

EC 821  
Time Series Econometrics  
Spring 2003  
Prof. Baum

Problem Set 1  
Due at classtime, 17 Feb 2003

Perform these exercises using Stata 7.0 or 8.0. You may use either version of Stata on any computer with Internet access (Mac, Windows, Unix, Linux). If you are interested in acquiring your own copy of Stata 8, please see

<http://www.stata.com/info/order/new/edu/gradplans/gp3-order.html>

1. Using the Mishkin data ("Is the Fisher Effect for real?", J. Monetary Econ., 30, 195-215, 1992) accessible via

use <http://fmwww.bc.edu/ec-p/data/hayashi/mishkin92.dta>

Calculate inflation from the CPI-U as

$$\pi_{t+1} = 100 \left( \left( \frac{CPIU_t}{CPIU_{t-1}} \right)^{12} - 1 \right)$$

and the ex post real interest rate (EPRR) as the one-month T bill rate minus your computed measure of inflation (due to timing of the measurements,  $Tbill1mo_t$  should be aligned with  $\pi_{t+1}$ ). The efficient markets hypothesis (EMH) suggests that the inflation forecast error is a martingale difference sequence with respect to the information set. As an implication of this property, the EPRR should have a constant mean and should be serially uncorrelated.

Calculate the first twelve autocorrelations of the series over Fama's sample, 1953m1–1971m7 (hint: `help ac`, and consider function `tin()`) and using the asymptotic approximation to the standard error of an empirical autocorrelation,  $s = 1/\sqrt{T}$ , calculate the standard error of these autocorrelations and the associated  $z$ -scores. Are they significantly different from zero? Does this cast doubt on the EMH?

2. Under the EMH, we may calculate the optimal predictor of inflation as the forecast from a regression of  $\pi_{t+1}$  on  $R_t$ , the one-month T bill rate. Test the hypothesis that the slope coefficient in this regression is unity over the 1953m1–1971m7 sample, as implied by the EMH, using both OLS and robust (White) standard errors. Is this implication of the EMH supported by the data? Conduct

the Breusch–Godfrey test for serial correlation on the residuals of this model (hint: `findit bgtest`). Is the hypothesis of no serial correlation warranted?

3. Rerun this regression over the same sample period allowing for ARMA(1,1) errors (hint: `help arima`). Does this affect your inference on the slope coefficient? Rerun the regression, both via OLS and allowing for ARMA(1,1) and ARMA(2,1) errors, over the full sample. Does the modelling of the error process affect your inference about the slope coefficient? Explain.