

# Macro Problem Set 3 Solutions

## Correction to Macro Problem Set 2 Q1 solutions

Available potential job seekers refer to people who are not in the labour force but want to work and are available to work. Thus, this category is akin to the US's marginalized workers. It includes discouraged workers.

Consequently, the given answer for U-6(SG) has double-counted discouraged workers.

The given answer was 9.9%, constructed as a ratio of the following:

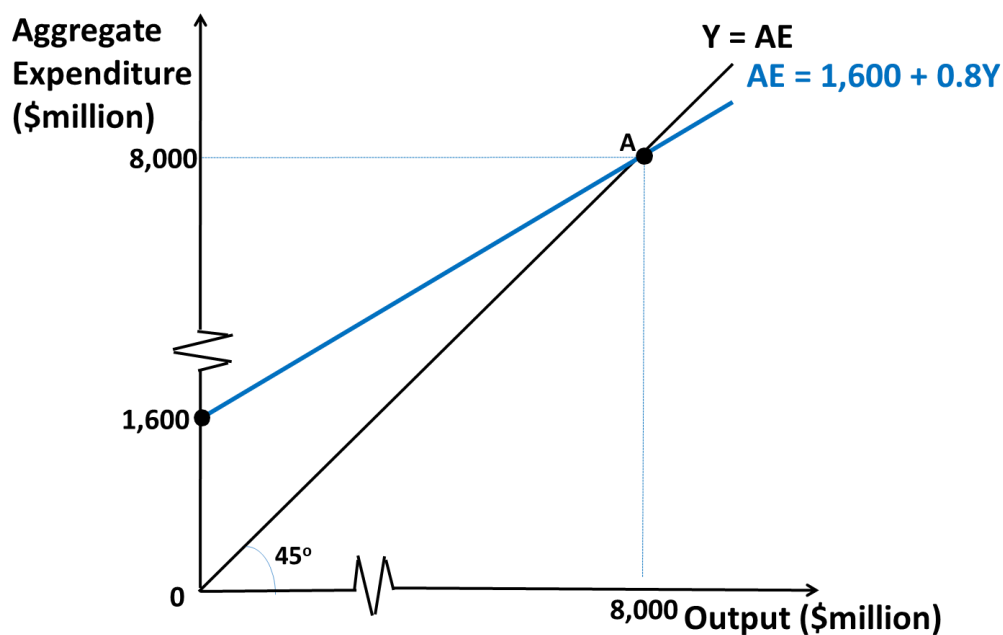
- Numerator = unemployed + **discouraged workers** + unavailable job seekers + available potential job seekers + time-related under-employed persons = 242,000.
- Denominator = labour force + **discouraged workers** + unavailable job seekers + potential available job seekers = 2,447,800.

The correct answer should be 9.5%, constructed as a ratio of the following:

- Numerator = unemployed + ~~discouraged workers~~ + unavailable job seekers + available potential job seekers + time-related under-employed persons = 230,400.
- Denominator = labour force + ~~discouraged workers~~ + unavailable job seekers + potential available job seekers = 2,436,200.

## Q1

a. Refer to the diagram below. The units for all equations will be millions of dollars



Aggregate expenditure:  $AE = C + I^P + G + NX$

$$= (800 + 0.8(Y - 500)) + 500 + 300 + 400$$

$$= 1,600 + 0.8Y$$

Firm's desired output (depicted as the 45-degree line):  $Y = AE$

Let  $Y^*$  denote equilibrium output.

In equilibrium:  $Y^* = 1,600 + 0.8Y^*$

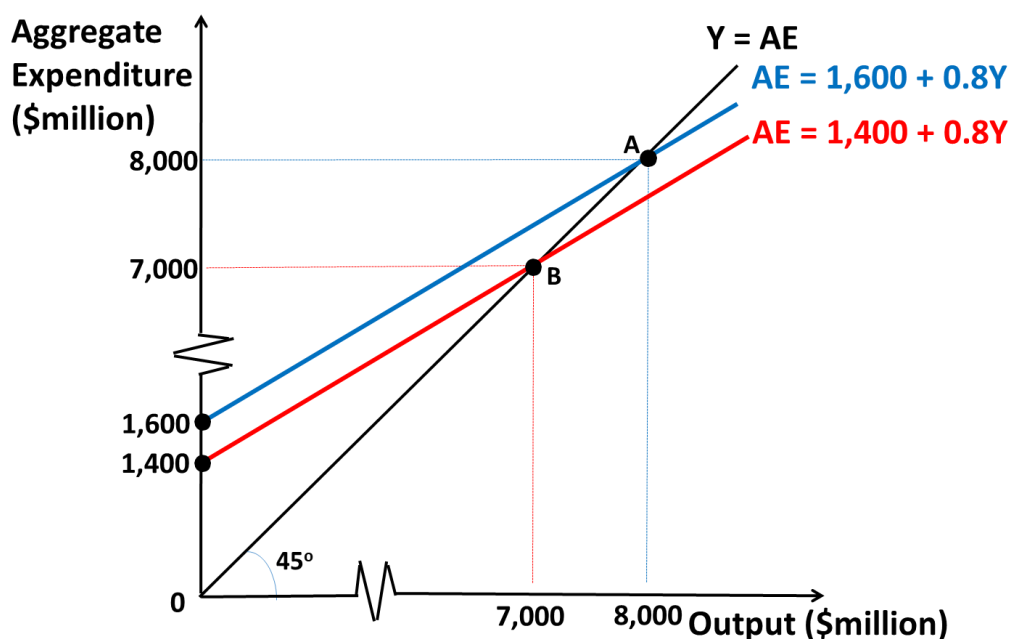
$$Y^* = \frac{1}{1 - 0.8} (1,600) = 8,000.$$

Thus, equilibrium output is verified to be \$8,000 million.

In the diagram, the economy's aggregate expenditure curve is given by the blue line, which has a slope of 0.8. The equilibrium is given by point A.

b.

- i. The expenditure multiplier is  $\frac{1}{1-0.8} = 5$ . Thus, for an initial change in government expenditure of  $-\$200$  million,  $Y^*$  changes by  $5 \times -\$200$  million  $= -\$1,000$  million. The new equilibrium output is thus  $\$8,000$  million  $- \$1,000$  million  $= \$7,000$  million. In the diagram below, the AE line shifts down from the blue line to the red line. The new equilibrium is at point B.



- ii. As government expenditure falls (shift in the AE line), firms' inventories increase, which prompts firms to reduce output. Households thus receive less income, and in turn respond by reducing consumption expenditure. Aggregate expenditure thus falls. This, in turn, leads to inventories increasing, continuing the process until output and aggregate expenditure are once again equal. This account describes the multiplier process. Note: a fall in an autonomous spending component is sometimes called a **negative demand shock**.

## Q2

- a. Yes. In every economy, tax receipts tend to rise when the economy's GDP rises. This is because many taxes are set as percentages of income or sales. Singapore's GST, for example, is set at 7 percent of a product's price. As more goods get sold, GST collection by the government rises.

b.

The consumption function is now:  $C = 800 + 0.8(Y - 0.0625Y) = 800 + 0.75Y$ .

Aggregate expenditure is now:

$$\begin{aligned} AE &= C + I^P + G + NX \\ &= (800 + 0.75Y) + 500 + 300 + 400 \\ &= 2,000 + 0.75Y \end{aligned}$$

Firm's desired output is still described by:  $Y = AE$

In equilibrium:  $Y^* = 2,000 + 0.75Y^*$

$$Y^* = \frac{1}{1 - 0.75} (2,000) = 8,000.$$

Thus, equilibrium output for Taxia is also \$8,000 million.

- c. Taxia's aggregate expenditure line, given by the equation  $AE = 2,000 + 0.75Y$ , has a gentler slope of 0.75 when compared to 0.8 for Keynesia's aggregate expenditure line.
- d.
- i. The expenditure multiplier is now  $\frac{1}{1-0.75}$ . Thus, for an initial fall in government expenditure of \$200 million,  $Y^*$  will fall by  $\$200 \text{ million} \times \frac{1}{1-0.75} = \$800 \text{ million}$ . The new equilibrium output is then  $\$8,000 \text{ million} - \$800 \text{ million} = \$7,200 \text{ million}$ . This is quite a bit higher than Keynesia's equilibrium output when facing the same negative demand shock.
  - ii. The nature of Taxia's tax system weakens the multiplier process by partially counteracting the fall in consumption induced by the demand shock. Thus, the economy's output reacts less strongly to the demand shock. This tax system is an example of an **automatic stabilizer** built into Taxia's fiscal policy. Diagrammatically, as described in part b, the slope of the AE line is gentler, and thus the multiplier becomes smaller.

**Q3**

- a. Yes. While planned investment is supposed to be forward-looking, chiefly concerned with future economic prospects, such expectations about the future can be heavily influenced by the state of the economy today. When GDP is rising, businesses become more optimistic that they can sell more goods and services in the future, which would prompt them to increase their planned investment today.

b.

The investment function is now  $I^P = 100 + 0.05Y$ .

Aggregate expenditure is now:

$$\begin{aligned} AE &= C + I^P + G + NX \\ &= (800 + 0.8(Y - 500)) + (100 + 0.05Y) + 300 + 400 \\ &= 1,200 + 0.85Y \end{aligned}$$

Firm's desired output:  $Y = AE$

In equilibrium:  $Y^* = 1,200 + 0.85Y^*$

$$Y^* = \frac{1}{1 - 0.85} (1,200) = 8,000.$$

Thus, equilibrium output for Investia is also \$8,000 million.

- c. Investia's aggregate expenditure line, given by the equation  $AE = 1,200 + 0.85Y$ , has a steeper slope of 0.85 when compared to Keynesia's aggregate expenditure line.

d.

- i. The expenditure multiplier is now  $\frac{1}{1-0.85}$ . Thus, for an initial fall in government expenditure of \$200 million,  $Y^*$  will fall by \$200 million  $\times \frac{1}{1-0.85} = \$1,333$  million. The new  $Y^*$  is thus \$8,000 million  $- \$1,333$  million = \$6,667 million. This is a bigger reduction than that affecting Keynesia's equilibrium output when facing the same negative demand shock.
- ii. The nature of planned investment strengthens the multiplier process. Thus, the economy's output has a greater reaction to a demand shock, and thus exhibits greater volatility. We say that planned investment's behavior here makes it an **automatic destabilizer**.

**Q4**

a.

Equilibrium for a closed economy is given by the equilibrium condition:

$$Y = C + I^P + G.$$

By the definition of saving,

$$S = Y - T - C.$$

Rearranging gives

$$Y = C + S + T.$$

Thus, replacing  $Y$  in the equilibrium condition with  $C + S + T$ , gives us an alternative formulation of the equilibrium condition:  $S + T = I^P + G$ .

Note: in many textbooks,  $S$  and  $T$  are labelled as **leakages** from spending, while  $I^P$  and  $G$  as labelled as **injections** to spending. The equation  $S + T = I^P + G$  can thus be described as **leakages = injections**.

Upon rearranging,

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

b.

$S$  rises immediately by \$100. But this means that autonomous consumption falls by \$100. This is a negative demand shock.

This fall in autonomous consumption starts the multiplier process, which eventually reduces equilibrium output (and income) by  $\frac{1}{1-b} \times \$100$ .

Given that  $T$  is autonomous, for every \$1 of income lost,  $C$  falls by  $b$  and  $S$  falls by  $(1 - b)$ . With  $\frac{1}{1-b} \times \$100$  of income reduction,  $S$  falls by  $(1 - b) \frac{1}{1-b} \times \$100 = \$100$ .

Thus,  $S$  falls back to its initial value.

This modeling exercise illustrates an old idea called the **Paradox of Thrift** that Keynes popularized (though he did not invent it). When households decide to save more, incomes fall, and jobs are lost. Consequently, households may not in the end achieve higher saving.

c.

In the Keynesian model, attempts by households to cut consumption expenditure (to increase saving) results in a fall in the economy's output. Thus, these attempts are, in the short run, bad for the economy.

In the Classical model, via Say's Law, the same attempts automatically result in a falling interest rate in the loanable funds market. Consequently, planned investment expenditure rises by an equal and opposite amount as the fall in consumption. When the consequent addition to the capital stock eventually becomes available for production purposes, the economy's output will have grown. Thus, attempts to save are, in the long run, good for the economy.

d.

For Class discussion during tutorial. No solutions are provided.

**Q5**

a.

A well-targeted fiscal stimulus provides spending assistance to those who need it the most, and to those who are most likely to spend. Fortunately, those who need financial assistance the most tend to coincide with those who are most likely to spend when given such assistance.

For example,

- Poor households tend to have higher-than-average marginal propensities to consume - their incomes are hardly enough to make ends meet, so they will spend most of any income increment.
- The unemployed are much more likely to need (and to spend) financial assistance than those who have kept their jobs.
- Businesses that are hard hit by the recession are more likely to spend if given financial assistance than businesses that are less affected by the recession.

b.

For class discussion during tutorials. No solutions are provided.

c.

Factors that weaken the case for discretionary fiscal policy include

- High saving rate: MPC is small, and thus expenditure multipliers are small.
- Open economy: much of the fiscal stimulus will be spent on imported goods, again making expenditure multipliers smaller compared to other countries.

Factors that strengthen the case include

- Short implementation lags because of the ability to disburse transfers quickly.
- Short decision lags because the Singapore government can make quick decisions.
- Less worry about long-term crowding out, because the Singapore government does not need to borrow to finance its deficit.