

Homework 1

Show all your work. Please type or use a pen. Assignments written in pencil will not be regraded. Graphs should be clearly labeled. The total for the homework is 5 points. Start early. Homework is due in class on Wednesday, January 20 (or if you cannot make it to class, drop it off in the main office, Buchanan Tower 997, by the end of the class). No late homeworks are excepted.

Problem 1 (1 point)

In class we defined an indifference curve as a line connecting consumption bundles that provide same utility to an individual. In this problem you are asked to experiment with a particular utility function.

Assume the following utility function: $U(c_1, c_2) = \ln(c_1) + \ln(c_2)$. An indifference curve corresponds to a curve on (c_1, c_2) diagram for a given level of utility $U(c_1, c_2)$. For example, the indifference curve from Lecture 2 corresponds to utility level of $2\ln(1.5)$, so that the line is given by equation $\ln(c_1) + \ln(c_2) = 2\ln(1.5)$.

(a) For the utility above, pick three different utility levels (three numbers) and draw three corresponding indifference curves. Draw an arrow showing the direction of preference.

(b) Rank the following consumption bundles in terms of utility derived from them. (HINT: you do not need a computer to be able to do this exercise, just use the three properties of indifference curves that we learned in class: two points on the same indifference curve are equally preferred, more consumption is better, and more balanced consumption is better):

$(c_1, c_2) = (2,1); (6,4); (1,0); (5,5); (1,1.5); (1.5, 8.5); (1.5, 1.5)$

Problem 2 (2 points)

Consider a 2-period OLG economy with constant population $N=100$ and endowments of 2 units of consumption good for young and 0 units for old. Assume that initial old are endowed with $M=3$ dollars of fiat money. For all questions, consider only stationary consumption allocation: $c_{1,t}=c_1$ and $c_{2,t}=c_2$ in all periods t .

- Draw a resource constraint. What is the set of feasible allocations?
- Assume preferences are given by the utility function from Problem 1. Find the optimal allocation on the diagram. (You should be able to find specific bundle, but it is not required).
- Describe trades that are being made. Write down budget constraints for young and old for a given price. Derive the lifetime budget constraint.
- Write down money market clearing condition (total money supply equals total money demand) and derive the rate of growth of prices (which is the inverse of the real return on money).

- (e) Plug prices into budget constraint and draw it on a diagram.
- (f) For preferences from Problem 1 what is the equilibrium stationary allocation? (Point on the diagram will do).
- (g) Is this equilibrium allocation optimal? Explain.
- (h) Define money velocity as total endowment in dollars divided by total money supply. Quantity theory of money predicts that velocity is constant – does that prediction hold in this economy?

Problem 3 (2 points)

How would your answers in Problem 2 (a)-(h) change if you make the following alternative assumptions? If there is no change, you do not have to explain.

- (a) Initial endowment is $M=6$ dollars.
- (b) Population is growing at a rate of 10% per period. Total money supply is constant at 300 dollars.
- (c) Money supply is growing at a rate of 20% per period (for example, in every period central bank gives current old extra amount of cash so that total cash in the economy is growing at 20%).
I decided that you do not need to solve 3(c) for this homework
- (d) It is known that in period 35 central bank gives the old an infinite amount of money.