

Econ 220B, Winter 2009
James Hamilton

Problem Set 4
Due Wednesday, February 18

This problem set asks you to replicate and extend the analysis by Hayashi and Fama of the joint hypothesis of efficient markets and constant ex ante real interest rates. You can download the data set from

<http://fhayashi.fc2web.com/hayashi%20econometrics/ch2/MISHKIN.ASC>

This text file has the following monthly data from February 1950 to December 1990:

Column 1: year

Column 2: month

Column 3: one-month inflation rate (at annual rate)

Column 4: three-month inflation rate (at annual rate)

Column 5: one-month T-bill rate (at annual rate), as of beginning of month t

Column 6: three-month T-bill rate (in percent, annual rate), as of beginning of month t

Column 7: CPI for urban consumers, all items (the 1982-1984 average is set to 100), as reported for month t and assumed to be known at the end of month t .

For this exercise we will only use columns 5 and 7. You can analyze this data set using any package you like. You should hand in a copy of your computer output along with a brief write-up of your calculations and answers to the following specific questions.

1.) Calculate the ex post inflation rate for month t using the raw CPI data as $\text{inf} = (((\text{cpi}(t)/\text{cpi}(t-1))^{\wedge}12) - 1)*100$. Which dates of CPI must be matched up with the t-bill rates for a correct investigation of this hypothesis? Try to replicate the estimate of (2.11.9) in Hayashi's text. Estimate the equation both with the usual standard errors and with White standard errors. Use the White standard errors to calculate p -values for tests of the following null hypotheses, and indicate in each case whether you accept or reject the hypothesis:

a) $\beta_1 = 0$

b) $\beta_2 = 1$

c) the joint hypothesis that $\beta_1 = 0$ and $\beta_2 = 1$.

2.) Extend the set of fitted OLS residuals so that pre-sample values are set to zero. Perform the TR^2 test for omitted second-order serial correlation. Does this lead you to conclude that the errors are serially correlated? Does this lead you to think that your tests of the efficient markets/ constant real interest rate hypothesis are invalid? Hint: be sure to think about what this hypothesis really means before answering.

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3.) Perform the TR^2 test for omitted second-order ARCH effects and the TR^2 form of White's test for omitted general heteroskedasticity. Does this lead you to conclude that the errors are homoskedastic? Does this lead you to think that your tests of the efficient markets/ constant real interest rate hypothesis are invalid? Again please reflect on the hint in question (2) before answering.