15.467 Asset Management, Lifecycle Investing & Retirement Finance
Spring 2021
Homework 4

Due April 11, 2021

1. Performance Fees

Consider Hedge Fund XXX charging a "2 and 20" annual fee structure. The risk-free interest rate is 3%, the target standard deviation of the fund is σ=20% and the current price per share of the fund is $100,000. Suppose that you are confident in your estimate that the fund has an expected excess return, alpha (net of 2% AUM fee) equal to 4% for the next 12 months.

i) Calculate the AUM flat fee that would be equivalent to the current fee structure. How would your answer change if the target standard deviation changes to σ=30%? How would it change if you receive new information which causes your estimate of the fund alpha (net of AUM fee) is 8%? Explain your answers.

ii) Calculate the loss in "AUM equivalent-value-fee" that would imply for the manager to have a cap on the performance fee of $3,000 per share. What incentives does a scheme like this put on the manager?

As a client, you now ask the HF manager to design a new fee structure. You don't want to pay any performance fees unless the hedge fund (net of AUM fee) return exceeds a hurdle rate of 5%. The HF manager agrees to include this clause in the agreement, but he states that he wants to have the exact same "equivalent-value fee" than before the change. Assume no cap.

iii) Assuming that the AUM flat fee stays at 2%. What level of performance fee would be necessary to achieve the HF manager desire?

Let's assume now that that you ask the HF manager to benchmark himself against XYZ Equity Index, instead of using a plain fixed hurdle rate. XYZ has a standard deviation of σ=18% and -under your estimations- the HF has had a historical correlation of 0.6 with the Index. The value of 1 share in XYZ Equity Index is $100,000.

iv) Which level of performance fee would the HF manager need to set in order to have an "equivalent fee" of 2%? Assume that the AUM flat fee is now 0%.

v) Explain the different incentives that the HF manager has under the settings in i) and iv)?

2. Trading on Implied Volatility

Consider call options on a hypothetical Exchange Traded Fund (ETF) XXXX with time to expiration 0.23 years and strike price of $45 are trading at an implied volatility of 14.3%. XXXX

is currently trading at $44.56 per share and the continuously compounded risk-free interest rate is 5.21% .

a) If you believe that the true correct volatility of XXXX over the next 0.23 years is 15%, how can you trade on your belief without taking on exposure to the performance of XXXX?
b) How many shares of XXXX stock will you hold for each option contract purchased or sold?
c) Suppose that the 0.23-year put options on XXXX with a strike price of $45 are selling at an implied volatility of 16.5%. Describe a portfolio strategy comprising of positions in calls, puts, XXXX shares and risk-free assets that would yield a sure profit?