FINM3093 Investments

Lecture 3 Exercises

1. Consider a risky portfolio. The end-of-year cash flow derived from the portfolio will be either $70,000 or $200,000 with equal probabilities of .5. The alternative risk-free investment in T-bills pays 6% per year.
    a. If you require a risk premium of 8%, how much will you be willing to pay for the portfolio?
    b. Suppose that the portfolio can be purchased for the amount you found in (a). What will be the expected rate of return on the portfolio?
    c. Now suppose that you require a risk premium of 12%. What price are you willing to pay?
    d. Comparing your answers to (a) and (c), what do you conclude about the relationship between the required risk premium on a portfolio and the price at which the portfolio will sell?

2. Consider a portfolio that offers an expected rate of return of 12% and a standard deviation of 18%. T-bills offer a risk-free 7% rate of return. What is the maximum level of risk aversion for which the risky portfolio is still preferred to T-bills?

3. You manage a risky portfolio with an expected rate of return of 18% and a standard deviation of 28%. The T-bill rate if 8%.
    1) Your client chooses to invest 70% of a portfolio in your fund and 30% in an essentially risk-free money market fund. What are the expected value and standard deviation of the rate of return on his portfolio?
    2) Suppose that your risky portfolio includes the following investments in the given proportions:

Stock A	25%
Stock B	32%
Stock C	43%

        What are the investment proportions of your client's overall portfolio, including the position in T-bills?
    3) What is the reward-to-volatility (Sharpe) ratio (S) of your risky portfolio? Your client's?

4) Draw the CAL of your portfolio on an expected return-standard deviation diagram. What is the slope of the CAL? Show the position of your client on your fund's CAL.
5) Suppose that your client decides to invest in your portfolio a proportion y of the total investment budget so that the overall portfolio will have an expected rate of return of 16%.
    a. What is the proportion?
    b. What are your client's investment proportions in your three stocks and the T-bill fund?
    c. What is the standard deviation of the rate of return on your client's portfolio?
6) Suppose that your client prefers to invest in your fund a proportion y that maximizes the expected return on the complete portfolio subject to the constraint that the complete portfolio's standard deviation will not exceed 18%.
    a. What is the investment proportion, y?
    b. What is the expected rate of return on the complete portfolio?
7) Your client's degree of risk aversion is $A = 3.5$.
    a. What proportion, y, of the total investment should be invested in your fund?
    b. What are the expected value and standard deviation of the rate of return on your client's optimized portfolio?

4. Suppose that the borrowing rate that your client faces is 9%. Assume that the equity market index has an expected return of 13% and standard deviation of 25%, that $r_f = 5\%$, and that your fund has an expected return of 11% and standard deviation of 15%.
    a. Draw a diagram of your client's CML, accounting for the higher borrowing rate. Superimpose on it two sets of indifference curves, one for a client who will choose to borrow and one for a client who will invest in both the index fund and a money market fund.
    b. What is the range of risk aversion for which a client will neither borrow nor lend, that is, for which $y = 1$?
    c. Solve (a) and (b) for a client who uses your fund rather than an index fund.
    d. What is the largest percentage fee that a client who currently is lending ($y < 1$) will be willing to pay to invest in your fund? What about a client who is borrowing ($y > 1$)?

5. A pension fund manager is considering three mutual funds. The first is a stock fund, the second is a long-term bond fund, and the third is a money market fund that provides a safe return of 8%. The characteristics of the risky funds are as follows:

	Expected Return	Standard Deviation
Stock fund (*S*)	20%	30%
Bond fund (*B*)	12	15

The correlation between the fund returns is .10.

1) What are the investment proportions in the minimum-variance portfolio of the two risky funds, and what the expected value and standard deviation of its rate of return?
2) Tabulate and draw the investment opportunity set of the two risky funds. Use investment proportions for the stock fund of 0% to 100% in increments of 20%.
3) Draw a tangent from the risk-free rate to the opportunity set. What does your graph show for the expected return and standard deviation of the optimal portfolio?
4) Solve numerically for the proportions of each asset and for the expected return and standard deviation of the optimal risky portfolio.
5) What is the Sharpe ratio of the best feasible CAL?
6) Suppose an investor's degree of risk aversion is $A = 3$. What should be her capital allocation?
7) You require that your portfolio yield an expected return of 14%, and that it be efficient, that is, on the steepest feasible CAL.
    a. What is the standard deviation of your portfolio?
    b. What is the proportion invested in the money market fund and each of the two risky funds?
8) If you were to use only the two risky funds and still require an expected return of 14%, what would be the investment proportions of your portfolio? Compare its standard deviation to that of the optimized portfolio in (7). What do you conclude?

6. Suppose that there are many stocks in the security market and that the characteristics of stocks A and B are given as follows:

Stock	Expected Return	Standard Deviation
A	10%	5%
B	15	10
	Correlation = -1	

Suppose that it is possible to borrow at the risk-free rate, r_f. What must be the value of the risk-free rate? (*Hint*: Think about constructing a risk-free portfolio from stocks A and B.)