ECON2113 Macroeconomics

Chapter 10 Exercises

Solutions

1.

a. $AD = C + I = 100 + (0.8)Y + 50 = 150 + (0.8)Y$

The equilibrium condition is $Y = AD$ ==>

$Y = 150 + (0.8)Y$ ==> $(0.2)Y = 150$ ==> $Y = 5*150 =$ **750**.

b. Since $TA = TR = 0$, it follows that $S = YD - C = Y - C$. Therefore

$S = Y - [100 + (0.8)Y] = - 100 + (0.2)Y$ ==> $S = - 100 + (0.2)750 = - 100 + 150 =$ **50.**

As we can see $S = I$, which means that the equilibrium condition is fulfilled.

c. If the level of output is $Y = 800$, then $AD = 150 + (0.8)800 = 150 + 640 =$ **790.**

Therefore the amount of involuntary inventory accumulation is

$UI = Y - AD = 800 - 790 =$ **10**.

d. $AD' = C + I' = 100 + (0.8)Y + 100 = 200 + (0.8)Y$

From $Y = AD'$ ==> $Y = 200 + (0.8)Y$ ==> $(0.2)Y = 200$ ==> $Y = 5*200 =$ **1,000**

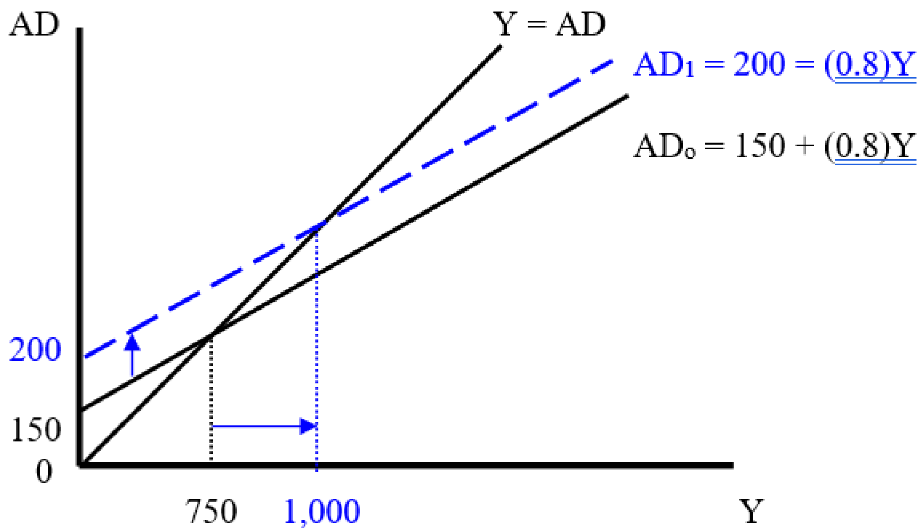
Note: This result can also be achieved by using the multiplier formula:

$\Delta Y = (\text{multiplier})(\Delta Sp) = (\text{multiplier})(\Delta I)$ ==> $\Delta Y = 5*50 =$ **250**,

that is, output increases from $Y_o = 750$ to $Y_1 = 1{,}000$.

e. From **1.a.** and **1.d.** we can see that the multiplier is $\boldsymbol{\alpha = 5}$.

f.



2.

a. Since the mpc has increased from 0.8 to 0.9, the size of the multiplier is now larger. Therefore we should expect a higher equilibrium income level than in **1.a.**

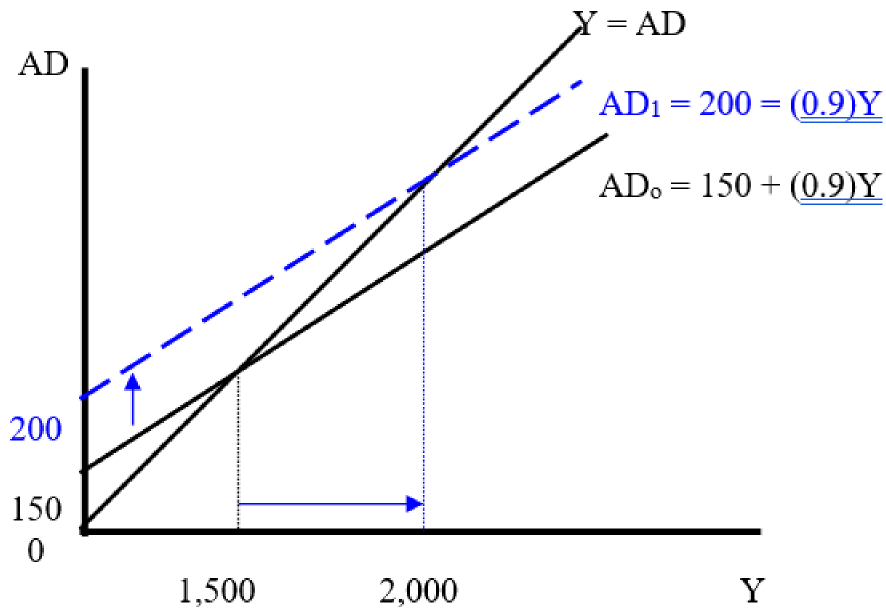
$AD = C + I = 100 + (0.9)Y + 50 = 150 + (0.9)Y \implies$

$Y = AD \implies Y = 150 + (0.9)Y \implies (0.1)Y = 150 \implies Y = 10*150 = \mathbf{1{,}500}$.

b. From $\Delta Y = (\text{multiplier})(\Delta I) = 10*50 = 500 \implies Y_1 = Y_o + \Delta Y = 1{,}500 + 500 = \mathbf{2{,}000}$.

c. Since the size of the multiplier has doubled from $\alpha = 5$ to $\alpha^1 = 10$, the change in output (Y) that results from a change in investment (I) now has also doubled from 250 to **500**.

d.



3.

a. $AD = C + I + G + NX = 50 + (0.8)YD + 70 + 200 + 0 = 320 + (0.8)[Y - TA + TR]$

$= 320 + (0.8)[Y - (0.2)Y + 100] = 400 + (0.8)(0.8)Y = 400 + (0.64)Y$

From $Y = AD \implies Y = 400 + (0.64)Y \implies (0.36)Y = 400$

$\implies Y = (1/0.36)400 = (2.78)400 =$ **1,111.11**

The size of the multiplier is $\alpha = 1/0.36 =$ **2.78**.

b. $BS = tY - TR - G = (0.2)(1{,}111.11) - 100 - 200 = 222.22 - 300 =$ **- 77.78**

c. $AD' = 320 + (0.8)[Y - (0.25)Y + 100] = 400 + (0.8)(0.75)Y = 400 + (0.6)Y$

From $Y = AD' \implies Y = 400 + (0.6)Y \implies (0.4)Y = 400$

$\implies Y = (2.5)400 =$ **1,000**

The size of the multiplier is now reduced to $\alpha^1 = (1/0.4) =$ **2.5**.

d. The size of the multiplier and equilibrium output will both increase with an increase in the marginal propensity to consume. Thus income tax revenue will also go up and the budget surplus should increase. This can be seen as follows:

$BS' = (0.25)(1{,}000) - 100 - 200 = -50 \quad ==> \quad BS' - BS = -50 - (-77.78) = \mathbf{+\,27.78}$

e. If the income tax rate is t = 1, then all income is taxed. There is no induced spending and equilibrium income always increases by exactly the change in autonomous spending. We can see this from

$$Y = C + I + G ==> Y = C_o + c(Y - TA + TR) + I_o + G_o = C_o + c(Y - 1Y + TR_o) + I_o + G_o$$

$$==> \quad Y = C_o + cTR_o + I_o + G_o = A_o$$

$$==> \quad \Delta Y = \Delta A_o$$

It should be noted that when t = 1 and all income is taxed, it is unlikely that much economic activity will take place other than activity in the "underground economy," as there are no economic incentives to earn income. As the above equation shows, all income comes from autonomous spending, that is, spending that is predetermined and thus not dependent on currently earned income.

4.

a. While an increase in government purchases by $\Delta G = 10$ will change intended spending by $\Delta Sp = 10$, a decrease in government transfers by $\Delta TR = -10$ will change intended spending by a smaller amount, that is, by only $\Delta Sp = c(\Delta TR) = c(-10)$. Thus the change in intended spending equals $\Delta Sp = (1 - c)(10)$ and equilibrium income should therefore increase by

$$\Delta Y = (\text{multiplier})(1 - c)10.$$

b. If c = 0.8 and t = 0.25, then the size of the multiplier is

$$\alpha = 1/[1 - c(1 - t)] = 1/[1 - (0.8)(1 - 0.25)] = 1/[1 - (0.6)] \quad = 1/(0.4) = \mathbf{2.5}.$$

The change in equilibrium income is therefore

$$\Delta Y \quad = \quad \alpha(\Delta A_o) = \alpha[\Delta G + c(\Delta TR)] = (2.5)[10 + (0.8)(-10)] = (2.5)2 = \mathbf{5}$$

c. The budget surplus should increase, since the level of equilibrium income has increased and therefore the level of tax revenues has increased, while the changes in government purchases and transfer payments cancel each other out. Numerically, this can be shown as follows:

$\Delta BS = t(\Delta Y) - \Delta TR - \Delta G = (0.25)(5) - (-10) - 10 = \mathbf{1.25}$