

Economics G6222
Advanced Macroeconomic Analysis II
Economic Fluctuations
Second Half
Final Exam
Due 08-Dec-2008 at Noon

Risk-Aversion Business Cycles

Consider a neoclassical model driven by exogenous stochastic movements in the coefficient of risk aversion: Households maximize the following lifetime utility function

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{[c_t(1-h_t)\chi]^{1-\sigma_t} - 1}{1-\sigma_t}$$

subject to

$$\begin{aligned}k_{t+1} &= (1-\delta)k_t + i_t, \\y_t &= k_t^\alpha h_t^{1-\alpha}, \\c_t + i_t &= y_t,\end{aligned}$$

with the usual notation. The exogenous variable σ_t obeys the law of motion

$$\sigma_{t+1} - \sigma = \rho(\sigma_t - \sigma) + \eta\epsilon_{t+1},$$

where ϵ_t is a white noise distributed $N(0, 1)$, and $\eta > 0$, $\sigma > 0$, and $\rho \in (0, 1)$ are parameters.

Calibrate the model by setting $\rho = 0.9$, $\sigma = 2$, $\beta = 1.04^{-1/4}$, $\alpha = 0.3$, and $\delta = 0.025$. In addition, pick the parameter χ to ensure that households allocate 20 percent of their time to work ($h = 0.2$). Set η to ensure that the unconditional standard deviation of σ_t be equal to 0.0625.

1. Report the implied values of χ and η .
2. Approximate the equilibrium dynamics of the model up to first order by performing a linearization with respect to σ_t and a log linearization with respect to all remaining variables. Display the eigenvalues of the matrix h_x (using the notation developed in class) defining the equilibrium dynamics of the state vector.
3. Produce a table displaying the implied unconditional standard deviations, correlations with output, and serial correlations of output, consumption, investment, and hours.
4. Using the attached data file (identical to the one used in assignment 5), detrend the logs of output, consumption, investment, and hours by extracting a quadratic trend. Produce a table displaying the standard deviations, correlations with output, and serial correlations of output, consumption, investment, and hours of the detrended variables.

5. Compare the empirical and theoretical second moments. Discuss the ability of the model to account for the observed business cycles. (Note: you do not need to detrend the model variables since they are originally stationary.)
6. Produce a 2x2 plot depicting the impulse responses of output, consumption, investment, and hours to a unit innovation in σ_t . Plot 20 periods.
7. Now assume that households devote 80 percent of their time to work in the steady state. In the same graph produced in the previous item, display the corresponding impulse responses under the present parameterization. Discuss your results.
8. Derive analytically a condition involving χ and the steady-state values of c_t and h_t under which the impulse responses of output, consumption, investment, and hours to an innovation in σ_t are all zero up to first order.