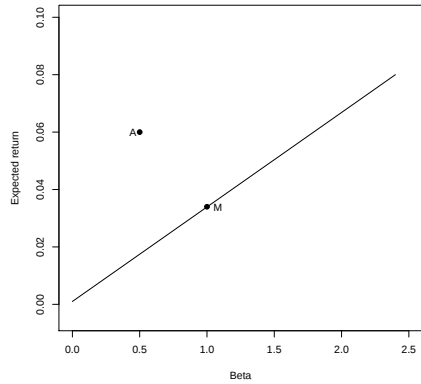


Homework 6

Answer the following questions:

- a. The following plot shows the expected return against beta of the market portfolio M and your portfolio A based on some model you chose.



It is given that $\bar{R}_A = 0.06$, $\beta_A = 0.5$, $\bar{R}_M = 0.034$, $\sigma_M^2 = 0.015$, $R_f = 0.001$. The total risk of your portfolio is 0.03375. Compute the following components:

Return from selectivity

Return from net selectivity

Return from diversification

You are a portfolio manager and a client has given you a target risk $\beta_T = 0.25$. Compute the following components:

Return due to “investor’s risk.”

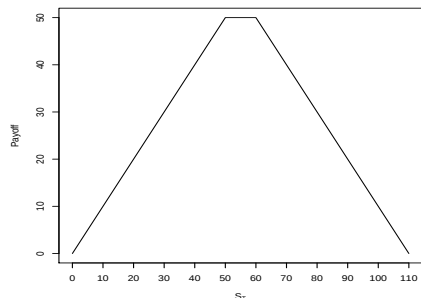
Return due to “manager’s risk.” This is the return due to the manager’s choice of a different risk than the target.

- b. A large pension fund wants to evaluate the performance of four portfolio managers for the last 5 years. During this time period the average annual return of the S&P500 was 14% with standard deviation 12%. The average annual risk free interest rate was 8%. The four portfolios gave the following data:

Portfolio	Average annual return (%)	Standard deviation (%)	Beta
A	16	19	1.2
B	22	16	1.9
C	10	10	0.8
D	15	13	1.3

For funds A and B , how much the return on B has to change to reverse the ranking using the Sharpe measure?

- c. One of the investing strategies using European options is the “protective put,” where the investor buys the put and buys the stock. What position in call options is equivalent to this strategy? Please explain and provide all the necessary plots to support your answer.
- d. Design a portfolio using only call options and the underlying stock with the following payoff at expiration:



- e. Suppose data are collected for a certain stock:

Stock price	\$110
Call price (1-year expiration, $E = \$105$)	\$17
Put price (1-year expiration, $E = \$105$)	\$5
Risk-free interest rate	5% per year

Is there a mispricing of the call and put? If yes, can you exploit this mispricing to create arbitrage profit? Please provide the numerical example.

- f. The price of a European put option on stock A is \$4.0. The current price of the stock is $S_0 = \$46$, the exercise price of the put option is $E = \$51$, time to expiration is 1 month, and the risk-free interest rate for the one-month period is 0.005. Is there an opportunity for riskless profit? If there is, please explain the positions you need to hold with the corresponding payoffs.
- g. A large pension fund wants to evaluate the performance of four portfolio managers for the last 5 years. During this time period the average annual return of the S&P500 was 14% with standard deviation 12%. The average annual risk free interest rate was 8%. The four portfolios gave the following data:

Portfolio	Average annual return (%)	Standard deviation (%)	Beta
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Compute the Treynor performance measure for portfolio A and the Sharpe measure for portfolio B ?

- h. Refer to question (g). Compute the Jensen differential performance index for each portfolio and show them on the space expected return against beta.
- i. Consider the multi-index model as discussed in class. Derived the covariance between stocks that belong in the same industry and the covariance between stocks that belong in different industries. Please show the details.
- j. Consider the following two measures of portfolio performance: The Sharpe ratio and the differential excess return. Show graphically a situation of two portfolios A and B that are ranked as $A > B$ using the Sharpe ratio but at the same time $B > A$ using the differential excess return. Please explain why $A > B$ and $B > A$ for the respective measures of performance mentioned above.