ECON 5350 Final Exam – Fall 2020

The Taylor rule for monetary policy describes how central bank authorities set interest rates in response to output and inflation. A simple Taylor rule is

$$r_t = \beta_1 + \beta_2 y_t + \beta_3 \pi_t + \epsilon_t \tag{1}$$

where r_t is the interest rate, y_t is the output gap (i.e., deviation of national income from its long-run trend), π_t is inflation, and $\epsilon_t \sim i.i.d.(0, \sigma^2)$.

1. (20 pts) Discuss the expected signs of the coefficients and describe how to do a partial regression plot of r_t against π_t.

2. (20 pts) What conditions are necessary to obtain unbiased estimates of β_2 and β_3? Show that under these conditions, the OLS estimates are unbiased.

3. (20 pts) In practice, which classical assumptions are least likely to hold for estimation of this simple Taylor rule. Explain your answers.

4. (20 pts) The Taylor principle states that interest rates need to increase more than one-for-one with inflation. Write out the steps to perform a simple t test of this hypothesis.

5. (20 pts) Write out equation (1) using matrix algebra. Then explain how to execute an unrestricted F test for the hypothesis that the monetary authorities do not respond to output or inflation when setting interest rates.

6. (20 pts) Describe how the same test can be performed by comparing the goodness-of-fit of the restricted and unrestricted models.

7. (20 pts) In 1979, Paul Volcker was appointed chairman of the U.S. Federal Reserve. His tough stance on inflation, which was nearly 10 percent at the time, was considered a structural change in U.S. monetary policy. Describe how to set up and execute a Chow test for this potential structural change.

8. (20 pts) The liquidity trap specifies that when interest rates are near zero (say 1%), the monetary authorities are less effective in stimulating the economy. Write down an econometric spline model of the Taylor rule that captures the notion of a liquidity trap. How would you use the spline model to test the liquidity trap? Explain.

9. (20 pts) Macroeconomists have proposed that monetary policy exhibits *gradualism*, such that interest rates change slowly over time in response to economic conditions. A simple way of capturing this phenomenon is to include r_{t-1} as an additional explanatory variable. What are the possible tradeoffs associated with adding r_{t-1} as an explanatory variable? Explain.

10. (20 pts) Finally, assume that $\sigma_t^2 = \sigma^2 y_t^2$. Using this fact, re-write equation (1) such that the errors satisfy all the Classical assumptions. Then describe how to calculate efficient estimates of β_2 and β_3. Discuss the tradeoffs between the efficient estimates and the OLS estimates?