

Specimen Exam MTH6113

1. An investor has a utility from wealth described by: $U(w) = w$ where $w > 0$ is their wealth.
- Explain whether this investor prefers more to less and whether they are risk averse.
[4 marks]
 - What are this investor's Arrow Pratt measures of risk aversion? Explain what these results convey.
[6 marks]
 - The investor is considering entering a business venture that involves a 20% probability of an income of £1,000 and 80% probability of an income of £200 depending on the state of the economy. The initial investment involves a payment of I_0 . The investor's initial wealth is $w_0 = £1,000$. Using the definition of a "fair gamble", find the level of initial investment that guarantees this venture is a fair gamble for the investor.
[5 marks]
 - Explain, giving reasons, whether the investor accepts the business venture at the investment level found in part c).
[5 marks]
- Total: [20 marks]
2. Rogers Ltd. is considering investing in two stocks, FTD and BLN. The expected annual return on FTD is 6% and the expected annual return on BLN is 14%. The rates of return from these two companies' shares have a correlation coefficient of $\rho = 0.03$. The standard deviation of the rates of return on FTD is 0.03 and the standard deviation of the return on BLN is 0.04. An investor prefers more to less and can short sell both assets (i.e. hold negative amounts of either asset).
- A portfolio P is formed using only FTD and BLN.
 - Calculate the portfolio weights on FTD and BLN in order for P to be a global minimum variance portfolio.
[4 marks]
 - Calculate the expected return and the standard deviation for this portfolio P.
[4 marks]
 - Suppose the investor requires an expected return of 8% with the lowest possible variance from a portfolio Q formed using FTD and BLN shares. Calculate the required weights on FTD and BLN.
[4 marks]
 - Assume now that the annual rates of return of FTD and BLN are in fact perfectly correlated with $\rho = -1$.
 - Can the investor build up a portfolio F with zero risk? If no, explain why. If yes, calculate this portfolio's weights on FTD and BLN.
[4 marks]
 - Calculate the expected return of the risk free portfolio.
[2 mark]
 - Show and explain the efficient frontier using a standard "expected return – standard deviation" diagram that displays the annual returns of FTD, BLN, and F.

- [4 marks]
- iv) Describe how different risk averse investors find their optimum portfolios, using a diagram to support your answer.

[4 marks]

Total: [26 marks]

3. On January 1st, 2024 the 1-year Hungarian Government Bonds are offered at 1% yield. An investor is interested in investing in the Hungarian capital market. He has the following information about the expected annual returns, variances and correlations for two Hungarian cargo airlines (assuming these are the only stocks traded on this market): ASL Airlines and Fleet Air.

Stock	Correlations with		Expected Annual Return	Variance
	ASL Air	Fleet Air		
ASL Air	1	0.6	5%	0.16
Fleet Air	0.6	1	7%	0.09

- a)
- i) Do the 1-year Hungarian Government bonds bear any risk? Explain any assumptions you made in arriving at your answer. [5 marks]
- ii) Find the annual risk free rate in this economy. [2 mark]
- iii) Calculate the annual risk premium of ASL Air. [3 mark]
- b) In order to decide his optimum portfolio, the investor needs to know the tangency portfolio in this market. Find the weights of the tangency portfolio. [5 marks]
- c) Calculate the expected annual return and variance of the tangency portfolio. [5 marks]
- Total: [20 marks]

4.

- a) An analyst has access to all the annual, monthly and daily returns of Coca Cola since it started trading on NYSE in 1919. Explain how the analyst would test whether the NYSE is efficient, by presenting any two statistical tests. [6 marks]
- b) Define all the levels of market efficiency that you know. [6 marks]
- c) Which type of market efficiency did the analyst test in point (a)? [6 marks]
- d) A colleague of the analyst suggested that NYSE is not efficient as Coca Cola's returns can be forecasted based on the returns of Pepsi Cola. His argument is that, in the absence of arbitrage, all assets with identical factor exposures or risks earn the same return. Explain whether he is correct or not. [4 marks]

Total: [20 marks]

5. You are working in the research department of an investment bank. A stock you have analysed has underperformed relative to its industry peers for the last three years. In a report for the front office you state that you are 90% sure that this stock will underperform in the coming year as well.

a) Discuss whether your advice could be biased, based on concepts learnt in behavioural finance.

[7 marks]

b) Before you submit your report, you learn of a rumour that the company might soon announce higher than expected earnings for the current year. However, you decide that this rumour is unfounded and do not incorporate it in your report. Describe a bias that could explain your decision.

[7 marks]

Total: [14 marks]

END OF PAPER