FINC460: Homework 4

1   CAPM and portfolio selection

1. Open the HW4Data.xls spreadsheet. It contains historical monthly returns for several stocks (DELL, EXXON, GM, IBM, TARGET, SONY and CITIGROUP), along with returns on the market portfolio and the riskfree rate.

2. Compute average returns, standard deviations and correlations for the seven securities. Feed them into the Portfolio optimizer and compute the weights to the optimal portfolio.

3. Consider the regression model,

$$R_{i,t} - r_{f,t} = a + b(R_{M,t} - r_{f,t}) + \epsilon_{i,t} \tag{1}$$

   where R_i is the return on each security and R_M is the risk-free rate.

   - Report the estimated coefficients a and b, along with their standard errors and 95% confidence intervals.
   - Report the R^2 for each stock; What is the relation between R^2 and the amount of idiosyncratic risk in each security?

4. Now, let's assume that a single factor model describes returns. This is a statistical model that assumes that for each security i, $cov(\epsilon_{i,t}, \epsilon_{j,t}) = 0$ for $i \neq j$. Under this assumption compute the correlation matrix again and repeat Step 2 above. Why are the two correlation matrices different? When would you use one versus the other?

5. Now let's go back to the original correlation matrix computed in step 1, but let's assume that the CAPM holds exactly. How does your optimal portfolio look now?

6. From your analysis so far, you see that Dell has had higher expected returns that those implied by the CAPM. Suppose that you believe that this is likely to be the case in the future as well. You believe that Dell will have higher returns than those implied by the CAPM by 1%. For the remaining stocks, you believe that going forward, the CAPM will hold. Recompute the optimal portfolio weights given your view.

   The Black-Litterman model that we saw in class is a more sophisticated version of this exercise. It allows you to express your view that Dell will have higher returns going forward as well as your degree of confidence.