

## Homework 2

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You are advising an investor about their optimal portfolio. This investor currently has their wealth invested completely in the VFINX index fund and Treasuries, but is considering diversifying into gold.

Download from Canvas the spreadsheet “Homework 2 data.xlsx,” which provides a history of monthly returns on gold and on VFINX, as well as risk-free returns, since 2008.

Based on the historical data in the spreadsheet, answer the following questions:

1. What portfolio of gold and VFINX had the lowest possible volatility?
2. What portfolio of gold and VFINX had the highest possible Sharpe ratio?

As we discussed in class, the optimal portfolio for a mean-variance investor can be found in two steps: First, draw the capital allocation line (CAL) from the risk-free investment (zero excess return, zero volatility) to the portfolio of risky investments (gold and VFINX) with the maximum Sharpe ratio. Then, find the position on the CAL that is best for the investor given their attitude towards risk.

For the following three investors, determine their optimal weights across risk-free, VFINX, and gold:

3. An investor who uses the mean-variance utility function with  $A = 6$ .
4. An investor who uses the mean-variance utility function with  $A = 7$ .
5. An investor who uses the mean-variance utility function with  $A = 8$ .

Submit your answers as a spreadsheet that clearly shows the steps you followed. In other words, it is not sufficient just to state the answers to the question. It must be clear *how* you arrived at them.