Economics 4905
Financial Fragility and the Macroeconomy
Cornell University
Fall 2017
Practice Questions for Prelim 2
Solutions will be posted on Monday, October 30

1. Money Taxation with Two Monies

Consider an economy with a single commodity, $\ell = 1$, chocolate. There are 5 consumers, so $n = 5$. The endowments are defined as

$$\begin{aligned}\omega &= (\omega_1, \omega_2, \omega_3, \omega_4, \omega_5)\\ &= (30, 15, 24, 40, 10)\end{aligned}$$

measured in ounces of chocolate.

Consider a scenario where there are 2 monies, red dollars R and blue dollars B, with respective chocolate prices of money, $P^R \geq 0$ and $P^B \geq 0$.

In each of the following cases, solve for the equilibrium exchange rate between B and R. Do these depend on the endowments ω? Give the economic explanation for your answer.

For each of the 3 cases, solve for the set of equilibrium allocations.

a) $\tau^R = (1, 2, 3, 0, -2)$ and $\tau^B = (1, 0, -1, 0, -2)$

b) $\tau^R = (1, 1, 0, -1, -2)$ and $\tau^B = (1, 1, 1, 0, -5)$

c) $\tau^R = (1, 1, 2, 0, -4)$ and $\tau^B = (5, 0, -1, -2, -2)$

2. Inter-temporal Economics

2.1 Futures Market Economy

Consider a 1 good, 2 individuals ($h = 1, 2$), 2 periods ($t = 1, 2$) futures market economy.

$$\begin{aligned} u_h &= (x_h^1)^\alpha (x_h^2)^\beta \text{ for } h = 1, 2\\ \text{Mr 1:}\quad \omega_1 &= (100, 50) = (\omega_{11}, \omega_{12})\\ \text{Mr 2:}\quad \omega_2 &= (50, 100) = (\omega_{21}, \omega_{22})\end{aligned}$$

Set up the CP and CE for when there are (only) perfect futures markets.

Solve for the CE allocations, the CE prices, the interest factors R, and the CE interest rate r for the following cases:

(a) $\alpha = 1, \beta = 1$

(b) $\alpha = 1, \beta = 5$

(c) $\alpha = 5, \beta = 1$

Discuss the economics of your answers to parts (a), (b) and (c).

2.2 Money Market Economy

Consider a 1 good, 2 individuals, 1 inside money money market economy. The utility function and endowments of the consumers are identical as in Part (2.1).

Set up the CP and the CE in this problem. Show that the CE allocations in (2.1) are also a CE allocations in (2.2). Identify in (a), (b) and (c) which individual is a borrower and which one is a lender. Discuss the economics of your answers.

Show that there is a CE allocation in Example B that is not a CE allocation in Example A. Discuss the economics.

2.3 Comparing the Two Economies

What is the difference between the futures market and the money market? Which model is more realistic?

3. Bank Runs

Consider the Diamond-Dybvig bank run model. The probability λ of being impatient is 50%. The utility function is:

$$u(c) = 10 - \frac{1}{(0.5)\sqrt{c}}.$$

The rate of return to the asset harvested late is 400%, i.e.,

$$R = 5.$$

(a) What is the depositor's *ex-ante* expected utility W as a function of c_1, consumption in period 1, and c_2, consumption in period 2?

(b) Show that the depositor prefers consumption smoothing.

(c) Why can't she insure on the market against liquidity shocks?

Assume that her endowment is 100 and that she deposits her entire endowment in the bank.

(d) What is her utility W in autarky?

(e) What is her utility W under perfect smoothing, i.e. when $c_1 = c_2$?

(f) What is the bank's resource constraint RC? Write this down precisely. Explain this in words.

(g) What is the incentive problem? Write this down precisely and explain in words the incentive constraint IC.

(h) Find the optimal deposit contract for this bank. What is W if there is no run?

(i) Why is there a run equilibrium for this bank?

(j) Calculate the following numerical values of *ex-ante* utility W and and rank them in numerical ascending order: $W_{autarky}$, $W_{perfect\ smoothing}$, $W_{no\ run}$, W_{run}.

(k) Assume that the run probability s is 2%. Will individuals deposit in this bank? That is, will they accept this banking contract? Explain.

4. The Overlapping Generations Model

- 2 period lives
- 1 commodity per period, $\ell = 1$
- Stationary environment
- 1 person per generation

The utility functions are given as:

$$u_0(x_0^1) = x_0^1$$
$$u_t(x_t^t, x_t^{t+1}) = (x_t^t)^\alpha (x_t^{t+1})^\beta \text{ for } t = 1, 2, \ldots$$

The endowments are 1 unit for each person during each period she is alive:

$$\omega_0^1 = \omega_t^t = \omega_t^{t+1} = 1 \text{ for } t = 1, 2, \ldots$$

Define:

$$z^t = x_t^t - \omega_t^t$$
$$z^{t+1} = \omega_t^{t+1} - x_t^{t+1}$$

Case 1: $\alpha = 1, \beta = 10, m_0^1 = 1, m_s^t = 0$ otherwise
Case 2: $\alpha = 1, \beta = 0.2, m_0^1 = 1, m_s^t = 0$ otherwise

For each of the above cases, solve for the following:

a) The demand (x_t^t, x_t^{t+1})

b) The offer curve (OC)

c) The steady states

d) The set of equilibrium money prices, $\mathcal{P}^m$

e) The full dynamic analysis, including the stability of steady states

5. Quantity Theory of Money

What is the difference between "the quantity theory of money" and "the absence of money illusion"? Be precise. What is the importance of this for financial fragility and economic policy? Be brief.