Introductory Macroeconomics

Lecture 7: Keynesian model of the economy, part two

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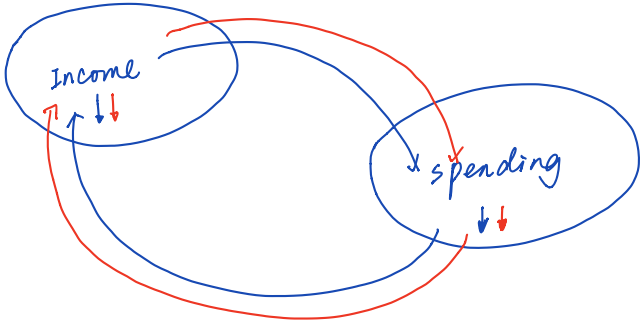
Online Quiz

- Reminder
  - 30 minute online quiz, 10 questions
  - quiz available from 9:00 March 31 to 16:00 April 1
  - covers material including week 3 (material before this week)

This Lecture

- Keynesian macroeconomics, part two
  - savings and investment
  - paradox of thrift
  - more on taxes and spending
- BOFAH chapter 7


Income
spending

Savings and Investment

- Start with a closed economy

- *Private savings* is defined as disposable income less consumption

$$S = (Y - T) - C$$

disposable income; consumption

- By national income accounting identity

$$Y = C + I + G$$

aggregated income

- Cancelling common terms we get

$$S = I + (G - T)$$

$S = (C + I + G - T) - C$
$= I + (G - T)$

$Y = S + C + T$

(个人: saving + consumption + taxes).

$Y = C + I + G$

(整体 个人 consumption
firm investment
government purchase

Savings and Investment

- **Key point:** In a closed economy, investment equal to *private savings* S plus *public savings* $T - G$

$$I = S + (T - G)$$

$\uparrow \Rightarrow$ { $I \uparrow$ or $S \downarrow$ or combination of I and S

investment = private saving + public savings

I S $T - G$

Public Savings

- Public saving is excess tax revenue T over government spending G
- If $T > G$, government has *fiscal surplus*, public saving positive
- If $T < G$, government has *fiscal deficit*, public saving negative

Aside on Open Economy

- In an open economy, domestic investment equal to *domestic private savings* S plus *domestic public savings* $T - G$ plus *borrowing from abroad*

$$I = S + (T - G) + (M - X)$$

import, export; ① $S = Y - T - C$; open economy; ① and ② $\Rightarrow$ $Y = C + I + G + X - M$

$S = C + I + G + X - M - T - C = I - (T - G) + (M - X)$.

- **Example:** Suppose government budget balanced, $G = T$, then

$$I = S + (M - X)$$

trade balance

- This gives

$$I > S \quad \Leftrightarrow \quad M > X$$

import exceed export; trade deficit; borrowing abroad to fund domestic

- But for now, back to closed economy

$I < S$ trade surplus

Keynesian Model Revisited

- Suppose consumption function is

$$C = \bar{C} + c(Y - T)$$

marginal propensity to consume $0 < c < 1$

$\bar{C}$: exogenous consumption

- *Planned private savings* are then given by

$$S = (Y - T) - C = (1 - c)(Y - T) - \bar{C}$$

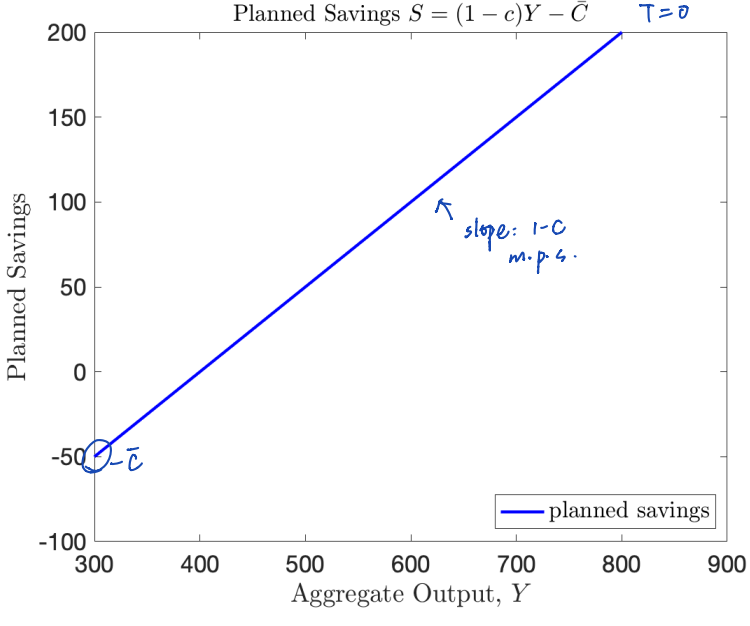
$S = (Y-T) - C$
$= (Y-T) - \bar{C} - c(Y-T)$
$= (1-c)(Y-T) - \bar{C}$

with *marginal propensity to save* $1 - c$

$-\bar{C}$: autogenous saving

- Exogenous increase in planned consumption $\bar{C}$ is equivalent to exogenous decrease in planned private savings

Planned Private Savings



Savings and Investment in Equilibrium

- Planned private savings

① $$S = (1-c)(Y-T) - \bar{C}$$

"assumption" about economic behavior

- In closed economy

② $$I = S + T - G$$

⇒ $S = I - T + G$. ["identity"]. holds in any economy

don't treat accounting identity as a causal relationship

eg. $S \uparrow$ implies $I \uparrow$

$X \Rightarrow \bar{I}$ exogenous

- Suppose $\bar{I}, \bar{T}, \bar{G}$ are given. Look for value of Y that solves

$$\bar{I} = (1-c)(Y-\bar{T}) - \bar{C} + \bar{T} - \bar{G} \qquad (*)$$

has economy content

- Solves for

$$Y = \frac{1}{1-c}\left(\bar{C} - c\bar{T} + \bar{I} + \bar{G}\right)$$

simple economy

consume \$1 less → save \$1 more

Paradox of Thrift 节俭.

- Is saving more (i.e., being '*thrifty*') a good thing?
- Consider a *decrease* in autonomous consumption $\bar{C}$ $\bar{C}\downarrow \Rightarrow S\uparrow$
- This shifts *up* the planned private savings function

$$S = (1-c)(Y-T) - \bar{C}$$

- So there is now more saving at any level of Y
- But equilibrium level of output is *lower*

Why Does More Saving Reduce Output?

- In the Keynesian model, short-run output is *demand-determined*
- More saving means less consumption demand, hence less output.
- **Key point:** if output is demand determined, individual households being thrifty may paradoxically be harmful to the economy overall
- In this situation, public dissaving (*deficit spending*) can usefully offset an increase in private savings

What Does this Leave Out?

- Omits all the long-run *supply-side* benefits of savings
- More savings allows more investment to be funded, which builds up the economy's productive capacity
- Much more on this in Part II of the subject

Simple Economy

- Suppose initially there is no government spending or taxation

$G = T = 0$

$\bar{G} = \bar{T} = 0$

- Planned private savings

① $S = (1-c)Y - \bar{C}$

- Planned investment

② $I = \bar{I}$

$Y = C + I + G \Rightarrow \bar{I} = Y - C$ (100, 0)

definition $S = (Y - \bar{T}) - C$ ($\bar{T} = 0$)

$\bar{I} = Y - C = 100$

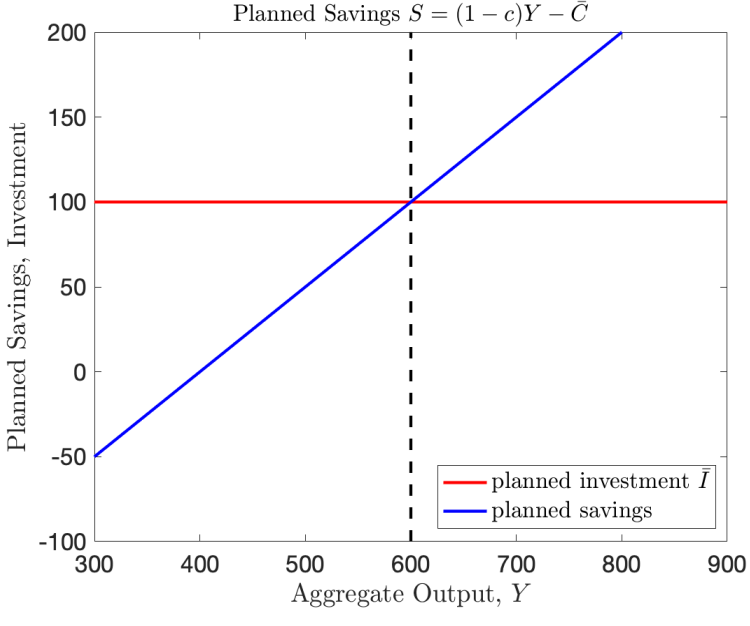
$100 = \frac{1}{2}Y - 200$

$Y = 600$

- **Example:** Suppose $c = 0.5$, $\bar{C} = 200$, $\bar{I} = 100$.
  Short-run equilibrium $Y = 600$. Private savings $S = \bar{I} = 100$.

Short-Run Equilibrium

$I = S + (T - G)$.



$\bar{I} = 0$

no government

$T = G$

$\Rightarrow S = \bar{I} = 100$

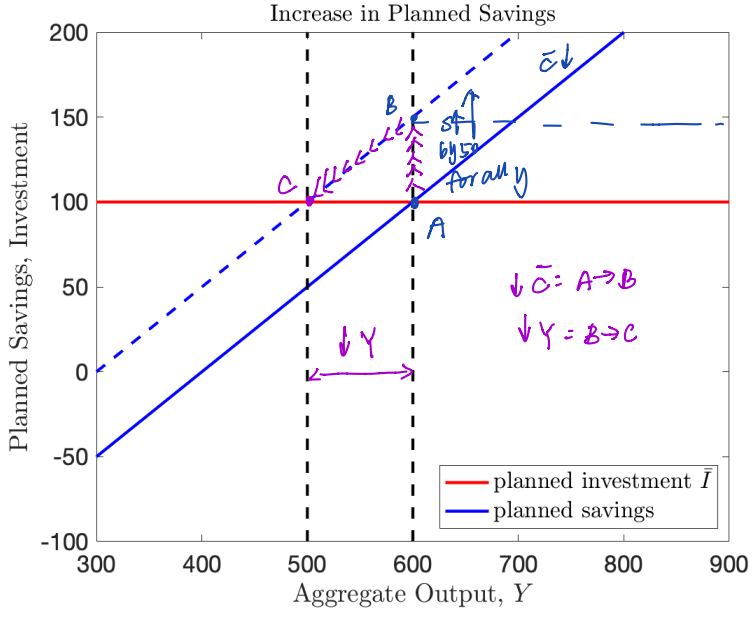
Increase in Planned Savings

- Suppose increase in *planned* private savings, $\bar{C}$ decreases to 150
- Short-run equilibrium output falls to $Y = 500$
- But *actual* private savings does not change, $S = \bar{I}$
- Here it is output Y that adjusts to make $S = \bar{I}$

$\bar{C}$: 200 ↓ 150

↑ S by 50 for all y

Paradox of Thrift



Paradox of Thrift

- **Key point:** Can get a recession when households all try to increase their savings.

Fiscal Stimulus

- Offset fall in consumer spending by rise in government spending

dissaving

- Suppose set $\bar{G} = 50$ with $\bar{T} = 0$. Public dissaving $\bar{T} - \bar{G} = -50$

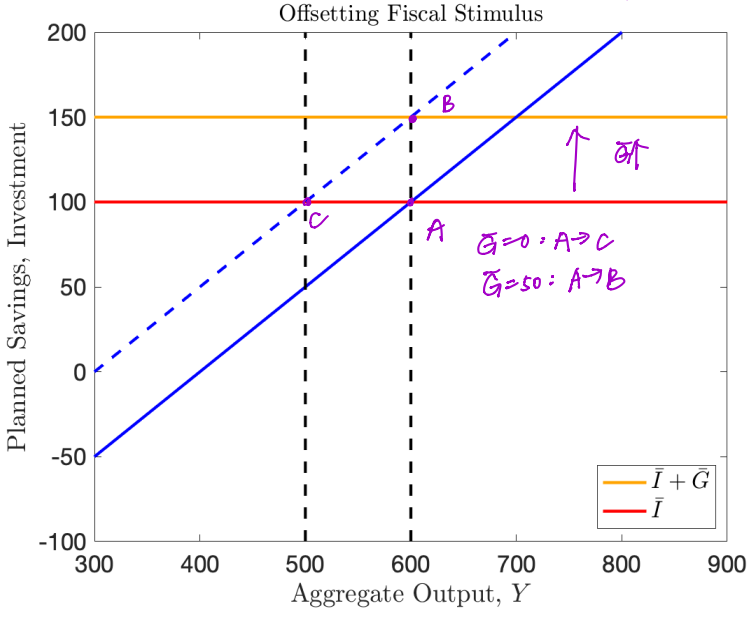
- Private savings now increase to accommodate increase in planned savings, made possible by public dissaving

$$\bar{I} = S + T - G$$

↑public dissaving

- Keeps output at original short run equilibrium $Y = 600$

Fiscal Stimulus



$T \geq 0$.

$I = S + (T - G) = S - G$.

$S = \bar{I} + \bar{G}$.

$\bar{I} + \bar{G} = 150$

$\bar{I} = 100$

$\bar{G}$↑

$\bar{G} = 0$: $A \to C$

$\bar{G} = 50$: $A \to B$

Fiscal Stimulus: Increase $\bar{G}$ or Decrease $\bar{T}$?

- Short-run output given by

$$Y = \frac{1}{1-c}\left(\bar{C} - c\bar{T} + \bar{I} + \bar{G}\right)$$

- Can stimulate output by *increase* in $\bar{G}$ or *decrease* in $\bar{T}$

- Suppose increase deficit by \$1. Which gives bigger effect on short-run output? Change in $\bar{G}$ gives

$$\frac{dY}{d\bar{G}} = \frac{1}{1-c} = 1 + \frac{c}{1-c}$$

Change in $\bar{T}$ gives

$$\frac{dY}{d\bar{T}} = -\frac{c}{1-c}$$

tax multiplier

$dY = -\frac{c}{1-c}dT$

$\Rightarrow dT < 0 \Leftrightarrow dY > 0$

$\left|\frac{dY}{dT}\right| < \frac{dY}{dG}$

Next Lecture

- Fiscal policy
  - more on fiscal policy and demand management
  - budget deficits and public debt
- BOFAH chapter 8