

# FNCE 385/885 Assignment 3: Applying Lasso Regression for Trading

Due: Monday, Dec 12, 2016, at 3:30pm

In this assignment you will run a Lasso regressions and compare them with OLS linear regressions when it comes to the development of a quantitative trading strategy.

We need to work with R package *glmnet*.

## Part 1: An OLS regression

Start with data set *Data\_Daily\_1970.csv*. This file contains daily excess return of the US equity market, together with Fama-French 49 industry portfolios.

Run the following regression:

$$rx_{m,t} = \beta_0 + \sum_{i=1}^{49} rx_{i,t-1} + \varepsilon_t,$$

where  $rx_{m,t}$  is the excess return of US equity market in day  $t$ , and  $rx_{i,t-1}$  is that of the  $i$ th Fama-French industry portfolio in day  $t - 1$ . As a result, you are essentially running a *predictive* regression using lagged Fama-French portfolio returns.

Report the  $R^2$  and the over-all fitting  $p$ -value. Does it appear that the lagged portfolio returns can predict the excess return of US equity market?

## Part 2: A Lasso regression

Repeat the practice in Part 1. However, this time you should run a *Lasso* regression. You can check the session notes 3 for help.

After running the regression, plot the histogram of *regression coefficients* for both the OLS regression and Lasso regression. What can you see in terms of the distribution of the regression coefficients?

## Part 3: an Out-of-sample trading experiment

Now we will use the regression coefficients to predict returns out-of-sample and evaluate the trading strategy's performance. Specifically, you should work with the data set *Data\_Daily\_1971.csv*.

1. With the OLS regression coefficients, *predict* the daily returns in 1971 using lag data. Then construct the portfolio using the simple strategy: long the US equity market if the predicted return is positive, or short if not. Calculate the gross excess return of your portfolio, as well as the Sharpe Ratio using daily returns.

*To be specific, the gross excess return of  $T$  periods is calculated using  $\prod_{i=1}^T (1 + r_t)$ , where  $r_t$  is the excess return in period  $t$ . The Sharpe Ratio is calculated using  $\frac{\bar{r}}{\sigma_r}$ , where  $\bar{r}$  and  $\sigma_r$  are sample mean and standard deviation of daily excess returns, respectively.*

2. With the Lasso regression coefficients, repeat the practice above. What do you see in terms of the performances between the two strategies? Plot the history of gross excess return during 1971 for both strategies, together with that of holding US equity market portfolio in the same figure.