Introductory Macroeconomics

In-Tutorial #4
Week Starting 29 March 2021

Questions.

1. Consider the *savings-investment* approach to a simple Keynesian model without government purchases or taxes. The economy is described by

$$C = \bar{C} + cY$$
$$I = \bar{I}$$

with specific numerical values $\bar{C} = 1600$, $\bar{I} = 1000$ and marginal propensity to consume $c = 0.8$.

   (a) Using the condition $S = \bar{I}$ derive an equation that determines the short-run equilibrium level of output.

   (b) Solve for short-run equilibrium output.

   (c) Provide a graphical respresentation for the equilibrium in this model using the condition $S = \bar{I}$.

2. An economy is described by the following equations:

$$C = 400 + 0.8(Y - T)$$
$$\bar{I} = 1000$$
$$\bar{G} = 3000$$
$$T = 3000 + 0.05Y$$

   (a) Find a numerical equation relating planned aggregate expenditure to output.

   (b) Solve for short-run equilibrium output.

   (c) Is the government budget in (primary) deficit or surplus at this level of equilibrium output?

   (d) What is the value of the government purchases multiplier?

   (e) Suppose potential GDP is $Y^* = 10500$. What level of exogenous taxation would ensure actual GDP equals potential GDP?

   (f) What are the implications for the government's budget of the tax change you identified in part (e)? What does this imply for the level of government debt?

Solutions to In-Tutorial Work.

1. (a) Aggregate savings is disposable income less consumption. Here there are no taxes so disposable income is simply Y, hence $S = Y - C$. Then using the consumption function

$$\begin{aligned} S &= Y - C \\ &= Y - \bar{C} - cY \\ &= (1-c)Y - \bar{C} \end{aligned}$$

In equilibrium $S = \bar{I}$ hence we can write

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

which we can solve to get short-run equilibrium output

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

(b) Plugging in the given parameter values

$$Y = \frac{1}{1-0.8}(1600 + 1000) = 13000$$

(c) See Figure 1.

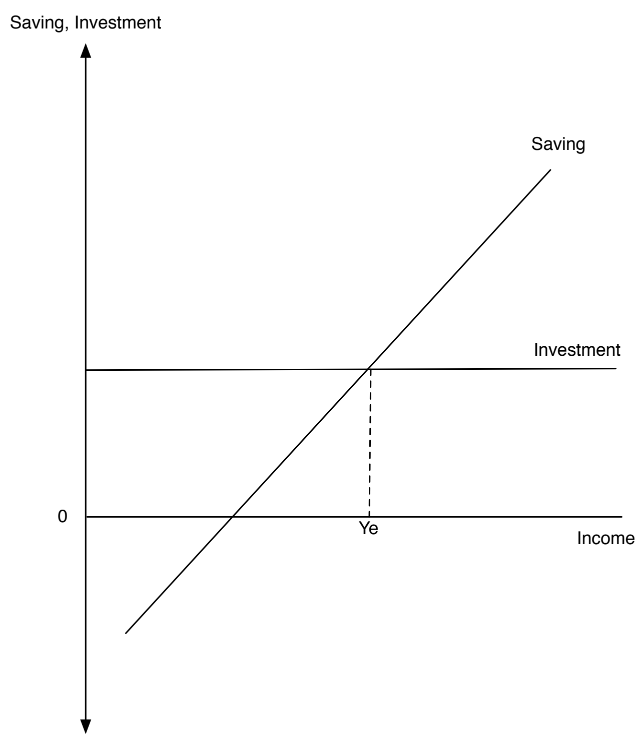

Figure 1: Savings and Investment Equilibrium

2. (a) Planned aggregate expenditure is given by

$$\begin{aligned} PAE &= C + I + G \\ &= 400 + 0.8(Y - (3000 + 0.05Y)) + 1000 + 3000 \end{aligned}$$

This is a numerical equation relating planned expenditure to output Y.

(b) In equilibrium, $Y = PAE$ so

$$\begin{aligned} Y &= PAE \\ &= 400 + 0.8(Y - (3000 + 0.05Y)) + 1000 + 3000 \\ &= 2000 + 0.76Y \end{aligned}$$

This allows us to solve for $Y = 8333.3$.

(c) Government purchases are $G = 3000$ At this level of output, tax revenue is $T = 3000 + 0.05Y = 3416.65$ so the budget is in (primary) surplus, $T > G$.

(d) We can rearrange our equilibrium condition as follows:

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

Collecting terms

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

Hence short-run equilibrium output is given by

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

which implies the government purchases multiplier is

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

(e) We can find the level of $\bar{T}$ that makes $Y = Y^*$ by solving

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

for $\bar{T}$. Plugging in $Y^* = 10500$ and the other parameter values

$$10500 = \frac{1}{1 - 0.8 + 0.8(0.05)}\left(400 + 1000 + 3000 - 0.8\bar{T}\right)$$

Then solving this equation for $\bar{T}$ gives

$$\bar{T} = 2350$$

(f) Total government purchases are still $G = 3000$. With this tax scheme, total tax revenue is $T = 2350 + 0.05(10500) = 2875$ so government purchases are greater than tax revenue, $G > T$, so there is a (primary) deficit. Hence the level of government debt will be increasing.