ECON30024
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# Tutorial 4 (for Week 5)[1]

1. Review Quiz 4 questions

2. An investor chooses a portfolio comprising one risky asset with expected rate of return $\mu_Z = 0.15$, and standard deviation of return $\sigma_Z = 0.40$, and lending or borrowing at a risk-free rate, $r_0 = 7\%$. Let $q$ denote the proportion of the portfolio invested in the risky asset, $\mu_P$ the expected rate of return on the portfolio, and $\sigma_P$ the standard deviation of the rate of return on the portfolio. Assume that the investor acts to maximise the objective function

$$G(\mu_P, \sigma_P) = \mu_P - 0.5\sigma_P^2.$$

   (a) In a digram, sketch the investor's portfolio frontier, and find the slope of it.

   (b) Following Quiz 4, question (2), express the optimum portfolio by a point in the $(\sigma_P, \mu_P)$ space corresponding to the optimal value of $q$. In the same diagram drawn in (a), sketch the indifference curves and depict the investor's optimum portfolio.

   (c) Suppose that the interest rate increases to 11% ($\mu_Z$ and $\sigma_Z$ remaining unchanged). Re-calculate the optimal value of $q$ and the optimum portfolio. Sketch the new portfolio frontier and depict the optimum portfolio in a diagram.

   (d) Suppose the interest rate at which the investor can borrow increases to 11%, but the rate at which the investor can lend remains at 7%. Re-calculate the optimal value of $q$ and the optimum portfolio. Sketch the new portfolio frontier and depict the optimum portfolio in a diagram.

3. Go through the solution for Exercise 4.1 by yourself and try to understand: how to construct the portfolio frontier with two risky assets; the concept of minimum risk portfolio and how to find it; how to formulate the portfolio selection problem of an investor and how to solve it to find the investor's optimum portfolio. If you have trouble understanding the solution, ask your tutor in the tutorial class.

4. Discussion questions: Suppose you have chosen two stocks and you have $5000 to invest in them. Suppose you only care about the expected rate of return on your investment one month later and the risk associated with it. Based on the portfolio selection theory discussed in Topic 4, how would you choose the optimal combination of the two stocks? Think about what information/data you would need to conduct this analysis, and what procedures would be involved in your analysis.

[1] Topic 4 and 5 will be the focus of the mid-semester exam. Aim to understand everything on the lecture slides and use the list of review questions to check your understanding.