FINANCIAL CRISES AND DEPRESSIONS ECON 4033

PROBLEM SET #1

1. Consider an economy that has the aggregate production function

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$$

and in which feasible consumption and investment plans (C_t, I_t) satisfy

$$C_t + I_t = Y_t$$
$$K_{t+1} = (1 - \delta)K_t + I_t.$$

a) Discuss carefully how you would measure each of the variables Y_t , C_t , I_t , K_t . How would you measure A_t ? Discuss the significance of A_t .

b) Define a balanced growth path for this economy.

2. Find annual time series data on real output, real investment, employment, working age population, and — if you can — hours worked for some country. If you have sufficient data for other variables, calibrate an annual deprecation rate δ and a capital share α . Otherwise, use the values $\delta = 0.05$ and $\alpha = 0.30$ in what follows.

a) Use the data for real investment to construct a series for the capital stock following the rule

$$\begin{split} K_{t+1} &= (1 - \delta) K_t + I_t \\ K_{T_0} &= \overline{K}_{T_0} \, . \end{split}$$

where T_0 is the first year for which you have data on output and investment. Choose \overline{K}_{T_0} so that

$$K_{T_0+1} / K_{T_0} = (K_{T_0+10} / K_{T_0})^{1/10}$$
.

b) Repeat part a, but choose \overline{K}_{T_0} so that

$$K_{T_0} / Y_{T_0} = \left(\sum_{t=T_0}^{T_0+9} K_t / Y_t\right) / 10.$$

c) Compare the two series constructed in parts a and b.

d) Perform a growth accounting exercise for this economy. That is, decompose the growth and fluctuations in real GDP per working-age person into three factors, one of which depends on total factor productivity, one of which depends on the capital/output ratio, and the third of which depends on hours worked per working-age person:

$$\frac{Y_t}{N_t} = A_t^{\frac{1}{1-\alpha}} \left(\frac{K_t}{Y_t}\right)^{\frac{\alpha}{1-\alpha}} \frac{L_t}{N_t}.$$

Discuss what happens during different time periods.