

Homework #3

(Due: Wed., June 16)

1. Study Guide (SG) :

Chap 7 : Multiple Choice: 5-15, 17
Short Answer Problems: 2-5, 7

2. The Neoclassical Model of Flexible Prices (one more practice)

Note: Please follow the example I gave you in class and the solution to Extra Credit Quiz #4. The answer for part (4) is provided for you to check your calculation but you need to write down the process of getting this answer!

Model Setting:

- (1) Suppose an economy consists of 20 identical households and 15 identical firms.
- (2) Each firm has the following production technology: $y_s = l_s^{1/4}$, which means the firms use only labor to produce the only good in the economy (bread, for example), taking technology and capital levels as given. The output (bread) is measured in terms of certain units, and you can think of this unit to be loafs (for bread) or pounds.
- (3) Each household wants to maximize its utility which depends on the amount of bread (output) it wants to consume or demand, y_D , and the number of leisure hours it enjoys, $24 - l_s$ (where l_s denotes the labor supply for a single household or the amount of working hours it chooses, and we assume each household consists of one person who only has 24 hours a day). The utility function is:
$$U = y_D^{1/3} (24 - l_s)^{2/3}.$$
- (4) Let p be the price level in the market for goods and services (how much one has to pay for one unit of output/bread).
- (5) Let w be the money wage rate in the labor market (how much one gets for working one hour).
- (6) For simplicity we assume all profits are retained by firms and not redistributed to households.

Questions:

1. Please write down the household's optimization problem. (Hint: write down both the utility maximization equation and the budget constraint in the form I gave you in class.)
2. Please write down the firm's optimization problem. (Hint: Write down just one profit maximization equation and plug in the individual production function.)
3. Denote the optimal level of labor supply for an individual household as l_s^* and optimal labor demand for an individual firm as l_D^* (both are functions of real wage rate). Denote the optimal level of bread demand for an individual household as y_D^* and optimal bread/output supply from an individual firm as y_s^* (both are functions of real wage rate). Denote the profit of individual firm at optimal level of production as π^* .
Write down the general forms of two market clearing equations. (Hint: don't forget the number of households or firms in the economy!)
4. Now suppose that price and money wages are fully flexible. If we have (take as given):

$$l_s^* = 8$$

$$l_D^* = \left(\frac{p}{4w}\right)^{4/3}$$

$$y_s^* = \left(\frac{p}{4w}\right)^{1/3}$$

$$y_D^* = 8 \frac{w}{p}$$

Please solve out the equilibrium real wage rate (w^* / p^*) by using the equilibrium conditions you derive in part (3). (Hint: treat $\frac{w}{p}$ as one variable, say, x , to solve for it.) Note: you may leave the fraction of power unsolved, such as $10^{-1/4}$, $\frac{24^{-2/5}}{7}$, etc.

(Correct answer: $w^* / p^* = \frac{1}{4(\frac{160}{15})^{3/4}} = \frac{1}{4(\frac{32}{3})^{3/4}} = \frac{1}{4}(\frac{3}{32})^{3/4}$, **just for your reference**)