Problem Set 2: Due on November 8th, 2021

October 24, 2021

1. Read the paper "The Labor Market in the Great Recession" by Elsby, Hobijn and Şahin (2010) before you start.

2. The table shows the number of unemployed, employed and not in the labor force individuals in December 1982 and December 1985.

	December 1982	December 1985
Unemployed	11.5 million	8.1 million
Employed	99 million	108.2 million
Not in the labor force	62.1 million	62.8 million
Unemployment rate	.....	.....
Labor force participation rate	.....	.....
E/P	.....	.....

- Calculate the unemployment rate in December 1982 and December 1985.
- Calculate the labor force participation rate in December 1982 and December 1985.
- Calculate the employment-to-population ratio in December 1982 and December 1985.
- How much did the unemployment rate change from December 1982 to December 1985?
- How much did the labor force participation rate change from December 1982 to December 1985?
- How much did the employment-to-population ratio change from December 1982 to December 1985?
- What was the role of labor force participation and employment-to-population ratio in the change in the unemployment rate? Derive a decomposition to decompose the effect of these two margins.

3. Calculate the unemployment inflow and outflow rates for the U.S. economy following the steps below:

   - Download the Employment Level, Unemployment Level, the Number Unemployed For Less Than 5 weeks, Average Weeks Unemployed from the BLS website for the time period January 1996 to September 2020.

     Use Matlab or a similar software package. Note that you will have monthly data but you can not calculate the outflow and inflow rates for the last month in the sample.

   - Calculate the unemployment outflow probability using the definition below:

     $$F_t = 1 - \frac{U_{t+1} - U_{t+1}^{<5weeks}}{U_t}$$

     where F_t is the outflow probability, U_t is the number of unemployed and $U_t^{<5weeks}$ is the number of unemployed for less than 5 weeks (or 1 month).

   - Calculate

     $$f_t = -log(1 - F_t)$$

     where f_t is the outflow rate. (You are converting the outflow probability to the outflow rate by doing this.)

   - Plot the outflow rate and the average duration of unemployment together for the 1996-2020 period.

   - Calculate the unemployment inflow rate using

     $$s_t = \frac{U_{t+1}^{<5weeks}}{E_t(1 - f_t/2)}$$

     where s_t is the inflow rate, E_t is the number of employed and f_t is the outflow rate that you calculated above. Plot the time series for s_t for the 1996-2020 period. Note that this is a simple way of capturing the fact that an unemployed person has on average half a month to find a job.

   - Calculate the unemployment inflow rate using the actual evolution of the unemployment over time, by solving for s_t directly.

   - Calculate the steady-state unemployment rate for the 2000-2020 period using

     $$u_t^* = \frac{s_t}{s_t + f_t}$$

     using two measures of the inflow rates. Note that u_t^* changes every month since inflow and outflow rates change.

- Now assume that s_t is fixed at its mean value for the sample and f_t varies over time. Calculate the counterfactual unemployment rate for the 1996-2020 period.
- Now assume that f_t is fixed at its mean value for the sample and s_t varies over time. Calculate the counterfactual unemployment rate for the 1996-2020 period.
- Which margin is more important for unemployment rate fluctuations?
- Apply the decomposition in Elsby, Hobijn and Şahin (2010) to the Covid-19 recession.