HW 1
FINM 35900: Macro-Finance
Due start of class, date of canvas deadline

For each italicized subsection you should both answer the questions in written form, including figures as needed, **AND generate 3 slides you can use to present your results in class.** You should submit on canvas:

- One PDF with your slides (no .pptx files)
- One PDF with your write-up (no .docx files)
- One Notebook/Python script with your code (.ipynb/.py/.r).
- (Optionally) a data preview of less than 5MB in size.

Macro asset returns

1. Compute annualized geometric mean total returns for measures of US and European 10-year government bonds[1], public equity and high yield credit since 2000, and a measure of global commodities over the same period. Focus on cash instruments, where possible.[2]
    a. *Non-required extension, if desired: Do the same for Japanese assets.*
2. Compute the annualized volatility of all 7 returns.[3] What things do you notice?
3. Decompose the US equity and bond returns in (1) into carry (i.e. income) returns and price (i.e. capital) returns.[4] You are not required to do this for HY credit. Why do you think I am not asking you to do this?
4. Compute the volatility of both income and capital returns for US equity and bonds. What things do you notice?

Asset allocation v. security selection

5. Assuming you generally invest in non-trivial portfolios (i.e. you have various investments in each investment portfolio), if you can be right at *either* asset allocation across asset classes *or* security selection within asset classes, *but not both*, which do you think is better to be correct in, and over what horizon? Justify your answer quantitatively.
6. What does that mean for a CIO deciding if he/she should be investing more resources in the asset allocation or security selection parts of his/her fund?

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[1] The risk free government bond in Europe is considered either the German one or 75% German and 25% UK depending on the comparable equity index you are using. To keep it simple, use the German 10y Bund here for the European government bond.
[2] I realize this is difficult for commodities given their indices are generally constructed with futures. Given these are usually how they are traded by macro investors, focus on the futures for commodities only.
[3] For your volatility calculations you may use anything from daily to monthly return frequency, but no coarser.
[4] Unless you have done this before in other courses, this could be challenging for government bonds. Consider using the Taylor approximation that has duration and convexity as a way to compute price returns. Another useful way to think about this will be to realize that the quoted 10-year yield at any given time is the yield on a bond priced at par, so will also be the coupon rate on the bond.

Mini-project question

Investing in HY credit

7. Based on your answer to questions (1) - (2), you should have determined that US HY credit appears, at least based on returns and volatility, like a desirable asset to hold. I would like you to assess if this is really true for a typical macro investor. Why or why not? Justify your answer quantitatively. Things you should probably consider are:
    a. What is the right measure of risk for this asset? Is this risk priced by the market and if yes, how?
    b. How is owning HY credit similar or different from dynamically managing a portfolio of government bonds and equity?
    c. How time-varying are your answers to (a) and (b) above?
    d. Are there practical investment constraints that may be relevant for some funds and could reduce their ability to invest in certain asset classes in ways that might be “optimal”? (e.g., leverage constraints, etc.)
    e. How does being long HY credit compare with risk premium harvesting strategies more generally?
    f. What are the implications of (d) and (e) for investor behavior as it pertains to HY credit?