EXAM

Answer one of two questions from each part

Part I.

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

$$\max \sum_{t=t_0}^{\infty} \beta^{t-t_0} [\gamma \log C_t + (1-\gamma) \log(N_t \overline{h} - L_t)]$$

s.t. $C_t + K_{t+1} - K_t = w_t L_t + (r_t - \delta) K_t$, $t = t_0, t_0 + 1, t_0 + 2, ...$
 $K_{t_0} = \overline{K}_{t_0}$.

The sequences of total factor productivities $A_{t_0}, A_{t_0+1}, A_{t_0+2}, \dots$ and of working age populations $N_{t_0}, N_{t_0+1}, N_{t_0+2}, \dots$ 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. Explain how you would use these conditions and data to calibrate the parameters β and γ .

c) Explain how you could use the conditions part b to calculate an equilibrium for this model based on data from a specific country over a specific period of time.

d) The graphs below compare the data for Mexico with the results of a model that takes the sequences $A_{t_0}, A_{t_0+1}, A_{t_0+2}, ...$ and $N_{t_0}, N_{t_0+1}, N_{t_0+2}, ...$ as exogenous and that is calibrated to Mexican data. What are the major deviations of the model's performance from the data? Explain what you learn about the Mexican economy from this exercise.



Capital-output ratio in Mexico



2. Consider a simple version of the Diamond-Dybvig model of banking. There are three periods: 0,1,2. There is a single, storable good. There are many consumers who make a total deposit, which we normalize to 1 unit, in t = 0. The technology for investing in a project is given by the diagram:



The good can be invested in a project that pays R > 1 in t = 2 for each unit in t = 0. The project can be shut down in t = 1 and the investment can be salvaged one-for-one. A project that is shut down cannot be restarted. Consumers can store the good. The consumer's utility is $v(c_1, c_2, \theta)$, where θ takes on the value 1 or 2 in t = 1

$$v(c_1, c_2, 1) = u(c_1)$$
$$v(c_1, c_2, 2) = \beta u(c_1 + c_2).$$

Here $u(c) = \frac{c^{1-\sigma}-1}{1-\sigma}$.

a) Suppose that the probability that a consumer has the liquidity shock $\theta = 1$ in t = 1 is λ , $0 < \lambda < 1$. What is the maximum expected utility for a consumer who invests on his own?

b) Suppose now that all the consumer deposit in a bank in t = 0. Liquidity shocks are independent across consumers. Now λ is the fraction of depositors who receive the liquidity

shock $\theta = 1$ in t = 1 as well as the probability that and individual consumer receives the shock. Set up and explain the bank's optimal deposit contract problem of determining c_1^1, c_1^2, c_2^2 , where the bank pays c_t^{θ} in period t to the depositor who has liquidity shock θ .

c) Show that, in the optimal deposit contract, if $R > 1/\beta > 1$ and $\sigma \ge 1$,

$$1 < c_1^1 < c_2^2 < R$$
.

Interpret this contract in terms of gross rates of returns r_t on deports withdrawn in period t.

d) Suppose now that the type of a depositor in t = 1 is not verifiable, that is, it is private information. Argue that, if other patient depositors start to run on the bank every depositor will want to run on the bank. Argue that the government, by providing deposit insurance or serving as a lender of last resort, can stop a bank run.

e) Discuss the strengths and weaknesses of this model as a model of financial panics.

Part II.

1. In their *Monetary History of the United States*, Milton Friedman and Anna Schwartz hypothesize that it was a lack of leadership in the Federal Reserve System that turned the October 1929 stock market crash into the contract phase of the U.S. Great Depression 1929–1933. Discuss, stressing the policy implications of this point of view.

2. Charles Kindleberger agues that it was a breakdown in the international financial system in the late 1920s and early 1930s that lead to the Great Depression. He also argues that a powerful international lender of last resort could have prevented, or at least lessened the impact of, the worldwide Grate Depressions of the 1930s. Discuss with reference to policy implications for the recent worldwide financial crisis.