FINM 25000 **Mark Hendricks**
Summer 2020

Midterm #1

Due on Monday, July 13, at 9:00pm.

The Exam requires you to use the data set corresponding to Homework #2, `hedge_data.xls`

- This file is posted with the midterm, but it is exactly the same as the versions posted with HW#2.
- For the tab `HedgeFund_ExcessRets`, we **only use the data through 6/30/98** in order to match the dates of the LTCM tab.
- So be sure to insert code to only grab the data through 6/30/98, or even just delete the rows after that.
- You will not use the fund data past 6/30/98 at all.

Finally, the data is already in excess returns, and everything discussed below already assumes you are using excess returns. So no need to subtract the risk-free rate.

1 Allocation (50pts)

This section only uses the fund data in the tab `HedgeFund_ExcessRets`.

1. Summary Statistics for the 14 funds.
   (a) (5pts) Calculate and display the mean and volatility of each fund's excess return. Annualize the answers.
   (b) (5pts) Which assets have the best and worst Sharpe ratios?
   (c) (5pts) Conceptually, (before even calculating the Tangency portfolio,) will the Tangency portfolio put any money into the asset with the worst-performing Sharpe ratio? Why or why not?
   (d) (5pts) Calculate the 5th quantile (5th percentile) of each fund.
2. Tangency portfolio derived from the 14 funds.
   (a) (10pts) Calculate the weights of the tangency portfolio.
3. Recalculate the tangency portfolio, but instead of using the covariance matrix, use a diagonalized version which zeros out every element off the main diagonal. (So it is just a matrix of the variances, with zeros everywhere else.)
   (a) (10pts) Report the new tangency portfolio weights.
   (b) (5pts) Which version of the tangency portfolio do you expect will perform better for the period beyond 6/30/98? No need to calculate it.
   (c) (5pts) Putting aside statistical stability and out-of-sample performance, name one other reason that an investor might choose to have a portfolio which is not mean-variance optimal.

2 Performance (35 pts)

1. From the tab `LTCM_ExcessRets`... grab the LTCM NET returns.
2. Regress the LTCM NET return on the Total Index.
   (a) (10pts) Report the α, β, and r-squared.
   (b) (5pts) Can LTCM's mean return be explained by the Total Index?
   (c) (5pts) Can LTCM's variation in return be explained by the Total Index?
   (d) (5pts) If the Total Index goes up 1%, what should we expect happened to LTCM that month?
3. Information Ratio
   (a) (5pts) Report the Information ratio of LTCM on the Total Index.
   (b) (5pts) What does that Information Ratio say about LTCM's strategy's skill/performance on a relative basis?

3 Pricing (15pts)

No further calculation needed for this part.

1. (10pts) Suppose you believe that the Total Index used in the previous part is the one and only factor needed for a perfect pricing model. Then in the regression of LTCM on the Total Index, what would we expect, (if anything,) about the following three statistics?
   (a) alpha
   (b) beta
   (c) r-squared
2. (5pts)

   If the Total Index really did work perfectly as a linear factor pricing model, (i.e., it were the "true model",) then what would we know about its long-run Sharpe Ratio compared to the long-run Sharpe Ratio of the tangency portfolio? Why?

   (Note that I only say "long-run" to clarify that I'm not asking the question about a limited sample, but about the entire population.)