

Principles of Macroeconomics

Topic 3 Part 3

Aggregate Expenditure and Equilibrium Output (CH 8)

Aggregate Expenditure and Aggregate Output

Three Versions of AE:

1. $AE = C + I$
2. $AE = C + I + G$
3. $AE = C + I + G + (X - M)$

We are currently studying the first version.

The Forgotten Key Points

This model is called the “Keynesian Cross”.

It is a “short-run” model.

Short Run: a period where at least one factor of production is fixed.

For example, in a short run, firms cannot build a new factory because land and capital are fixed.

Long Run: a period where all factors of production are variable.

The Forgotten Key Points

Since Keynesian Cross is a short-run model, we observe “sticky price” and hence no inflation in this model.

As a result, recall from **Topic 3 Part 1 Page 5** that

- In our **short-run** analysis, we will assume the sticky price, i.e. **the price level is constant**, and there is no inflation.
- As a result, real output = nominal output.

The Forgotten Key Points

The Keynesian Cross is based on Keynes' concept that **Demand creates Supply.**

Recall that to solve $Y = AE$, we first find the AE.

Then, we can solve for Y^* .

This procedure reflects that concept that **how much people produce depends on how much people demand.**

That is, **Demand creates Supply.**

Change in the Equilibrium

- The “adjustment towards equilibrium” is about the goods market returning to its **Original** equilibrium.
- We also have the case where the equilibrium completely changes. Here, we will have a **New** equilibrium.
- **This occurs when AE changes.**
- For example, what happens if I increases from 25 to 50?

Change in the Equilibrium

- Now, we have $C = 100 + 0.75Y$ and $I = 50$.
- Using $Y = AE = C + I$, we solve for $Y^* = 600$.
- Recall that when $I = 25$, $Y^* = 500$.
- **Hence, an increase in investment of 25 leads to an increase in the equilibrium output of 100.**

The Multiplier

- This is the result of the “multiplier” effect.
- The key idea is that “**one man’s spending is another man’s income**”.
- For example, suppose $MPC = 0.8$.
 - When you receive \$100 from you mom and you use \$80 (you save \$20), the \$80 you use will become an income of Mr.A.
 - Mr.A then use \$64 (he saves \$16), and the 64 he uses will become an income of Mr.B.
 - Mr.B uses this money, and the loop continues.

The Multiplier

- **multiplier** The ratio of the change in the equilibrium level of output to a change in some exogenous variable.
- Multiplier = $\Delta Y / \Delta \text{Exogenous Variable}$
- Exogenous Variables: Autonomous Investment, Autonomous Consumption, Tax, Government Spending, Export, Import, and so on.

The Multiplier

Interpretation

- Consider the “investment” multiplier, $\Delta Y / \Delta I = 4$.
- This means when I increases by 1, Y will increase by 4.
- In our example from Page 4, an increase in I of 25 causes Y leads to an increase in Y of 100. Thus, investment multiplier in this example is 4.

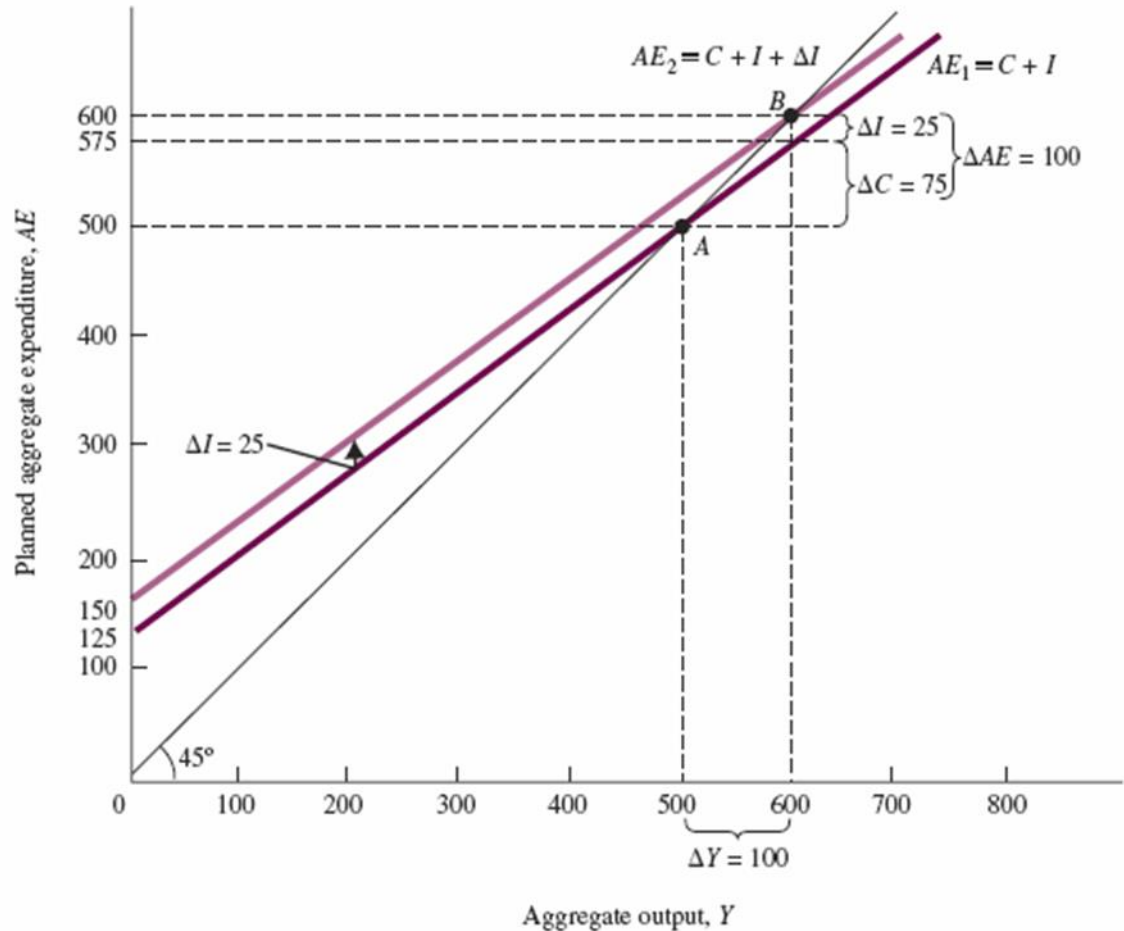
The Multiplier as Seen in the Planned Aggregate Expenditure Diagram

At point *A*, the economy is in equilibrium at $Y = 500$. When I increases by 25, planned aggregate expenditure is initially greater than aggregate output.

As output rises in response, additional consumption is generated, pushing equilibrium output up by a multiple of the initial increase in I .

The new equilibrium is found at point *B*, where $Y = 600$.

Equilibrium output has increased by 100 ($600 - 500$), or *four times* the amount of the increase in planned investment.



Deriving the Multiplier

- Recall that $\text{Multiplier} = \Delta Y / \Delta \text{Exogenous Variable}$.
- Let's derive the “investment multiplier” or $\Delta Y / \Delta I$.
- $Y = C + I$, with $C = a + bY$ and $I = I_0$ (a constant).
- $Y = a + bY + I$.
- **Note that we will not substitute $I = I_0$ into the equation because we want to find $\Delta Y / \Delta I$ and we need I to be a “variable”, not a constant.**

Deriving the Multiplier

- From $Y = a + bY + I$, we need to find $\Delta Y / \Delta I$.
- $Y - bY = a + I$
- $(1 - b)Y = a + I$
- $Y = \frac{1}{1-b} (a + I)$
- $\frac{\Delta Y}{\Delta I} = \frac{1}{1-b}$
- Recall that $b = \text{MPC}$, so investment multiplier $= \frac{1}{1-\text{MPC}}$.

The Size of the Multiplier

- Investment Multiplier $= \frac{\Delta Y}{\Delta I} = \frac{1}{1-MPC}$.
- Note that when **MPC is LARGE**, the multiplier is **LARGE**.
- This means **when Investment increases, the output will increase A LOT**.
- **Intuition**
 - When people spend a lot of money (high MPC), others will receive a lot of money as their incomes.
 - They will spend a lot too, and many will receive a lot.
 - The economy will grow a lot.

The Size of the Multiplier

- Recall that MPC is the slope of the AE line.
- When AE is steep (high MPC), the multiplier is large.

Investment Function – Revisit

- So far, we assume that I is exogenous and is given.
- However, recall the Investment Function: $I = I_0 + I_1Y$.
- $I_1 = \Delta I / \Delta Y$ represents
 - The slope of Investment Function
 - The sensitivity of investment to an income change.
 - The Marginal Propensity to Invest (MPI).
- In this case, I also depends on income Y , and we call this **“Induced Investment”**.

Investment Function – Revisit

- Let $C = 100 + 0.60Y$ and $I = 50 + 0.20Y$. Find Y^* .

Investment Function – Revisit

- Let $C = C_0 + C_1Y$ and $I = I_0 + I_1Y$. Derive $\Delta Y / \Delta I$.