Lab Section 05

Please log in the class website and download the spreadsheet called

Lab 05 Data

The spreadsheet contains monthly return data from December 1996 to December 2021 for:

- The SP500
- A one month T-bill
- 165 stocks from the SP500. These are less than 500 stocks: we included only stocks who have been continuously part of the SP 500 for the entire time period. Some stocks were not part of the SP500 early in the period (for example Google entered the SP500 in 2006), and other stocks left during the period.

Calculate the beta of one stock

Choose a stock ticker you like in the table and focus on the five year time period December 1996 to November 2001. What is the company corresponding to the particular stock ticker you chose?

Create a scatter plot with the SP500 **excess return** on the x-axis, and the **excess return** on the stock you pick on the y-axis. Using the function LINEST that we discussed in class, calculate the slope and the intercept of the regression line.

What is a confidence interval for the beta of the stock? What is a confidence interval for the intercept of the regression line? According to CAPM, what fraction of the stock variance constitutes systematic risk, and what fraction constitutes idiosyncratic risk?

Calculate the beta of all stocks

Now use a spreadsheet with all stocks, and focus on the same time period as above (December 1996 to November 2001). Using the excel function SLOPE, calculate the beta of all stocks.

Note: when you use the function SLOPE, you do not need to create an additional column with excess returns on the stock and on the SP500. You can directly subtract the returns inside the SLOPE function. That is you can write:

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SLOPE(G2:G61-$F$2:$F$61,$C$2:$C$61-$F$2:$F$61)
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where, in the above formula:

- G2:G61 is the column of stock return
- F2:F61 is the column of risk free rate
- C2:C61 is the column of SP500 return

Create a frequency table of the betas. What is the average beta? What is the variance of beta? Is there any stock with negative beta? What is the beta of the SP500?

Calculate the actual expected excess return of each stock. Calculate the expected excess return of each stock, as predicted by CAPM. According to CAPM, what should be the relationship between these two returns?

What is the actual expected excess return for the SP500? What is the expected excess return for the SP500 predicted by CAPM? What about for the return on 1 month Treasury bill? Explain your finding.

Now create a scatter plot with beta on the x-axis, and average excess returns on the y-axis. Are larger beta generally associated with a higher average excess returns?

Now do a regression of average excess return on beta. According to CAPM, what should be the slope of this regression? What is the R2 of the regression? What fraction of the variance of average excess return can be explained by beta?

Now redo the same analysis for the 2002-2006, 2007-2011, 2011-2016, and 2017-2021 periods (note: for this you only have to copy different data in the same spreadsheet). How do your results change? Do betas appear to explain excess return? Do betas appear to be stable from one period to the next?