

**ISEG**  
**Monetary Policy**  
**Midterm exam**  
**April 11th, 2024**

**Duration: 1 hour and 20 minutes**

**The use of computers and calculators is forbidden. Use the notation employed in class in your answers. Please provide short answers to the questions in part I.**

**Part I**

(2 pts.) **1.** What is money neutrality? Is money neutral in the long run? And in the short-run?

Solution: Money is neutral if money supply only affect nominal variables and not real variables. Empirical evidence suggests that in the short run the money supply affects output and unemployment; In the long run the evidence suggests that money is neutral.

(2 pts.) **2.** Describe how the net worth (or balance-sheet) channel of the monetary transmission mechanism works.

Solution: Expansionary monetary policy  $\implies$  interest rates or return on bonds  $\downarrow \implies$  prices of bonds  $\uparrow \implies$  equities or housing more attractive relative to bonds  $\implies$  stocks or housing demand  $\uparrow \implies$  prices of stocks  $\uparrow \implies$  wealth  $\uparrow \implies$  collateral value  $\uparrow \implies$  bank loans  $\uparrow \implies I \uparrow$  and  $C \uparrow \implies Y^{ad} \uparrow$

(2 pts.) **3.** What are excess reserves? What is the opportunity cost of excess reserves?

Solution: The excess reserves are the difference between total reserves and required reserves. The opportunity cost of excess reserves is the difference between the federal funds rate and the interest rate earned on excess reserves

(2 pts.) **4.** What is the federal funds rate? How does the Fed control the federal funds rate?

Solution: The federal funds rate is the interest rate on “overnight” loans of reserves between banks. The Fed sets a target for the federal funds rate. To achieve that target the Fed forecasts the net demand for reserves in the federal funds market and determines the amount of nonborrowed reserves it must supply so that the price in this market equals the target.

**Part II**

Consider an economy which lasts for 2 periods. Suppose the representative household's lifetime utility is given by

$$U(C_1, C_2) = \log C_1 + \beta \log C_2$$

where  $0 < \beta < 1$  is the intertemporal discount factor,  $C_1$  is consumption in the first period and  $C_2$  is consumption in the second period. Let  $Y_1$  be the household's real income in the first period and  $Y_2$  the real income in the second period. Furthermore, assume that initially households have a positive wealth  $\mathcal{W}$ . In the first period households either consume or invest in nominal bonds which yield a nominal return  $i$ . In the second period they spend all of their income.

(2 pts.) **1.** Write the budget constraints for periods 1 and 2 in nominal terms and derive the intertemporal budget constraint.

(2 pts.) **2.** Recall that the exact relationship between the real,  $r$ , and the nominal interest rate,  $i$ , is

$$1 + r = \frac{1 + i}{1 + \pi}$$

where  $\pi$  denotes net inflation. Use this relationship to express the intertemporal budget constraint in real terms.

(2 pts.) **3.** State the agent's optimization problem and derive the optimal consumption path.

(2 pts.) **4.** What is the condition for the consumption path to be constant? Provide an economic explanation.

(2 pts.) **5.** Assume the goods market clears, i.e.  $C_t = Y_t$ , for  $t = 1, 2$ . Derive the log linear dynamic IS curve.

(2 pts.) **6.** Assume the Phillips curve of this economy is given by

$$\pi = \pi^e + \lambda(y - y^n),$$

where  $\pi^e$  is expected inflation,  $0 < \lambda < 1$ ,  $y = \log Y$ , and  $y^n$  is the log of natural output. Assume that monetary policy cannot affect the natural output. Explain, using the Phillips curve and the IS curve, how an unexpected increase in the nominal interest rate affects the real interest rate.

Solution: The answers to these questions are in Lecture 7.