

**Homework 7. Due Monday March 26.**

1. (10% of Macro II midterm 1, 2015)

a) Let

$$x_t = \alpha_0 + 5 * u_t + u_{t-1} ,$$

where  $u_t$  is white noise.

Find the autocovariances for  $x_t$  in terms of  $\sigma_u^2$  (the variance of  $u_t$ ).

b) Given the stationary AR(1) process

$$x_t = 3 + .5 * x_{t-1} + u_t$$

where  $E u_t^2 = 3$ . Find the variance of  $x_t$ , and the first 3 autocovariances and autocorrelations.

2. For the AR(1) process:

$$e_t = a e_{t-1} + u_t ,$$

for  $t = 1, 2, 3$  and  $a = .6$ .

a) Find the variance matrix  $\Omega = \text{var}(e)$ .

b) Find  $\Omega^{-1/2}$  using the Prais-Winsten transformation.

c) Verify by matrix multiplication that  $\Omega^{-1/2} \Omega \Omega^{-1/2'} = I$ .

3. Computer question (continuation of previous homeworks). In Matlab, regress real per capita U.S. data consumption growth on income growth and the interest rate using the posted dataset. (This is the what you did in homework 1.)

a) Calculate the residuals  $e$ . Regress  $e_t$  on  $e_{t-1}$ ? Is there evidence of autocorrelation (Use t-tests.)

b) Assume you concluded that there is autocorrelation in the residuals (so don't condition on part a). Perform 2-stage GLS using the Prais-Winsten transformation.

c) Do the approximate feasible GLS estimation using the Cochrane-Orcutt transformation. Are you results sensitive to whether you do Prais-Winsten or Cochrane-Orcutt?