Macroeconomics A
Problem Set 3

Johannes Boehm

Geneva Graduate Institute — Fall 2024

Question 1

Consider the model of the interbank market presented in the lectures. i is the interbank interest rate, i_d is the interest rate offered by the central bank on positive balances on banks' reserve accounts (deposit rate), i_b is the interest rate charged by the central bank on negative reserve balances (borrowing rate). Banks face uncertainty about the payments they must make after the interbank market has closed. The probability that a bank's required payment is less than T is denoted by $F(T)$. Optimization by banks implies the following condition:

$$(i_b - i)(1 - F(R/n)) = (i - i_d)F(R/n)$$

or equivalently:

$$F(R/n) = \frac{i_b - i}{i_b - i_d}$$

where R is the total quantity of reserves and n is the number of banks.

1. Provide an intuitive explanation of the optimality condition for banks.

2. Show how the equilibrium interbank interest rate is determined using a diagram.

3. Suppose the central bank would like to raise the market interest rate. Explain how this can be done through:

    (a) Open market operations (only R is adjusted);
    (b) Adjusting standing facility terms (only i_b and i_d are adjusted)

4. Suppose there is now a "stigma" attached to a bank being seen to make use of the central bank's borrowing facility. Show the effect on the equilibrium of the interbank market if banks treat this stigma as part of the cost of borrowing.

5. Suppose the central bank introduces reserve requirements. In particular, now only balances above a threshold Q receive the deposit interest rate i_d, and the borrowing interest rate is levied on the diffrence between Q and the bank's actual reserve balance if this is below Q Show the effect on the equilibrium of the interbank market (you do not need to derive the answer mathematically, an intuitive explanation will suffice).

6. Explain how the management of market interest rates would differ between a "channel system" (target interest rate is in the middle of the interval between i_d and i_b) and a "floor system" (target interest rate is at the bottom of the interval between i_d and i_b).

Question 2

You are hired by the International Monetary Fund, and you're being assigned on a mission to provide technical assistance to Bank al-Maghrib, the central bank of Morocco. You're being asked to estimate the impact of monetary policy on unemployment. Knowing that your boss is not fond of DSGE models, but also distrusts the results from Christiano-Eichenbaum-Evans (because they were obtained with data from high-income countries), you decide to estimate a Vector Autoregression model (with interest rates and unemployment as the endogenous variables) yourself.

1. Write down the system of equations for a first-order Vector Autoregression where the nominal interest rate and unemployment depend on each other and a lagged variable for each. Both variables are also determined by a shock, η_t^i and η_t^u, which are orthogonal to past values of i and u.

2. Explain why estimating the system with ordinary least squares would not give you consistent estimates of the coefficients.

3. Suggest an identification strategy that would allow you to estimate the coefficient parameters consistently.

4. Which data would you look for, and where can you find such data?