Economics 442   Menzie D. Chinn
Fall 2020   Social Sciences 7418
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Problem Set 2

Due on 5:30pm CDT ~~Friday~~ <mark>Monday</mark>, October 12 by submission to Canvas. Be sure to put your name on your problem set. Put "boxes" around your answers to the algebraic questions.

1. Consider the Aggregate Demand-Aggregate Supply framework. Suppose lump sum taxes are decreased when the economy is at full employment, and the Fed does ***NOT*** target the interest rate. You can assume for simplicity expected inflation is always zero.
1.1 Show what happens in an IS-LM and AD-AS graph in the period lump sum tax decrease occurs.
1.2 Show what happens over time to output, the price level, and the interest rate.

2. Use the same AD-AS model as in Problem 1, consider what happens if many firms go out of business, thus decreasing the natural level of output (also known as potential GDP). Answer using AD-AS graphs.
2.1 Show what happens in the period in which potential GDP changes.
2.2 Show what happens over time, including the final equilibrium.
2.3 Would decreasing unemployment benefits increase or decrease potential GDP in this model? Explain your answer, perhaps using equations.

3. Since the end of 2019, the price of oil has declined from $60/barrel to $40/barrel. Consider the impact of the oil price decrease.
3.1 Show the impact in the period in which oil prices decrease, using an AD-AS diagram.
3.2 Show the impact over time, using an AD-AS diagram. Be sure to indicate the final equilibrium.
3.3 Suppose the decline in oil prices drives a decline in demand for construction in oil belt. How does that change your answer to 3.1?

4. This is an exercise to identify, download and manipulate macroeconomic data.
4.1 Download quarterly data on the level of real GDP from St. Louis Fed app FRED, https://fred.stlouisfed.org/ . The data should be measured in billions of Chained 2012$. What quarter did peak GDP occur?
4.2 Calculate what the quarter-on-quarter annualized growth rate in GDP is for 2019Q1-2020Q2. Show your work!
4.3 Are there two consecutive quarters of negative growth in the most recent quarters? If so, when are they.

4.4 Examine the data in 2001. Are there two consecutive quarters of negative growth in that year? Was there a recession in that year?

4.5 Download the Congressional Budget Office estimate of real potential GDP, measured in billions of Chained 2012$, from FRED. Use these numbers to calculate the output gap – measured as log(real GDP/real potential GDP) – for 2020Q2.

5. Consider the following data from US Treasury http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield (accessed 10/5/2020):

```
Date        1 Mo  3 Mo  6 Mo  1 Yr  2 Yr  3 Yr  5 Yr  7 Yr  10 Yr 20 Yr 30 Yr
10/01/20    0.09  0.09  0.10  0.12  0.14  0.16  0.27  0.46  0.68  1.23  1.45
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Suppose the expectations hypothesis of the term structure holds (term premium = 0). Calculate the expected one year interest rate, one year from 10/1/2020.

6. Yield curve and growth. Download data on interest rates (.xls) from http://www.ssc.wisc.edu/~mchinn/treasyields.xls . GS10 is ten year Treasury yields, TB3MS is 3 month Treasury yields.

6.1 Calculate the year-on-year growth rate of real GDP as $\log\left(\frac{Y_t}{Y_{t-4}}\right)$, and regress on the interest rate spread *lagged one year*, for 1967Q1 to 2020Q2. Report the regression results.

6.2 Interpret what an increase of 1 percentage point in the spread means for the growth rate, *in words*.

6.3 Report what the predicted year-on-year growth rate for 2021Q3 is. Show your work!