

DSGE- OSE Bootcamp 2019

Aniruddha Ghosh*

July 19, 2019

Contains answers to the exercises on DSGE (Part-2 & 3), taught by Kerk Phillips as a part of the OSE Lab Summer Camp 2019.

*Department of Economics, Johns Hopkins University, Baltimore, MD 21218

1 Homework 2

Exercise 3 (Dynamic Behavior)

We do the necessary matrix algebra here to transform

$$E_t[F\tilde{X}_{t+1} + G\tilde{X}_t + H\tilde{X}_{t-1} + L\tilde{Z}_{t+1} + M\tilde{Z}_t] = 0 \quad (1)$$

into

$$[(FP + G)P + H]\tilde{X}_{t-1} + [(FQ + L)N + (FP + G)Q + M]\tilde{Z}_t \quad (2)$$

By observation, we can see that eq.(2) is expressed in \tilde{X}_{t-1} and \tilde{Z}_t . We substitute in eq.(1) the expression for \tilde{X}_{t+1} and \tilde{Z}_{t+1} .

$$E_t[F\tilde{X}_{t+1} + G\tilde{X}_t + H\tilde{X}_{t-1} + L\tilde{Z}_{t+1} + M\tilde{Z}_t] = 0 \quad (3)$$

$$E_t[F(P(P\tilde{X}_{t-1} + Q\tilde{Z}_t) + Q(N\tilde{Z}_t + \epsilon_{t+1})) + G(P\tilde{X}_{t-1} + Q\tilde{Z}_t) + H\tilde{X}_{t-1} + L(N\tilde{Z}_{t-1} + \epsilon_t) + M\tilde{Z}_t] = 0 \quad (4)$$

$$[(FP + G)P + H]\tilde{X}_{t-1} + [(FQ + L)N + (FP + G)Q + M]\tilde{Z}_t = 0 \quad (5)$$

2 Homework 3

Exercise 1 (Perturbation Methods)

We differentiate expression (5) involving terms with $F(x, u)$ with respect to u and find,

$$x_{uuu} = -\frac{F_{uuu} + F_{xxx}x_u^3 + 3(F_{xxu}x_u^2 + F_{uux}x_u + F_{xu}x_{uu} + F_{xx}x_u x_{uu})}{F_x} \quad (6)$$

where the derivative is evaluated at $u_0, x(u_0)$.