



**STRATHMORE BUSINESS SCHOOL
BACHELOR OF FINANCIAL SERVICES
END OF SEMESTER EXAMINATION
AMS 4102: ADVANCED SECURITIES ANALYSIS AND INVESTMENT**

Date: Monday, 31st July 2023

Time: 2 Hours

Instructions

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

QUESTION ONE

- a) An investment adviser is counseling Aimée Goddard, a client who recently inherited Shs1,200,000 and who has above-average risk tolerance ($\lambda = 2$). Because Goddard is young and one of her goals is to fund a comfortable retirement, she wants to earn returns that will outpace inflation in the long term. Goddard expects to liquidate Shs60,000 of the inherited portfolio in 12 months to fund the down payment on a house. She states that it is important for her to be able to take out the Shs60,000 without invading the initial capital of Shs1,200,000. Exhibit 4 shows three alternative strategic asset allocations.

Investor's Forecasts

<i>Asset Allocation</i>	Expected Return	Standard Deviation of Return
<i>A</i>	10%	20%
<i>B</i>	7%	10%
<i>C</i>	5.25%	5%

Required:

- i) Based only on Goddard's risk-adjusted expected returns for the asset allocations, which asset allocation would she prefer? (You need to determine the utility received from each asset allocation). **(8 marks)**
- ii) Recommend and justify a strategic asset allocation for Goddard. **(6 marks)**
- b) Discuss the 2 objectives and any other 3 key components of an Investment Policy Statement (IPS). **(10 marks)**
- c) Differentiate between:
 - i. Capital allocation line (CAL)

- ii. Capital Market Line (CML)
- iii. Security Market line (SML).

(6 marks)

QUESTION TWO

Saylor Guitars was established 25 years ago in the US. Today, the company employs a highly-skilled workforce to produce handmade guitars. Ten years ago, the company instituted a defined-benefit pension plan (the Plan). There is no provision for early retirement. The average age of the workforce is 35 years, and there are no current pension recipients.

Until last year, Saylor made annual contributions to the Plan and it had a surplus. However, the latest economic downturn reduced sales of Saylor's premium-priced guitars, which resulted in lower profitability. This led the company to omit Plan contributions and now the Plan is just fully funded with no surplus. Customer orders have begun to increase with an improvement in the overall economy. Based on past experience, the company is forecasting that it will return to its typical high profit levels in the next several months. Saylor also expects to resume its contributions to the Plan in the first half of the upcoming year.

The average annual return on the Plan's asset portfolio since inception has been 4.8%. The portfolio is well-diversified across asset classes and has low return correlation with the broad equity market. Saylor uses a discount rate of 4.5% to compute its pension benefit obligation.

The expected inflation rate is 1.5%. Saylor's debt-to-assets ratio is 0.42 compared to the industry average of 0.40.

- a) Determine whether the risk tolerance of the Plan is below-average or above-average. Justify your response with two reasons
Note: Restating case facts is an incomplete justification and will not receive credit. **(5 Marks)**
- b) State the minimum return requirement of the Plan. Explain your response. **(4 Marks)**
- c) One month later, Saylor's management decides to offer to employees over age 50, a one-time lump-sum early retirement option that will be payable next year. Ten percent of Saylor's employees accept this option.
Discuss how the acceptance of the early retirement option changed each of the following:
 - i) Liquidity requirement
- d) Duration of Plan liabilities. **(5 Marks)**
- e) Discuss 3 investment strategies/approaches to equity investment portfolio management. **(6 marks)**

QUESTION THREE

Alexander and Elizabeth Mahorne, both age 45, are meeting with their financial advisor, Marc Lenard. Lenard is creating an investment policy statement for the Mahorne's. Alexander sold his consulting business at year-end and retired. The Mahorne's will rely on their investment portfolio to meet future expenses in excess of Alexander' retirement income. Elizabeth is not employed. Financial details include:

Income

Alexander will receive retirement payments of Kshs 125,000 per year for his lifetime from the business he sold. The retirement payments are not indexed for future inflation and are fully taxable as ordinary income.

Expenses

The Mahorne's' total living expenses last year were Kshs 300,000, and they are expected to grow each year at the inflation rate. Taxes are due immediately on the gain from the sale of the business at a rate of 15%. The Mahorne's do not expect any other significant cash outflows in the future.

The tax rate on ordinary income and all investment returns is 30%. The inflation rate is expected to be 2.5% per year.

Assets

The Mahorne's own their home, valued at Kshs 1,250,000, mortgage-free. They have a taxable investment portfolio with a current market value of Kshs 2,500,000. This portfolio has no previous tax liability due in the coming year. Alexander received a lump-sum Kshs 10,000,000 payment from the sale of his business; his cost basis is zero. The net proceeds of the sale will be added to the Mahorne's' investment portfolio. Their goals are to grow the asset base of the portfolio over time to maintain its after-tax purchasing power and to establish and maintain a cash reserve of Kshs 250,000.

- Determine the Mahorne's' nominal after-tax required rate of return for the coming year. Show your calculations. **(8 marks)**
- State two reasons why the Mahorne's' ability to assume risk in their investment portfolio is above average. **(4 marks)**
- Determine the Mahorne's' liquidity requirement (in Kshs) for the coming year. Show your calculations. **(3 marks)**
- Two years later, the Mahorne's ask Lenard to construct a new long-term strategic asset allocation with a more aggressive goal of achieving at least 3.5% annualized growth in the after-tax purchasing power of the portfolio. They indicate that the portfolio should have only a small probability of declining more than 10% in nominal pre-tax terms in any one year. Lenard explains to the Mahornes that a normal distribution can be used to model the portfolio returns. The Mahornes agree to use a two-standard-deviation approach to monitor the shortfall risk of the portfolio.

Expected inflation remains 2.5% per year and the tax rate remains 30%. Based on his current market outlook, Lenard considers three potential portfolio allocations for the Mahornes as shown in Exhibit 1.

Exhibit 1
Potential Long-Term Strategic Portfolios

Asset Class	Expected Annual Return	Portfolio X	Portfolio Y	Portfolio Z
Stocks	11.0%	70%	55%	60%
Bonds	6.0%	25%	35%	35%
Cash	2.5%	5%	10%	5%
Pre-tax expected return (nominal)		9.3%	8.4%	8.8%
Expected standard deviation (nominal)		11.0%	8.7%	9.3%

Determine the most appropriate portfolio from Exhibit 1 for the Voorts, given their objectives and constraints. Justify your response with two reasons. **(5 marks)**

QUESTION FOUR

KCB Bank is a US-based commercial bank that began operations in 1896. In order to attract skilled labor, KCB Bank offers employees attractive benefits which include a defined benefit pension plan and annual wage increases above the rate of inflation. An asset only (AO) approach to strategic asset allocation is currently used for the investment management of the pension plan. Omondi is a consultant to the board of trustees of KCB Bank's pension plan. The board asks Omondi to recommend a strategic asset allocation for the pension plan given the following investment policy objectives:

Return requirement: Earn an average annual return of 8.7 percent plus management and administration fees of 0.7 percent.

Risk objective: A maximum standard deviation of portfolio returns of 10.0 percent.

For the strategic asset allocation analysis, Omondi has generated the corner portfolios shown in Exhibit 1. The KCB Bank pension plan investment policy statement (IPS) prohibits short positions and the use of leverage. The IPS allows investment in any single portfolio or combination of portfolios described in Exhibit 1.

Exhibit 1
Corner Portfolios
(Risk-free Rate = 4.5%)

Corner Portfolio Number	Expected Return (%)	Expected Standard Deviation (%)	Sharpe Ratio	Asset Classes (Portfolio Weights, %)				
				U.S. Equities	Non-U.S. Equities	Intermediate-term U.S. Bonds	Non-U.S. Bonds	U.S. Real Estate
1	10.8	16.1	0.39	100.0	0.0	0.0	0.0	0.0
2	10.4	14.2	0.42	82.4	0.0	0.0	0.0	17.6
3	10.3	12.7	0.46	74.1	4.0	0.0	0.0	21.9
4	9.1	9.1	0.51	33.7	12.0	36.7	0.0	17.6
5	8.0	7.4	0.47	25.0	11.8	45.3	3.4	14.5
6	6.9	5.2	0.46	0.0	13.7	53.0	27.1	6.2
7	6.6	4.8	0.44	0.0	11.2	53.0	31.5	4.3

- a) Using traditional mean-variance analysis:
- i) **Select** the *most* appropriate portfolio or combination of portfolios for the strategic asset allocation of the KCB Bank pension plan. **Justify** your response with *two* reason other than meeting KCB Bank's return requirement. **(3 marks)**
 - ii) **Determine** the weight of total equities (U.S. and non-U.S. combined) in the *most* appropriate strategic asset allocation. **(5 marks)**
- b) Omondi proposes that the IPS be changed to allow borrowing or lending at the risk-free rate, currently 4.5 percent. He suggests that this change would enable KCB Bank's pension plan to minimize its expected standard deviation of return while achieving the plan's required return.
- i) Determine the most appropriate strategic asset allocation for the KCB Bank pension plan based on Omondi's proposal and the optimal asset allocation for the overall portfolio. **(6.5 marks)**
 - ii) Explain how this allocation improves the plan's risk-adjusted return. **(4 marks)**
 - iii) Determine the weight of total equities (U.S. and non-U.S. combined) in the most appropriate strategic asset allocation. **(1.5 marks)**

QUESTION FIVE

A public pension fund has employed three investment managers, each of whom is responsible for investing in one-third of all asset classes so that the pension fund has a well-diversified portfolio. Information about the managers is given below.

Manager	Average Return	$\hat{\sigma}$	$\hat{\beta}$
X	10%	20%	1.1
Y	11	10	0.7
Z	12	25	0.6
Market (M)	9	19	
Risk-free rate (R_f)	3		

Calculate the:

- a) The expected return for each manager, based on using the average market return and the CAPM.
(6 marks)

- b) Each manager's
 - i) Sharpe ratio,
 - ii) Treynor's ratio,
 - iii) M² alpha, and
 - iv) Jensen's alpha.
(8 marks)
- c) Analyze and critically discuss your results and plot the returns and betas of these portfolios.
(6 marks)