Core Macro 2009
Solution for Part(e) of HW1

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The difference from previous part is that endogenous variables are three.(i.e.,c_t,n_t,k_t).Therefore, we need to make three equations to pin them down.Three equations are as follows;

$$k_{t+1} = Ak_t^{\alpha} n_t^{1-\alpha} + (1-\delta)k_t - c_t - g_t \tag{1}$$

$$(\frac{c_t}{c_{t+1}})^{\nu(1-\delta)-1}(\frac{1-n_t}{1-n_{t+1}})^{(1-\nu)(1-\delta)} = \beta(\alpha A k_{t+1}^{\alpha-1} n_{t+1}^{1-\alpha} + 1 - \delta) \tag{2}$$

$$\frac{1-\nu}{\nu}\frac{c_t}{1-n_t} = (1-\alpha)Ak_t^{\alpha} n_t^{-\alpha} \tag{3}$$

(1),(2) and (3) are respectively "resource constraint","Euler equation", and "static condition". For simulation we require to set them up.

Now we examine (1) the effects of a temporary increase in government purchases ,and (2) the effects of a permanent increase in government purchases. For (1), we assume that government purchases increase only at period 10.For (2), we assume that government purchases increase from period 10. In addition to this, we set ν and σ to be respectively 0.4 and 2.*1.

First the result for case (1) is shown in Figure1.Unlike previous model, output decreases less after shock. That is because increase in labor input affects output positively.

We define the government purchase multiplier λ_t as

$$\lambda_t = \frac{y_t - y_{ss}}{g_t - g_{ss}} \tag{4}$$

where y_{ss} and g_{ss} are variables in steady state. In the case (1), the maximum value of λ_t is $0.1418(< 1)$.

Next, Figure2 shows the result for case (2).Compared to case (1), this shock affects more. In fact, the maximum value of λ_t is 1.1484 (> 1), which is bigger than case (1).

* If you find typos or something, please send e-mail to me(tomoaki.kotera@gmail.com)

*1 In the simulation. I somehow replace γ and μ with ν and σ

Figure1.

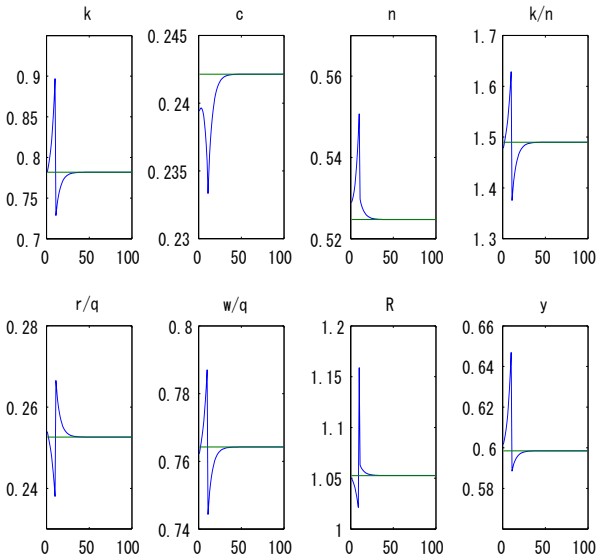

Figure2.