**Comparing CAPM and Fama/French 3-Factor Expected Returns**

Instructions for Students

Background Information

We know that a stock’s expected return must be calculated by some asset pricing model. The two models that we are studying in detail in this course are the Capital Asset Pricing Model (CAPM) and the Fama/French 3-Factor Pricing Model (FF3). As we learned in class, these pricing models are as follows:

CAPM: E(R) = Rf + β(RM-Rf)

FF3 : E(R) = Rf + β1(RM-Rf) + β2(SMB) + β3(HML)

The CAPM is a one-factor model while FF3 is a three-factor model (with the first factor being the same factor as is in the CAPM). For each model, Rf is the current risk-free rate. Each factor risk premium (RM-Rf, SMB, and HML) is the additional return an investor requires for taking on that risk when the beta for that factor is one and the other factor betas are zero. Each of the beta coefficients measures the sensitivity of the stock to that particular risk-factor.

The factor risk premiums cannot be known with certainty and in-fact probably change over time. Different analysts and researchers will assume different values for them, but they are often estimated as being the average realized risk premiums over a long period of time in the past. We will do that here with the data we have from July 1926 to the present.

Factor betas are also not constant over time. We are looking for the sensitivity of the stock’s excess returns to these factors *in the future*; we can only forecast these betas based on what they have been in the past. For this exercise, we will examine the most recent five years of monthly data that is available to us as well as the most recent two years of weekly data. Though there is no guarantee that a stock’s sensitivity to a factor in the future will be what it has been over the past 60 months or the past 100 weeks, these are the most commonly used estimates.

This exercise uses two spreadsheets with imbedded macros to obtain data on our factors and the risk-free rate from Ken French’s data library, and stock-specific data from Yahoo! Finance. When it is finished, it will calculate four different values for the required expected return for a stock. Two values will come from the Capital Asset Pricing Model (one using weekly data and one using monthly data) and two values will come from the Fama/French 3-Factor Pricing model (one using weekly data and one using monthly data). Which of the four (or combination of them) should an analyst use? That is for the student to decide.

Specific Instructions

It is critically important that you follow these instructions exactly as given and in the order given. Failure to do so will likely cause the spreadsheet to crash. If that happens to you, simply close out the spreadsheet(s) and begin again according to these instructions.

1. Go to the website for this exercise: <https://breesefine7110.tulane.edu/comparing-capm-and-famafrench-3-factor-expected-returns/> on a PC that allows macros and has the Analysis Tool Pack loaded into Excel.
2. Click on the link labeled “Step 1”. When prompted to do so, open the Excel file. A spreadsheet will open with a blue button in cell A1.
3. On the website, click on the link labeled “Step 2”. When prompted to do so, open the zip file.
4. A folder will open with a single application file in it (Weekly and Monthly Fama French Data). Double click on the file to open it. A security warning will likely appear. If it does, select “Run”.
5. An Excel spreadsheet will open up and begin filling up with the Fama/French data. This will take between one and two minutes. Wait until it is finished.
6. There will be two worksheets on this spreadsheet with data. One is titled “Weekly” and the other is titled “Monthly”.
7. Copy the weekly Fama/French data to your clipboard (but not the headings in row 1). The easiest way to do this is to select cell A2 and then press Ctrl+Shift+End on your keyboard. This will highlight all the data. After it is highlighted, press Ctrl+C to copy it to your clipboard.
8. Go back to the first Excel spreadsheet that you opened. There are four separate worksheets. Go to the worksheet titled “FF Weekly” and select cell A2. Paste the data from your clipboard onto the spreadsheet by pressing Ctrl+V. The dates will appear in column A, the three Fama/French factors will appear in columns B-D, and the risk-free rates will appear in column E. Since these values are percentages, but not currently formatted as percentages, the spreadsheet re-formats them in columns F-I.
9. Take a moment to note that columns N-P of rows 4535 and 4536 calculate the average factor values since July 1926 and cells Q4537 and Q4538 give you the current (most recent) risk-free rate.
10. Go back to the spreadsheet with the Fama/French data. You’ve already copied the weekly data, now you will want to copy the monthly data.
11. Go to the worksheet labeled “Monthly”, select cell A2, and press Ctrl+Shift+End to select this data and then CTRL+C to copy it to your clipboard (just as you did with the weekly data).
12. Return to the other spreadsheet and go to the worksheet titled “FF Monthly”. This is the worksheet with the blue button in cell A1.
13. Select cell A2 and paste the monthly data from your clipboard to this spreadsheet by pressing Ctrl+V. Just as with the weekly data, columns A-I will all fill up with data.
14. Note that columns O-Q of rows 1042 and 1043 calculate the average factor values since July 1926 and rows 1044 and 1045 of column R gives you the current (most recent) risk-free rate based on this monthly data, just as you noted earlier with the weekly data.
15. Click on the blue button in cell A1. A window will appear asking you to enter the ticker symbol for a stock. In the space provided, enter the ticker symbol for any stock (it will also work for many bonds, mutual funds, and ETFs) for which there is five years of price data on Yahoo! Finance. After you type the ticker symbol, click “OK”.
16. Columns A-G in the worksheets titled “Stock Monthly” and “Stock Weekly” will now be filled with the data for the stock you selected which can be found on Yahoo! Finance. Column H calculates the monthly returns for that stock.
17. Beginning in cell M994 of the “FF Monthly” worksheet, you will find the summary output for a multivariate regression estimating the three Fama/French factor betas using monthly data. Beginning in cell M1017 you will find the summary output which contains the CAPM beta. Take a moment to look at this data and be sure to understand what each value means and how it was calculated.
18. Beginning in cell M4484 of the “FF Weekly” worksheet, you will find the same summary output for regressions using weekly data.
19. In the “FF Monthly” worksheet, Cell O1047 will give you the required expected return for this stock based on the CAPM using monthly data. Cell O1048 will give you the required expected return for the same stock based on FF3 (also with monthly data). Cell O1050 will give you the required expected return for this stock based on the CAPM with weekly data, and cell O1051 uses FF3 with weekly data. Take a moment to study the formulas in these cells so that you will understand how each expected return was calculated.
20. To find the expected return of another stock, simply click on the blue button in cell A1 again and enter the symbol for another stock. It will only take a second for the new values to be calculated. The new data will overwrite your data for the first stock however. You can continue this process to find the beta estimates and expected returns for as many stocks as you want.
21. If you save the spreadsheet with the regression results, be sure to save it as a “macro enabled” worksheet. Otherwise, the macros will be deleted.

Questions to Answer and Turn In

* 1. What is the name and the ticker symbol of the stock you selected?
  2. What is the estimate of the CAPM beta for your stock using monthly data?
  3. What is the estimate of the CAPM beta for your stock using weekly data?
  4. What are the estimates of the three Fama-French betas for your stock using monthly data?
  5. What are the estimates of the three Fama-French betas for your stock using weekly data?
  6. Why do you think that the estimate of the CAPM beta is not identical to the estimate of β1 for the Fama-French betas for either the monthly or weekly data?
  7. Tell me briefly, in your own words, what information the CAPM beta gives you about your stock?
  8. Do you expect the CAPM beta to be constant over time? Why or why not?
  9. Tell me briefly, in your own words, what information β2 and β3 (from the FF3 betas) give you about your stock?
  10. Based on the monthly data, would you say that your stock acts like a large-cap stock or a small-cap stock, and to what degree?
  11. Does your answer change based on weekly data?
  12. Based on monthly data, would you say that your stock acts like a value stock or a growth stock, and to what degree?
  13. Does your answer change based on weekly data?
  14. In the FF3 model (with monthly data), do investors require a higher expected return because of the market capitalization of your stock, or will they accept a lower expected return? Why?
  15. In the FF3 model (with monthly data), do investors require a higher expected return because of the book-to-market ratio of your stock, or will they accept a lower expected return? Why?
  16. Would you say that there is a substantial difference among the four expected returns that these models calculated? If so, why?
  17. What would you use as the required expected return for this stock (the value used to discount expected future cash flows to stockholders) if it was your job to come up with a value? Why? Note that you do not have to use any of the four of the values that your spreadsheet came up with.