Professor Mark Gertler
New York University
Intermediate Macro
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Problem Set 6

1 Problem 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, m_t is the money supply and χ_t is a disturbance to consumption demand.. All variables are percent deviations from steady state.
Aggregate demand.

$$y_t = c_t$$

$$c_t = -(i_t - E_t p_{t+1} - p_t) + E_t c_{t+1} + \chi_t$$

Aggregate supply

$$y_t = a_t + n_t$$

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

$$p_t = \overline{p} \text{ or } \mu_t = 0$$

Monetary sector

$$m_t - p_t = y_t - \nu r_t^n$$

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

1. Collapse the model to three equations: IS/LM and AS for both the fixed price ($p_t = \overline{p}$) and flexible price ($y_t = 0$) cases.

2. Suppose that at time t, there is a negative shock to consumption demand (χ_t falls). In the fixed price model, what is the impact of the shock on output, employment, the markup and the interest rate? What is the effect in the flexible price model?

3. In the fixed price model, how should the central bank adjust the money supply is response to the negative demand shock. Assume that the goal of policy is to keep output as close as possible to its flexible price value.

2 Problem 2

The model of problem still applies.

1. Show that in the fixed price model, output depends not only on the current values of i_t and χ_t, but also their expected future values. (Hint; iterate forward the IS curve.)

2. Now suppose the is a temporary negative shock to current consumption demand: χ_t falls, but expected future value of χ_t remain unchanged. Show how it is possible that, if the shock is large enough, the economy could fall into a "liquidity trap", where the zero lower bound on the nominal interest rate is binding.

3. Show that even if the central bank cannot reduce the current nominal rate in the liquidity trap, it can in principle stimulate output by creating the expectation that it will reduce future nominal interest rates.

3 Problem 3

Let g_t denote government spending, τ_t lump sum taxes, τr_t, lump sum transfers c_t^u consumption by unconstrained households, and c_t^c consumption by constrained households. Again all variables are percent deviations from steady state, and upper case variables are steady state levels. Then consider the following aggregate demand sector with with fiscal policy.
Aggregate demand.

$$y_t = \frac{C}{Y}c_t + \frac{G}{Y}g_t$$
$$c_t = (1-\upsilon)c_t^u + \upsilon c_t^c$$
$$c_t^u = -i_t + E_t c_{t+1}^u$$
$$c_t^c = \frac{Y}{C}y_t - \frac{T}{C}\tau_t + \frac{\theta}{\upsilon}\frac{TR}{C}\tau r_t$$

where $\theta \epsilon [0,1]$ is the fraction of total transfers (e.g. unemployment benefits that constrained households receive. (Note that constrained households receive the fraction υ of steady state output, consume the fraction υ of steady state consumption and pay the fraction υ of steady state taxes.
Note also that we are restricting attention to the fixed price model and assuming that the central bank sets the interest rate i_t.

1. Derive an "IS curve" that relates current output to monetary and fiscal policy. (Hint: first iterate the equation for c_t^u to derive a relation in terms of the current and expected path of i_t)

2. Derive the multiplier effect on output for g_t, τ_t, and τr_t. For each case, describe intuitively what determines the size of the multiplier.

3. If the government wants to maximize the the effect of an increase in transfers on output, how should it set θ? Explain intuitively. For what value of θ will the transfer multiplier be the same size as the government expenditure multiplier? Explain intuitively.