MGT 6078 - Finance and Investments

Assignment 4 **Prof. Hsu**

This assignment must be submitted by the beginning of class on **Thursday, Dec.** 4^{th}**, 2025**. No late submissions will be accepted. The assignment questions are to be completed in group. You should complete it using word documents with (Python, R or Matlab) code attached. **Please keep in mind that copying assignments from past years is considered a honor code violation, and it will hurt your ability to perform on the exams.**

You will be testing the ability of certain factor models to explain the returns on different sets of portfolios. You will use the Gibbons, Ross and Shanken (GRS) test statistic to examine if alphas are jointly equal to zero.

1 Initial Reading:

1. Read AQR's (Cliff Asness') post on the five-factor model "Our Model Goes to Six and Saves Value From Redundancy Along the Way." **(Link or see accompanying PDF)**.

2. Read Karl Diether's slides on the Gibbons, Ross and Shanken test.

2 Gather Factor Data:

1. Download the Fama/French 5 Factors (monthly), the Momentum Factor, the 25 Portfolios Formed on Size and Book-to-Market and the 10 Industry Portfolios from Ken French's website (**Link**)

2. Download the HML-DEV (monthly) from AQR's website (**Link**)

3 Analysis:

1. Replicate Tables 1-4 in AQR's blog post. Please use the entire time series from July of 1963 to August or September of this year. Your results will slightly differ from the AQR post because you are using additional years of data for your analysis.

2. Using the 25 portfolios formed on size and book-to-market as the test assets:

   (a) Examine the ability of the the Fama and French Five Factors to explain returns on the test assets.

      i. Calculate the five-factor alpha for each of the test assets and report the alphas and the t-statistics

ii. Test if the alphas are jointly equal to zero using the GRS test.

(b) Examine the ability of the AQR six-factor model (Add the momentum factor and replace the Fama-French HML factor with the AQR HML-DEV factor) to explain returns on the test assets.

i. Calculate the six-factor alpha for each of the test assets and report the alphas and the t-statistics

ii. Test if the alphas are jointly equal to zero using the GRS test.

3. Repeat all of 3.2 using the 10 industry portfolios as the test assets