

Problem Set 3

Economics G6222

Advanced Macroeconomic Analysis II: Economic Fluctuations

Due October 7, 2008

1. Introduce government spending into the KPR economy analyzed in part 1 of homework 2. In particular, assume that government purchases, G_t , are financed by lump sum taxes. Assume that government purchases share the same trend as output, that is, $g_t \equiv G_t/Z_t$ is a stationary variable, and as before $Z_{t+1} = \gamma_z Z_t$. Show the complete set of equilibrium conditions for the economy with government purchases, then show the complete set of equilibrium conditions in stationary form. Assume that the stationary variable, g_t , follows an AR(1) process of the form $\ln g_{t+1}/g = \rho_g \ln g_t/g + \epsilon_{t+1}^g$, where g denotes the steady state value of G/Z . Assume that along the balanced growth path government purchases are 20 percent of GDP, that is, impose $G/Y = 0.2$ in the nonstochastic steady state. Compute a log-linear approximation to the solution of the model by modifying the code you developed in homework 2. Plot the impulse response to a one percent innovation in government purchases of (a) output; (b) investment; (c) hours; (d) consumption, and (e) labor productivity. Calibrate the model as in homework 2. For the persistence of government purchases consider two values: $\rho_g = 0$ and $\rho_g = 0.9$. Provide an intuitive explanation of the response of the five variables shown. Discuss to which extent a shock to government purchases is able to produce comovement across the five variables considered that is similar qualitatively to the comovement observed in postwar U.S. data.
2. Now assume that it is learned in period 0 that there will be a one percent increase in government purchases in period 1. Again find the impulse response (beginning in period 0) to this shock. Provide intuition for the behaviour you find. Discuss to which extent expected changes in government purchases are or are not a promising candidate for the driving sources of business cycles.
3. Consider an impulse response to a one period anticipated productivity shock. Specifically, assume, as in homework 2, that from period 1 onwards it is expected that total factor productivity evolves according to $E_t \ln A_{t+1} = \rho_A \ln A_t$. In period 0 it is learned that A_1 will be one percent above steady state. Assume that in period 0 all state variables take their nonstochastic steady state values. Plot the impulse response of output, investment, hours, consumption, labor productivity and total factor productivity beginning in period 0. Provide an intuitive account for the impulse responses you find. Discuss why or why not anticipated changes in total factor productivity provide a plausible explanation of observed business cycle fluctuations.
4. (Optional) Suggest modifications to the standard RBC model such that the three shocks considered here will generate comovement of the type observed in U.S. data. All I am asking for is an intuitive argument. No computations needed.

(In all cases please provide the eigenvalues of the matrix h_x and numerical values (in addition to a graph) for your impulse responses.)