Topics in Macro 2

Week 9 - Second Part - Part II - Exercise III

Oscar Fentanes
www.oscarfentanes.com

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 III: Labor Supply, Public Spending in Utility and the Multiplier

The Economy

Utility:

$$log\left(c_t^* - \frac{\eta}{1+\nu} n_t^{1+\nu}\right) \text{ where } c_t^* = c_t + \alpha_g g_t$$

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)

$$\max_{\{c_t, n_t\}} c_t + \alpha_g g_t - \frac{\eta}{1+\nu} n_t^{1+\nu} - \lambda_t \left[c_t - w_t n_t - \Pi_t + T_t \right]$$

F.O.C. c_t: $1 = \lambda_t$ (1)

n_t: $\eta n_t^{\nu} = \lambda w_t$ (2)

(2) / (1) : $\eta n_t^{\nu} = w_t$

Answer: $\eta n_t^{\nu} = w_t$.

Question 2. Determine the optimality condition of the firm.

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

F.O.C. $a = w_t$

(Interior Solution).

Answer: $w_t = a$.

Question 3. Determine the equilibrium output.

Equilibrium are quantities $c_t, n_t^s, n_t^d, g_t, T_t, y_t$ and prices w_t such that:

1.- c_t, n_t^s solve (1)

2.- n_t^d solve (2)

3.- $g_t = T_t$

4.- $y_t = c_t + g_t$

From (1): $\eta n_t^{\nu} = w_t$, From (2) $w_t = a \Rightarrow \eta n_t^{\nu} = a$

$\Rightarrow n_t^{\nu} = (a/\eta) \Rightarrow n_t = (\eta/a)^{1/\nu} \Rightarrow y_t = a(\eta/a)^{1/\nu}$

Answer: $n_t = \left(\frac{a}{\eta}\right)^{\frac{1}{\nu}}$ and $y_t = a\left(\frac{a}{\eta}\right)^{\frac{1}{\nu}}$.

Question 4. Compute the output and consumption multiplier and discuss the result.

- Multiplier is zero.
- Total crowding out of consumption.
- No income effects for labor supply (depends only on $w_t = a$).
- Constant income.

We know $y_t = a\left(\eta/a\right)^{1/\nu} \implies \dfrac{dy_t}{dg_t} = 0 \leftarrow$ Fiscal policy can't affect y_t

also $\dfrac{dc_t}{dg_t} = \dfrac{dy_t}{dg_t} - 1 \implies \dfrac{dc_t}{dg_t} = -1 \leftarrow$ Full crowding-out of consumption.

If $\alpha_g = 0$, $g_t \uparrow \Rightarrow c_t \downarrow$ because $T_t \uparrow$, and $c_t^* \downarrow$, $U(\cdot) \downarrow$

If $\alpha_g = 1$, $g_t \uparrow \Rightarrow c_t \downarrow$ because $T_t \uparrow$, but c_t^* and $U(\cdot)$ the same

If $\alpha_g = 0$, g_t is "thrown to garbage". If $\alpha_g > 0$, transfer to consumers.