Economics 8185
Advanced Topics in Macroeconomics–Computation
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Homework 3.

Choose 1, 2, or 3.

1. Assume the process for x_t is governed by

   a. AR(1): $x_t = \rho x_{t-1} + \epsilon_t$

   b. AR(2): $x_t = \rho_1 x_{t-1} + \rho_2 x_{t-2} + \epsilon_t$

   c. MA(1): $x_t = \epsilon_t + \rho \epsilon_{t-1}$

   d. Random walk: $x_t = \mu_t + \epsilon_t, \quad \mu_t = \mu_{t-1} + \eta_t$

   In all cases, set up a state space system (with x observed and μ, ϵ, η unobserved), apply the Kalman filter, and estimate the coefficients and shock variances (which you can assume are normal) via maximum likelihood. Show that your code finds the correct answer.

2. Choose parameters for the model of HW1. Simulate time series samples—T periods in length—for consumption, investment, output, and hours. Treat these as data for estimating the capital share and parameters governing the TFP shock.

3. Choose parameters for the model of HW2. Simulate time series samples—T periods in length—for consumption, investment, output, hours, and tax rates. Treat these as data for estimating the capital share and parameters governing the shocks.