3. The Aggregate Economy

I. Exercise Questions

Readings:
Lecture slide sets: #3, 4
The Economy: *Aggregate demand (13.3, 13.4), economic shocks (13.5), fiscal multiplier (14.1, 14.2)*

Problem 1 (*Aggregate demand and fiscal policy*)

Consider an open economy with output Y, private consumption C, autonomous consumption c_0, marginal propensity to consume c_1, investment I, government spending G, tax rate t, exports X and imports M. The economy's situation can be described as follows:

$$Y = 5000 \qquad C = c_0 + c_1 \cdot (1-t) \cdot Y \qquad I = 2000 \qquad G = 1000$$
$$X = 600 \qquad M = 800 \qquad c_0 = 200 \qquad c_1 = 0.5 \qquad t = 0.2$$

(a) Calculate private consumption C and justify whether the goods market of the economy is in equilibrium.

$$C = c_0 + c_1 \cdot (1-t) \cdot Y = 200 + 0.5 \cdot (1-0.2) \cdot 5000 = 2200$$
$$AD = C + I + G + X - M = 2200 + 2000 + 1000 + 600 - 800 = 5000$$
$$Y = AD \rightarrow \text{ goods market equilibrium}$$

A macroeconomic shock deteriorates consumers' marginal propensity to consume to $c_1' = 0.25$.

(b) Calculate private consumption C', aggregate demand AD' and output Y' in the short run (right after the shock). Interpret your results with reference to the assumed equality of production and spending in an economy (compare exercise 1, question 2).

$$Y' = Y = 5000$$
$$C' = c_0 + c_1' \cdot (1-t) \cdot Y' = 200 + 0.25 \cdot (1-0.2) \cdot 5000 = 1200$$
$$AD' = C' + I + G + X - M = 1200 + 2000 + 1000 + 600 - 800 = 4000$$
$$Y' > AD' \rightarrow \text{ production} > \text{spending} \rightarrow \text{ Difference: inventory spending}$$

In the short run, output can be higher than demand. The overproduction increases the inventory. In the long run, production decreases to come to a new equilibrium.

(c) Calculate private consumption C'_{equ}, aggregate demand AD'_{equ} and output Y'_{equ} in the new equilibrium.

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\begin{aligned}
Y'_{equ} &= AD'_{equ} \\
Y'_{equ} &= c_0 + c'_1 \cdot (1-t) \cdot Y'_{equ} + I + G + X - M \\
Y'_{equ} &= \frac{c_0 + I + G + X - M}{1 - c'_1 \cdot (1-t)} \\
Y'_{equ} &= \frac{200 + 2000 + 1000 + 600 - 800}{1 - 0.25 \cdot (1 - 0.2)} = 3750 \\
C'_{equ} &= c_0 + c'_1 \cdot (1-t) \cdot Y'_{equ} = 200 + 0.25 \cdot (1 - 0.2) \cdot 3750 = 950 \\
AD'_{equ} &= 3750
\end{aligned}
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(d) Calculate the fiscal multiplier and give an economic interpretation. Explain why the fiscal multiplier always has to be bigger than 1.

$$\frac{\partial Y'_{equ}}{\partial G} = \frac{\partial(\frac{c_0+I+G+X-M}{1-c'_1 \cdot (1-t)})}{\partial G} = \frac{1}{1 - c'_1 \cdot (1-t)} = 1.25$$

An increase in G increases AD thus increases Y thus increases C thus increases AD thus increases Y and so on. In addition to the direct effect of an increase in G on Y, there are several indirect effects which result in an overall effect bigger than 1. That's the multiplier effect.
$G \uparrow \rightarrow AD \uparrow \rightarrow Y \uparrow \rightarrow C \uparrow \rightarrow AD \uparrow \rightarrow Y \uparrow$

(e) If the government wants to keep equilibrium output at the same level as before the shock, what would be an appropriate reaction in government spending (t remains unchanged)? How would this reaction change the government's budget balance?

By how much does G have to increase to reach the old level of output of $Y = 5000$? $\Rightarrow$ Looking for: $\triangle G$

$$\triangle Y = \frac{\partial Y}{\partial G} \cdot \triangle G$$
$$\triangle G = \frac{\triangle Y}{\frac{\partial Y}{\partial G}}$$
$$\triangle G = \frac{5000 - 3750}{1.25} = 1000$$

$T = t \cdot Y = 0.2 \cdot 5000 = 1000$
Budget balance: $T - (G + \triangle G) = 1000 - 2000 = -1000$

(f) How would the government adjust its spending in equilibrium (t remains unchanged) if its budget had to be in balance? Calculate private consumption C'' and output Y'' in the new equilibrium.

Balanced budget: $G = T = t \cdot Y$

$$Y'' = AD''$$
$$Y'' = c_0 + c_1 \cdot (1 - t) \cdot Y'' + I + t \cdot Y'' + X - M$$
$$Y'' = \frac{c_0 + I + X - M}{1 - c_1' \cdot (1 - t) - t}$$
$$Y'' = \frac{200 + 2000 + 600 - 800}{1 - 0.25 \cdot (1 - 0.2) - 0.2} = \frac{2000}{0.6} \approx 3333.33$$
$$C'' = c_0 + c_1' \cdot (1 - t) \cdot Y'' = 200 + 0.25 \cdot (1 - 0.2) \cdot \frac{2000}{0.6} = \frac{520}{0.6} \approx 866.67$$
$$G'' = t \cdot Y'' = 0.2 \cdot \frac{2000}{0.6} = \frac{400}{0.6} \approx 666.67$$

(g) How does the tax rate influence the output in the long run?

$$\frac{\partial Y'_{equ}}{\partial t} = \frac{\partial(\frac{c_0 + I + G + X - M}{1 - c_1' \cdot (1 - t)})}{\partial t} = -\frac{c_1 \cdot (c_0 + I + G + X - M)}{(1 - c_1' \cdot (1 - t))^2} < 0$$

II. Multiple Choice

Select one answer.

1. **Household Balance Sheet**
   Assume an unexpected and permanent increase in the real wage of a non credit constrained consumer. Which of the following statements is true?

   (A) The consumer's target wealth rises.

   (B) The consumer's broad wealth decreases.

   (C) The consumer's home equity increases.

   (D) The consumer's precautionary saving relatively decreases.

2. **Fiscal policy**
   The paradox of thrift says that in the long run...

   (A) ... an increase in individuals' saving increases aggregate income.

   (B) ... an increase in individuals' saving decreases aggregate income.

   (C) ... an increase in individuals' saving increases aggregate wealth.

   (D) ... an increase in individuals' saving increases aggregate demand.

3. **Countercyclical fiscal policy**
   Which of the following statements is true?

   (A) Countercyclical fiscal policy means increasing taxes and government spending during recessions and decreasing taxes and government spending during boom periods.

   (B) Countercyclical fiscal policy means decreasing taxes and government spending during recessions and increasing taxes and government spending during boom periods.

   (C) Countercyclical fiscal policy means increasing taxes and decreasing government spending during recessions and decreasing taxes and increasing government spending during boom periods.

   (D) Countercyclical fiscal policy means decreasing taxes and increasing government spending during recessions and increasing taxes and decreasing government spending during boom periods.