Exercise 2.3 (An Open Economy with Habit Formation, I)

Consider a two-period small open economy populated by a large number of identical households with preferences specified by the utility function

$$\ln c_1 + \ln(c_2 - x), \tag{1}$$

where c_1 and c_2 denote, respectively, consumption in periods 1 and 2. Households are endowed with $y > 0$ units of goods each period and are born in period 1 with no assets or debts. In period 1, households can borrow or lend at a zero interest rate. Derive the equilibrium level of consumption and the trade balance under the following three formulations:

1. $x = 0$ (no habits).

2. $x = 0.5c_1$ (internal habit formation).

3. $x = 0.5\bar{c}_1$, where $\bar{c}_1$ denotes the economy's per capita level of consumption in period 1 (external habit formation).

Compare economies (1) and (2) and provide intuition. Similarly, compare economies (2) and (3) and provide intuition.

Answer:

1. The intertemporal budget constraint is

$$c_2 = 2y - c_1. \tag{2}$$

In the economy without habits, the optimality condition is

$$\frac{1}{c_1} = \frac{1}{2y - c_1}, \tag{3}$$

which yields

$$\boxed{c_1 = y} \tag{4}$$

2. With internal habits, the household's problem is to pick c_1 to maximize $\ln c_1 + \ln(2y - 1.5c_1)$. The optimality condition is

$$\frac{1}{c_1} = \frac{1.5}{2y - 1.5c_1}, \tag{5}$$

which yields

$$\boxed{c_1 = \frac{2}{3}y} \tag{6}$$

3. With external habits, the household's problem is to pick c_1 to maximize $\ln c_1 + \ln(2y - c_1 - 0.5\bar{c}_1)$. The optimality condition is

$$\frac{1}{c_1} = \frac{1}{2y - c_1 - 0.5\bar{c}_1}. \tag{7}$$

In equilibrium, $c_1 = \bar{c}_1$. Using this expression to eliminate $\bar{c}_1$, we obtain

$$\boxed{c_1 = \frac{4}{5}y} \tag{8}$$

Comparison of no habits with internal habits: Internal habits deliver less consumption in period 1 because households internalize that the more they consume in period 1, the less happy they are in period 2.

Comparison of internal and external habits: Again, with internal habits, households internalize the fact that period-1 consumption makes them unhappy in period 2. This internalization is absent under external habits, so households consume more in period 1 under the latter formulation.

It is of interest to note that period-1 consumption is lower under external habits than under no habits. This is because under external habits, when $c_2 - c_1 = 0.5c_1$, the marginal utility of consumption is higher in period 2 than in period 1, tilting consumption toward the future.