Asset Management, Lifecycle Investing & Retirement Finance
Spring 2021 HW# 5
Due April 25, 2021

1. Fixed-Income Performance Evaluation: Relation Between Yield-to-Maturity and Expected Holding-Period Rate of Return

(a) Is the yield-to-maturity on a *risk-free* US Treasury coupon bond equal to its realized rate of return, if held until maturity? Why?

(b) Is the yield-to-maturity on a zero-coupon risky bond equal to the expected return on that bond, if held until maturity? Why?

(c) Suppose there are two risky zero-coupon bonds, each with identical promised payment and the same maturity date. Is it true that the one with the lower market price (higher yield to maturity) have a higher expected return than the other one? Why?

(d) Suppose there are two risky zero-coupon bonds, each with identical promised payment and the same maturity date. Suppose that we know the probability of default is the same for each bond. Is it true that the one with the lower market price (higher yield to maturity) have a higher expected return than the other one? Why?

2. Performance Evaluation, Alpha vs. Sharpe Ratio
The market portfolio has an annual expected return of 15% per annum, and a standard deviation of 20% per annum. Hedge fund XYZ has a beta of 0, alpha of 3% per annum, and standard deviation of 10% per annum. The risk-free rate is 5% per annum.

(a) Calculate the Sharpe Ratio for the hedge fund and the market as a whole. Assuming you can only invest in either the market index fund or XYZ, which would you invest in?

(b) Assume you can invest in both the market index fund and hedge fund XYZ. Use the portfolio optimizer to determine the optimal portfolio weight (OCRA) in each fund. What is the Sharpe Ratio of this combination?

(c) What alpha would be required for XYZ to have the same Sharpe Ratio as the market?

3. Invest Only In What You Know About?
The market portfolio has an annual expected return of 15% per annum, and a standard deviation of 20% per annum. In a market model regression, hedge fund ABC has a beta of 1.2, alpha of 2% per annum, and *residual* standard deviation of 18% per annum. The risk-free rate is 5% per annum.

(a) Calculate the Sharpe Ratio for the hedge fund and the market as a whole.

Same as 2 (a)

(b) Use the portfolio optimizer to determine the Sharpe Ratio of the optimal combination of a market index fund and ABC fund.

(c) Respond to the oft-said investment advice, “Invest only in what you know about”.