

Extra Credit Problem

The economy is currently in equilibrium. The aggregate planned expenditure function is:

$$APE = C + I + G + NX$$

where NX are net exports, which are a part of the autonomous expenditure. Consumers pay taxes according to the following formula:

$$T = T_0 + s(Y - T_0)$$

where T_0 is the autonomous tax, Y is income, and s is the tax rate on the income in excess of T_0 . Assume that $Y \geq T_0$.

a) Derive the expression for the expenditure multiplier. Disposable income:

$$YD = Y - T = Y - T_0 - s(Y - T_0) = (1 - s)Y - (1 - s)T_0$$

Consumption function:

$$C = a + b \cdot YD = a + b((1 - s)Y - T_0) = a + b(1 - s)Y - b(1 - s)T_0$$

Aggregate planned expenditure:

$$APE = \underbrace{a - b(1 - s)T_0 + I + G + NX}_{\text{autonomous expenditure}} + \underbrace{b(1 - s)Y}_{\text{slope}}$$

Expenditure multiplier is equal:

$$M = \frac{1}{1 - \text{slope of APE curve}} = \frac{1}{1 - b(1 - s)}$$

b) If the slope of the consumption function is 0.8 and $s = 0.5$, what will the change in the equilibrium GDP be if T_0 increases by \$10 million?

When T_0 changes, equilibrium GDP will change by:

$$\Delta GDP = -b(1 - s)\Delta T_0 \cdot M = -\frac{b(1 - s)\Delta T_0}{1 - b(1 - s)} = -\frac{0.8(1 - 0.5) \cdot \$10}{1 - 0.8(1 - 0.5)} = -\frac{4}{0.6} = \boxed{-\$6.67 \text{ million}}$$

If T_0 increases by \$10 million, The GDP will fall by \$6.67 million.

Grading:

xx: 1 point

xv: 2 points

vv: 3 points