Econ 614 Hanes Another problem set on Clarida, Gali & Gertler

1) Consider the following model:

$y_t = E_t y_{t+1} - r_t$

$\pi_t = E_t\pi_{t+1} + y_t + u_t$ where $u_t = \rho u_{t-1} + \epsilon_t$ and ϵ_t is "white noise" (mean-zero i.i.d.).

y is the output gap. *r* is the gap between the real interest rate and the natural rate of interest. Expectations are rational. Assume there is a long-run steady state where $y = 0$, $\pi = 0$.

Every period a central bank chooses r_t to minimize a loss function $L_t = E_t \sum_{\tau=0}^{\infty} \beta^{\tau} \frac{1}{2}\left(y_{t+\tau}^2 + \pi_{t+\tau}^2\right)$

The central bank has "discretion," that is, its choice of r_t in no way constrains its future behavior.

At the time the central bank chooses r_t, it knows u_t and the public's $E_t\pi_{t+1}$.

a) Solve this model for π_t, y_t and r_t. Hint one: this model is similar to the one in Clarida, Gali and Gertler, "The Science of Monetary Policy: a New Keynesian Perspective." Solve it in the same way.

b) Draw a graph with time on the horizontal axis and π on the vertical axis. On the graph draw a line that shows how π_t evolves over time in response to a positive realization of ϵ at time t_0, assuming that just before t_0, the variables y, π and *u* were all zero.

c) Draw a graph with time on the horizontal axis and *r* on the vertical axis. On the graph draw a line that shows how r_t evolves over time in response to a positive realization of ϵ at time t_0, assuming that just before t_0, the variables y, π and *u* were all zero.

d) Would it be possible to reproduce the behavior of this central bank with an "interest rate rule" of the form $r_t = \phi\pi_t$? If your answer is yes, what would be the coefficient ϕ ?

2) Consider the following model:

$y_t = E_t y_{t+1} - r_t + g_t$ where $g_t = \rho g_{t-1} + \epsilon_{gt}$ and ϵ_{gt} is "white noise" (mean-zero i.i.d.).

$\pi_t = E_t\pi_{t+1} + y_t$

y is the output gap. *r* is the gap between the real interest rate and the natural rate of interest. Expectations are rational. Assume there is a long-run steady state where $y = 0$, $\pi = 0$.

Every period a central bank chooses r_t to minimize a loss function $L_t = E_t \sum_{\tau=0}^{\infty} \beta^{\tau} \frac{1}{2}\left(y_{t+\tau}^2 + \pi_{t+\tau}^2\right)$

The central bank has "discretion," that is, its choice of r_t in no way constrains its future behavior.

At the time the central bank chooses r_t, it knows g_t and the public's $E_t\pi_{t+1}$.

a) Solve this model for π_t, y_t and r_t. Hint one: this model is similar to the one in Clarida, Gali and Gertler, "The Science of Monetary Policy: a New Keynesian Perspective." Solve it in the same way.

b) Draw a graph with time on the horizontal axis and y on the vertical axis. On the graph draw a line that shows how y_t evolves over time in response to a positive realization of ϵ at time t_0, assuming that just before t_0, the variables y, π and *g* were all zero.

c) Draw a graph with time on the horizontal axis and *r* on the vertical axis. On the graph draw a line that shows how π_t evolves over time in response to a positive realization of ϵ at time t_0, assuming that just before t_0, the variables y, π and *g* were all zero.

d) Would it be possible to reproduce the behavior of this central bank with an "interest rate rule" of the form $r_t = \phi y_t$? If your answer is yes, what would be the coefficient ϕ ?