ECON 210C PROBLEM SET # 5

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1. Problems from Romer

1.1. **Romer, Problem 6.13.**

(a)

(b)

(c)

(d)

(e)

(f)

1.2. **Romer, Problem 7.10.**

2. Quadratic cost of adjusting prices and effect of money (Rotemberg 1982)

(a)

(b)

(c)

(d)

(e)

3. New Keynesian model in Dynare

(a)

(b)

(c)

(d)

4. Government spending multipliers in the new Keynesian model (Christiano, Eichenbaum and Evans 2012)

(a) The economy is characterized by the following log-linearized equations:

$$\begin{aligned}
\check{C}_t &= E_t\check{C}_{t+1} - \frac{1}{\psi}\left(i_t - E_t\pi_{t+1}\right) \\
\pi_t &= \beta E_t\pi_{t+1} + \kappa\left(\frac{\check{W}}{P}\right)_t, \quad \kappa = \frac{(1-\theta)(1-\beta\theta)}{\theta} \\
\left(\frac{\check{W}}{P}\right)_t &= \psi\check{C}_t + \frac{1}{\eta}L_t \\
\check{Y}_t &= \check{L}_t \\
\check{Y}_t &= s_g\check{G}_t + (1-s_g)\check{C}_t \\
i_t &= \phi_\pi\pi_t, \quad \phi_\pi > 1
\end{aligned}$$

The first equation is a standard Euler equation. The second equation is a recursive formulation of inflation rate, telling us that current inflation is a present value of future marginal costs. The third equation is household's labor supply. The fourth equation denotes aggregate production function. The fifth equation is national account, where s_g is the share the government spending. Finally, the last equtaion implies that the central bank follows the Taylor rule.

(b) The reduced system is characterized as follows:

$$\begin{aligned}
\check{C}_t &= E_t\check{C}_{t+1} - \frac{1}{\psi}\left(\phi_\pi\pi_t - E_t\pi_{t+1}\right) \\
\pi_t &= \beta E_t\pi_{t+1} + \kappa\left(\psi\check{C}_t + \frac{s_g}{\eta}\check{G}_t + \frac{(1-s_g)}{\eta}\check{C}_t\right)
\end{aligned}$$

We have two endogenous variables $(\check{C}_t, \pi_t)$ and one exogenous variable $(\check{G}_t)$.

(c) Assume that government spending has the following dynamics:

$$\check{G}_t = \rho\check{G}_{t-1} + \epsilon_t, \quad \epsilon_t \sim i.i.d.\left(0, \sigma^2\right)$$

Since both $\check{C}_t$ and π_t are jump-variables, the only state variable is $\check{G}_t$.

(d) In general, the determinacy of a new Keynesian model depends on the Taylor rule parameter, which in this model is ϕ. Since $\phi > 1$, one can expect that the model would have unique stable solution.

(e)

(f)

(g)

(h)

(i)

(j)

(k)

(l)