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Mgt 264b
Regression Analysis with Applications to Marketing and Finance

Problem Set #8

This problem set is designed to reinforce material covered in Chapter VII.

1. Back to the Detergent dataset

   a. Refit a regression model for the detergent dataset of

   log(Q(128 oz) Tide) on log(Price (128 oz Tide)) and log(Price (64 oz Tide))

   Also, fit a regression model for

   log(Q(64oz Tide)) on log(Price (128oz Tide)) + log(Price(64oz Tide))

   Fit the model only on non-promoted weeks (see chapter VII for details).

   b. If P&G were to cut the price of 128oz Tide by 10 per cent and hold the price of 64 oz Tide constant, by what per cent would the sales of 128oz increase?

   c. For the same change in price in part b), compute the effect on the sales of 64 oz Tide. By what per cent would these sales change?

   Hints:

   $$\log\left(S_{128}\right) = b_0 + b_1 \log\left(P_{128}\right) + b_2 \log\left(P_{64}\right)$$

   $$P_{new,128} = .9P_{old,128}$$

   $$P_{new,64} = P_{old,64}$$

   $$\log\left(S_{new,128}\right) - \log\left(S_{old,128}\right) = ???$$

2. Back to the Equity Premium

Fit the final model in chapter VII (the "restricted" model) only to the period from 1927 to 1989.

Use the coefficients from this model to compute the Mean Squared Error (average squared prediction error) for the period 1/1990 to 12/2009. That is, use the fitted coefficients from the earlier period but use the lagged values for independent variables from the actual data.

Compute the Mean Squared Error for a simple rule of using the average value of the Equity Premium from the 1927 to 1989 period as the predictor of the equity premium in the period 1/1990 to 12/2009.

Compare the MSE from the model with the "simple" rule MSE. What does this suggest to you have the ability of these models to predict the equity premium?

Hints:

You will need to create one dataframe with the variables you need to fit the model and another dataframe to use to predict "out-of-sample."

For example, suppose we are going to regress y on back(x) and then use this model to predict out of sample.

```
total_sample=data.frame(yyyymm,y,back(x))
estimation_sample=total_sample[yyyymm<200001,]
prediction_sample=total_sample[yyyymm>=200001,]
lmfit(y~back(x),data=estimation_sample)
predicted_y=predict(lmfit,data=prediction_sample)
MSE=???
```