

MTH 4600 Homework 2, Due 3/21/2017

- Please submit your homework in typewritten form, one submission per group.

1. The file `AllData.txt` contains the monthly returns of the 30 DJI stocks on a monthly basis for the five years 2012 – 2016. It also includes returns for the S&P 500 for the same time period. The one-month yield on T-bills was almost 0 over that period. Take the 1-month risk-free rate r_f to be 0.15 percent. The CAPM says that $r_t - r_f = \beta(m_t - r_f) + \epsilon_t$, where r_t is the month- t return of any one of the 30 DJIs, β is that stock's beta, m_t is the month- t market return (use the S&P 500).

- (a) Use OLS regression to estimate α and β for each stock with the model

$$r_t - r_f = \alpha + \beta(m_t - r_f) + \epsilon_t.$$

Under CAPM, we should have $\alpha = 0$ for each stock. Test this hypothesis for each stock at the 5% significance level. Stocks with $\alpha > 0$ ($\alpha < 0$) are said to over (under) perform the market. Identify which stocks over and under perform.

- (b) Using your favorite on-line source, report the betas for the 30 DJIs and compare to your results.

2. (a) For stock i , $1 \leq i \leq 30$, let μ_i be its expected return and β_i its beta. Let μ_m be the market's expected return. Then CAPM says that $\mu_i = r_f + \beta_i(\mu_m - r_f)$. Using the sample mean of the m_t , $1 \leq t \leq 60$, as an estimate of μ_m , compute estimates of each μ_i . Using these means and the sample covariance matrix for the 30 DJIs (as computed for Homework 1):

- (b) Re-do part (b) from Homework 1: Assuming the DJIs are the universe of available assets, what are the weights of the market portfolio?

- (c) Compare your portfolio compositions to those in Homework 1, where the sample means of the returns of the individual stocks were used for the μ_i .