4,212,2 Macroeconomics III

Take-Home Exercise 6

deadline: 12:00 pm (CET) on Tuesday, May 19th, 2020

SOME RULES / GUIDELINES

1. Please work individually or in groups of maximum 3 on the exercises. Only one team member has to upload the solutions, but through a preset **group** and not as an individual, using the file naming convention: lastname1_lastname2_lastname3.filetype.
2. Please upload your answers using the **"Assignments"** folder for the relevant take-home exercise on the StudyNet (Canvas) page of the exercise session in which you are registered (4,212,2.01-03).
3. **You** are responsible for verifying that you can upload files to the required folder prior to the deadline. Unfortunately **no extensions will be given.**
4. Clearly indicate the names and student numbers on all files that you submit.
5. If you upload multiple files, archive them in a zip-file and name it according to the rule in 1.

GOOD LUCK!

Exercise 6.1

In the figure below, downloaded from the U.S. Bureau of Labor Statistics, https://www.bls.gov/charts/employment-situation/civilian-unemployment-rate.htm#, you can observe the evolution of the monthly total unemployment rate over the past 20 years.

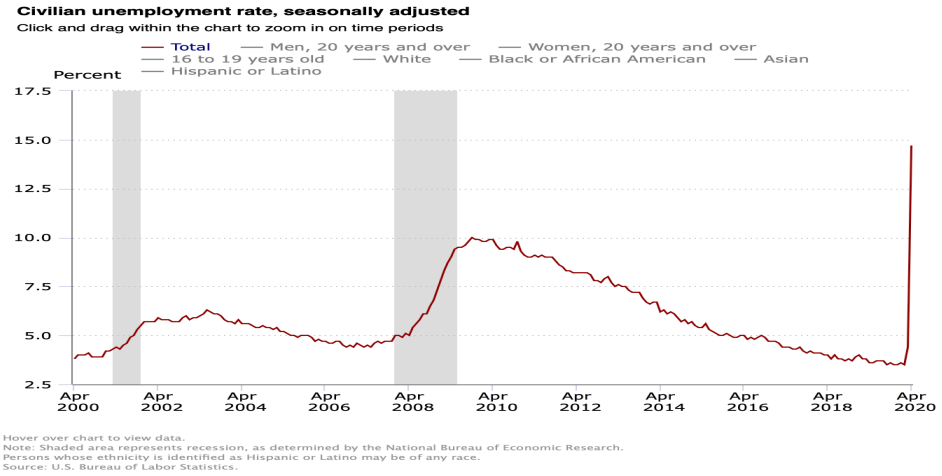
a) How is the rate of unemployment defined and measured by the U.S. Bureau of Labor Statistics? In particular, how is the number of unemployed counted? How is the labor force measured?

b) Explain in one paragraph the evolution of the unemployment rate over this period.

c) Download the unemployment rate series from https://data.bls.gov/ for the sample period 1948-2020. Plot the series. Compute the average unemployment rate over this period and briefly discuss the value.

d) (OPTIONAL) Discuss the effects of the coronavirus (COVID-19) pandemic and efforts to contain it. Make a comparison with the unemployment rate in another country of your choice. Note that you should report the data source.

e) (OPTIONAL) Do unemployment rates vary by gender, ethnicity, or educational attainment?



Exercise 6.2

Consider an efficiency wage model with one firm, as discussed in chapter 11.2 of the textbook. The firm's profits are $zR(a(w')L) - w'L$, where w' denotes the real wage paid by this firm. Furthermore, assume that the efficiency function is

$$a = (w' - v)^{\eta}, \qquad 0 \leq \eta < 1 \tag{1}$$

where v is the employees' outside option.[1]

a) Find the first-order conditions for the firm's profit maximization problem with respect to w' and L. Derive the Solow condition by combining the two conditions. Find the expression for the optimal wage as a function of v and η.

[1] The efficiency function given is for $w' \geq v$. For $w' < v, a = 0$.

b) How does the optimal wage depend on v and η? Explain the economic mechanisms.

From now on, assume that the outside option is

$$v = (1 - u)w + ucw, \qquad 0 < c < 1 \tag{2}$$

where u is the unemployment rate, c is the replacement ratio, and w is the general real wage level.

c) Using the outside option, express the optimal wage rate of the representative firm as a function of η, u, w and c. Then use the equilibrium condition $w = w'$ to derive the equilibrium rate of unemployment u^*.

d) How do the parameters η and c affect u^*? Explain the economic mechanisms.

e) Insert the expression you found for u^* into the outside option v; this gives you v^*. The plug this v^* into the efficiency function a. Assuming $\eta = 0.01$, what is the minimum the firm has to pay if it wants its workers to exert any effort?

f) (OPTIONAL) Now assume that a proportional labor income tax is introduced. The tax is levied on the workers, not on the firms. How does this impact the outside option equation? What are the effects on equilibrium unemployment u^*?

g) (OPTIONAL) How does your answer to f) change if the unemployment benefits are taxed at the same rate?