Topics in Macro 2

Week 8 - Second Part - Part II - Exercise II

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TSE

Tuesday (17:00-18:30)

TD Second Part: Fiscal Multipliers (Weeks 6 to 10)

Part I

- Exercise I: Habit Persistence and The Keynesian Multiplier (Week 6)
- Exercise II: A Benchmark Model (Week 7)
- Exercise III: Consumption, Labor Supply and the Multiplier (Week 7)

Part II

- Exercise I: Taxes on the Labor Input and the Multiplier (Week 8)
- **Exercise II: Public Spending in Utility Function and the Multiplier (Week 8)**
- Exercise III: Labor Supply, Public Spending in Utility and the Multiplier (Week 9)

Part III

- Exercise I: Endogenous Public Spending (Week 9)
- Exercise II: Externality in Production and the Multiplier (Week 10)
- Exercise III: Externality in Labor Supply and the Multiplier (Week 10)

Exercise II: Public Spending in Utility Function and the Multiplier

The Economy

Utility:

$$u(c_t, n_t) = log(c_t^*) - \eta n_t, \text{ where } c_t^* = c_t + \alpha_g g_t$$

Budget constraint:

$$c_t \leq w_t n_t + \Pi_t - T_t$$

Production:

$$y_t = a n_t$$

Profits:

$$\Pi_t = y_t - w_t n_t$$

Government budget constraint:

$$g_t = T_t$$

Market clearing:

$$y_t = c_t + g_t$$

Question 1. Determine the optimality condition of the households and then deduce the Marginal Rate of Substitution (MRS)

HH problem: $\max_{\{c,n\}} \log(c_t + \alpha_g g_t) - \eta n_t \quad s.t. \quad c_t \leq w_t n_t + \Pi_t - T_t$

$$\mathcal{L}(c,n,\lambda) = \log(c_t + \alpha_g g_t) - \eta n_t - \lambda_t [c_t - w_t n_t - \Pi_t + T_t]$$

F.O.C.

$c: \quad \frac{1}{c_t + \alpha_g g_t} = \lambda_t$

$n: \quad \eta = \lambda_t w_t$

$\eta(c_t + \alpha_g g_t) = w_t$

Answer: $\eta(c_t + \alpha_g g_t) = w_t$.

Question 2. Determine the optimality condition of the firm.

$$\max_{\{n\}} \; a n_t - w_t n_t$$

suppose interior solution

$w_t = a_t$

$$\Rightarrow \Pi_t = 0$$

Answer: $w_t = a$.

Question 3. Determine the equilibrium output.

We know $\eta(c_t + \alpha_g g_t) = w_t$,

$$a = w_t$$

and $c_t = y_t - g_t$

Then $\eta(y_t - g_t + \alpha_g g_t) = a$

$$\Rightarrow \quad y_t - (1-\alpha_g) g_t = \frac{a}{\eta}$$

$$\Rightarrow \quad y_t = \frac{a}{\eta} + (1-\alpha_g) g_t$$

Answer: $y_t = \frac{a}{\eta} + (1 - \alpha_g) g_t$.

Question 4. Compute the output multiplier and discuss the value of this multiplier with respect to α_g.

We know $y_t = \frac{a}{\eta} + (1-\alpha_g) g_t$

Then $\frac{dy_t}{dg_t} = (1-\alpha_g)$ and $\frac{dc_t}{dg_t} = \frac{dy_t}{dg_t} - 1 = -\alpha_g$

- If $\alpha_g = 0 \Rightarrow \frac{dy_t}{dg_t} = 1$ and $\frac{dc_t}{dg_t} = 0$

  Very effective fiscal policy

- If $\alpha_g = 1 \Rightarrow \frac{dy_t}{dg_t} = 0$, $\frac{dc_t}{dg_t} = 1$, Full crowding-out.

Answer: $\frac{dy_t}{dg_t} = (1 - \alpha_g)$.

Question 5. Compute the consumption multiplier and discuss the value of this multiplier with respect to α_g.

See previous slide.

Answer: $\frac{dc_t}{dg_t} = \frac{dy_t}{dg_t} - 1 = -\alpha_g$.