

Problem set 1

Instruction:

- 1) Write down names and ID clearly.
- 2) Due on Feb 15th 2016 (at the BE office, before 15:00)
- 3) No late homework will be accepted.

1. **Chapter 4 from Williamson:** #2 , #4, #6, #7, #10, #12, #15, #16 (If you don't have a copy of this book, see the e-copy of the book chapter posted in BE Moodle; under folder name "note on general equilibrium macroeconomics.")
2. Suppose that labor supply is strictly increasing; no part of the supply curve has backward bending property. An increase in the pay-roll tax would always cause an increase in the equilibrium real wage and a decrease in the total labor employment. Is the statement "TRUE", "FALSE" or "UNCERTAIN"?
3. (Hard) Suppose that there is a progressive tax on labor income. We model this by supposing that labor income wN below a threshold " M^* " then the household faces a tax rate τ , but if $wN > M^*$ the tax rate increases to $\tau' > \tau$ for that portion of income above the threshold.

(Hint: For simplicity, we will assume that the price of consumption goods is normalized to one, i.e. $p = 1$. This assumption can be made without the loss of generality.)

- a. Suppose a worker has unearned income π , has standard preferences over consumption and leisure, and faces this tax schedule.
 - i. Characterize the worker's budget set. Properly define what it looks like for the budget set.
 - ii. Characterize the worker's optimal choice. How many possibility could there be for the outcomes of optimal choices?

- b. Suppose that preferences (MRS) differ across workers but that they all face the same taxes and wage rates, and characterize the optimal choices for different individuals. Is there likely to be a mass of workers with labor income equal to M^* ?
 - c. Now suppose that there is an increase in the top labor tax rate τ' , but τ is unchanged. What happens to the labor supply choices of different workers?
 - d. Now suppose that there is an increase in the lower labor tax rate τ , but τ' is unchanged. What happens to the labor supply choices of different workers?
4. A representative worker (household) has preferences:

$$u(C, L) = 2\sqrt{C} - a \frac{(1 - L)^{1.5}}{1.5}$$

Suppose that we normalized price of the consumption goods to 1, i.e. $p=1$. The budget constraint is: $C = w(1 - L)$, where w is wage. Assume that total time endowment is normalized to 1, and hence L is expressed in term of the fractions of total time endowment. Capital is fixed at 1, and the representative firm technology is: $Y = z\sqrt{N}$

- a. Find the household labor supply function. Is the quantity of labor supply always fixed?
- b. Find the labor demand function. Is the labor demand function downward-sloping in wage?
- c. Find expressions for the equilibrium values of the labor input and the wage.
- d. How much does the representative worker (household) consume in the equilibrium?
- e. Suppose that “ a ” increases but “ z ” is unchanged. What is the effect of this change on labor and the wage? Provide some economics intuitions.
- f. Do the same exercise in “ e ”, but now suppose instead that “ z ” decreases but “ a ” stays the same. Provide some economics intuitions.