	Standard deviation
A	7.8%	10.5%
B	10.0%	14.0%
C	4.6%	5.0%
D	11.7%	18.5%
E	6.2%	7.5%

Required

(i) Which of these five portfolios is most likely to be the market portfolio. Draw the Capital Market Line (CML). (11 marks)

(ii) Having identified the market portfolio. If you are only willing to make an investment with $\sigma = 7\%$, is it possible for you to earn a return of 7% (4 marks)

(iii) What is the minimum level of risk that would be necessary for an investment to earn 7%? What is the composition of the portfolio along the CML that will generate that expected return? (5 marks)

QUESTION TWO [20 marks]

A portfolio manager uses Arbitrage Price Theory as a basis for evaluating strategies. She knows that portfolios [X] and [Y] are well diversified but has not encountered portfolio [Z]. The expected returns and factor sensitivity are as follows:

Portfolio	Expected Return	Factor Sensitivity
X	2%	0.5
Y	4%	1.5
Z	3%	0.9

Required

a) Does arbitrage opportunity exist? If yes, demonstrate how this can be exploited. (10 marks)

b) The portfolio manager now uses the following 2-factor model

Portfolio	Expected Return	Factor Sensitivity	
		Inflation	GDP growth
X	2%	0.5	1.0
Y	4%	1.6	0.0
Z	3%	1.0	1.1

Suppose the inflation forecast was 2% while actual value was 2.2% and GDP growth forecast was 1.5% while actual value was 1.0%. The error term for X, Y and Z is 1%, 0% and 0.5% respectively. Calculate the actual return of an equal weighted portfolio consisting of X and Y. (6 marks)

c) Explain the distinct difference in the way parameters are estimated for macroeconomic factor models and fundamental factor models. (4 marks)

QUESTION THREE [20 marks]

a) Mean Variance Optimization (MVO) is key in asset allocation despite its limitations. Discuss four limitations of MVO. (10 marks)

b) Consider the following relating to a certain market:

10-year historical	Current	Capital Market Expectations
Average government bond yield: 2.8%	10- year government bond yield: 2.3%	-
Average annual equity return: 4.6%	Year-over-year equity return: −9.4%	-
Average annual inflation rate: 2.3%	Year-over-year inflation rate: 2.1%	Expected annual inflation: 2.3%
Equity market P/E (beginning of period): 15×	Current equity market P/E: 14.5×	Expected equity market P/E: 14.0×
Average annual dividend income return: 2.6%	-	Expected annual income return: 2.4%
Average annual real earnings growth: 6.0%	-	Expected annual real earnings growth: 5.0%

Required

(i) Calculate the historical equity risk premium using the "equity- vs- bonds" premium method. (2 marks)

(ii) Calculate the expected annual equity return using the Grinold–Kroner model (assume 0.5% share repurchase). (6 marks)

(iii) Using your answer in (ii) above, calculate the expected annual equity risk premium. (2 marks)

QUESTION FOUR [20 marks]

a) Distinguish between active return and tracking error (2 marks)

b) Explain the three components of portfolio performance evaluation (6 marks)

c) Consider the following relating to equity portfolio. You have been tasked with performance evaluation.

Sector	Portfolio Weight	Benchmark Weight	Portfolio Return	Benchmark Return
Agriculture	50%	50%	18%	10%
Transport	30%	20%	-3%	-2%
Manufacturing	20%	30%	10%	12%

Required

Calculate and interpret:

(i) Allocation effect (4 marks)
(ii) Selection effect (4 marks)
(iii) Interaction effect (4 marks)

QUESTION FIVE [20 marks]

a) Discuss the following:

(i) Reverse optimization (3 marks)

(ii) Resampled Mean Variance Optimization (3 marks)

(iii) Risk budgeting (4 marks)

b) Consider the following selected data relating to a bond portfolio:

- Notional principal of portfolio (in millions) Sh.200
- Average bond coupon payment (per Sh.100 par value) Sh.2.25
- Coupon frequency Annual
- Current average bond price Sh.98.45
- Expected average bond price in one year (assuming an unchanged yield curve) Sh.98.62
- Average bond convexity 22
- Average bond modified duration 5.19
- Expected average yield and yield spread change 0.15%
- Expected credit losses 0.13%
- Expected currency gains (Sh. appreciation vs. $) 0.65%

Required

Calculate the bond portfolio's total expected return (10 marks)