FINANCIAL CRISES AND DEPRESSIONS **T. J. KEHOE**
ECON 4033 **FALL 2009**

PROBLEM SET #2

1. Consider a model with an infinitely-lived, representative consumer. The production function is $Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}$. The consumer solves the problem

$$\max \sum_{t=t_0}^{\infty} \beta^{t-t_0} [\gamma \log C_t + (1-\gamma) \log(N_t \bar{h} - L_t)]$$
$$\text{s.t. } C_t + K_{t+1} - K_t = w_t L_t + (r_t - \delta) K_t, \; t = t_0, t_0 + 1, t_0 + 2, \ldots.$$
$$K_{t_0} = \bar{K}_{t_0}.$$

The sequences of total factor productivities $A_{t_0}, A_{t_0+1}, A_{t_0+2}, \ldots$ and of working age populations $N_{t_0}, N_{t_0+1}, N_{t_0+2}, \ldots$ are exogenous.

a) Define an equilibrium of this economy.

b) Write out the first order conditions for the consumer's problem and the first order conditions for profit maximization.

c) Combine the conditions in part b so that the equilibrium conditions become a system of equations in $K_{t_0+1}, K_{t_0+2}, \ldots$ and $L_{t_0}, L_{t_0+1}, L_{t_0+2}, \ldots$ and no other endogenous variables.

2. Use the data from your answers to problems set #1 and the results from question 1 to estimate the values of the parameters β and γ.

3. Download the MATLAB programs found at

http://www.greatdepressionsbook.com.

Use this software and the Excel file with data for Finland available on the course web site to run the model for Finland and to replicate the graphs with the results. [Please note that we will hold class on Thursday, 15 October in Humphrey 50a, which is a computer classroom, to do this question. Doing this question correctly is easy, but it is essential for doing question 4.]

4. Using the MATLAB software the you downloaded for question 3, calculate the equilibrium of the model in question 1 using the data from problem set #1 and from question #2, taking the series for total factor productivity A_t as given. If you have enough data, you should calibrate the parameters β and γ for a period in which you are not very interested and then calibrate the equilibrium for a more interesting period. Briefly explain your computational methodology. Discuss your results.