Professor Mark Gertler
New York University
Intermediate Macro
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Midterm 2

Answer each of the following 3 problems. Each is worth 33 1/3 points.

1. Consider the following simple loglinear model, where y_t is real output, c_t is consumption, i_t is the nominal interest rate, p_t is the price level, n_t is employment, μ_t is the markup, a_t is total factor productivity, and m_t is the money supply. All variables are percent deviations from steady state.
IS curve:

$$y_t = c_t$$

$$c_t = -i_t + E_t c_{t+1}$$

Aggregate supply

$$y_t = a_t + n_t$$

$$a_t = \mu_t + \gamma_n n_t + c_t$$

$$p_t = \bar{p}$$

Monetary sector

$$m_t - p_t = y_t - \nu i_t$$

$$m_t = \bar{m}_t$$

1. Collapse the model to three equations: IS/LM and AS.

2. Suppose that at time t, the central bank increases $\bar{m}_t$. What is the effect on the nominal interest rate, output, and the markup?

3. How does the effect depend on whether the increase in the money supply is temporary (lasts just one period) or persistent (lasts several periods). (Hint: To see, use the LM curve to eliminate the interest rate in the IS curve, and then solve the IS curve forward.).

4. How does your answer to 3. suggest why it might be important for the Federal Reserve to communicate it's future planes for monetary policy? Discuss intuitively.

2. Let χ_t be a demand disturbance and a_t a supply disturbance (specifically a shock to productivity). Suppose that the goal of the central bank is to keep output y_t as close as possible to the natural (flexible price equilibrium) value y_t^*. Then how should the central bank set the nominal interest rate i_t to achieve this goal in the context of the following IS/LM model with a fixed price level?

IS curve

$$y_t = -i_t + E_t y_{t+1} + \chi_t$$

LM curve

$$i_t = \bar{i}_t$$

AS curve

$$\mu_t = -\kappa(y_t - y_t^*)$$

Flexible Price Equilbrium

$$y_t^* = a_t$$

$$y_t^* = -r_t^* + E_t y_{t+1}^* + \chi_t$$

$$\mu_t = 0$$

1. Show that it is possible to express the IS curve as relating the output gap $y_t - y_t^*$ negatively to the interest rate gap $i_t - r_t^*$ and positively to the expected output gap for next period.

2. How then should the central bank set i_t, given its' goal of keeping y_t as close as possible to y_t^*

3. In what direction should the central bank adjust i_t in response to a negative demand shock? To a negative supply shock?

4. What should the central bank do if there is news that a negative demand shock will hit the economy three periods from now?

3. Let g_t denote government spending and τ_t taxes. Again all variables are percent deviations from steady state. Then consider the following IS/LM model with both fiscal and monetary policy:

IS curve.

$$y_t = -\frac{C}{Y}i_t + E_t y_{t+1} + \frac{C}{Y}\chi_t + \frac{G}{Y}(g_t - E_t g_{t+1})$$

LM curve

$$i_t = \bar{i}_t$$

AS curve

$$\mu_t = -\kappa(y_t - y_t^*)$$

1. Describe how a negative demand shock (drop in χ_t) could put the economy into a "liquidity" trap, i.e., a situation where the zero lower bound on the nominal interest rate is binding and y_t is stuck below y_t^*

2. Describe how fiscal policy can move the economy out of the liquidity trap.

3. How does the amount of fiscal stimulus necessary to move y_t back to y_t^* depend on monetary policy.

4. Suppose fiscal policy is not available. How can monetary policy be used to move the economy out the liquidity trap? (Hint: think how expectations of the future matter to output).