Economics 416. Advanced Macroeconomics Christiano Homework #8, due November 21.

1. Typical analyses of the NK model linearize about an efficient steady state. As a result p^* is simply set to unity and it therefore plays no role. This is too bad, because p^* could in principle help to account for the observed variation in measured TFP. Solving and simulating the model with a second order approximation allows one to investigate whether the NK model in fact offers an interesting theory of TFP. In our handout on the NK model, we derived the 6 equilibrium conditions. Enter those, together with a Taylor rule, into Dynare. Use the following coefficients:

$$\beta = 0.99, \ \varepsilon = 5, \ \theta = 0.75, \ \varphi = 1, \ \rho_{\lambda} = 0.9, \phi_{\pi} = 1.5, \ \phi_x = 0, \ \rho_R = 0.8.$$

Also,

$$a_t = 1.85a_{t-1} - 0.855a_{t-2} + \varepsilon_t^a, \ E(\varepsilon_t^a)^2 = 0.01^2$$

$$\tau_t = \rho_\lambda \tau_{t-1} + \varepsilon_t^\tau, \ E(\varepsilon_t^\tau)^2 = 0.01^2.$$

where a_t denotes the log of technology and τ_t denotes the log of the labor preference shock. In the Taylor rule, make zero net inflation the target.

- (a) solve this model using first order perturbation, second order perturbation without pruning and second order perturbation with pruning. Simulate 50 observations using each of the three approaches. To make sure you are using the same random variables in each simulation, include the command, set_Dynare_seed(1); before the stoch_simul command.
- (b) Redo the simulations, replacing the technology process with $a_t = 0.9a_{t-1} + \varepsilon_t^a$. Does this change inference about the importance of p_t^* ?
- (c) Redo the calculations making 2.5 percent (annual) inflation the target. In this way, steady state inflation is 2.5 percent (annual

rate) and so there are steady state price distortions. Redo the calculations you did for (a) above. Does the change alter your inference about the importance of p_t^* ?

2. Consider part 1.2 in the take-home exam, the question on the real business cycle model with Nash bargaining. Replace the Nash sharing rule with alternating offer bargaining rule. How to do this is explained in the manuscript with Mathias Trabandt and Marty Eichenbaum that is on the website (see equation 2.25). Change the replacement ratio to the more defensible value of 0.40. How does the relative volatility of employment and output do in this version of the model?