

Principles of Macroeconomics

Topic 3 Part 2

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.

We also finished the consumption component of AE.

We will now look at the investment component.

Planned Investment (I) versus Actual Investment

- Inventory is the stock of goods, awaiting sale.
- **planned investment (I)** Those additions to capital stock and inventory that are planned by firms.
- However, inventories may build up or decline when as firms face unexpected events, so we differentiate between planned investment and actual investment.

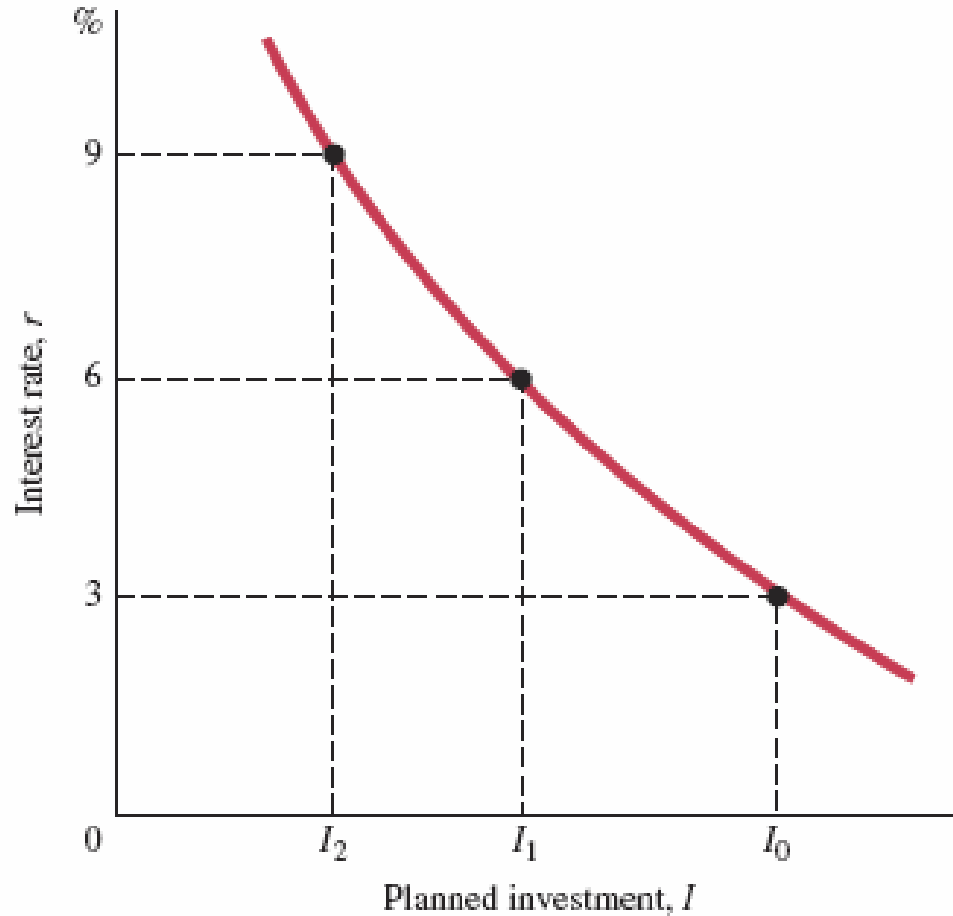
Planned Investment (I) versus Actual Investment

- **actual investment** The actual amount of investment that takes place; it includes items such as unplanned changes in inventories.
- If a firm overestimates how much it will sell in a period, it will end up with more inventory than it planned to have.

Planned Investment (I) and the Interest Rate (r)

- Increasing the interest rate, *ceteris paribus*, is likely to reduce the level of planned investment spending.
- When the interest rate falls, it becomes less costly to borrow, and more investment projects are likely to be undertaken.

Planned Investment Schedule



Planned investment spending is a negative function of the interest rate. An increase in the interest rate from 3% to 6% reduces planned investment from I_0 to I_1 .

Other Determinants of Planned Investment

- The optimism or pessimism of entrepreneurs about the future course of the economy can have an important effect on current planned investment.
- Keynes used the phrase *animal spirits* to describe the feelings of entrepreneurs, i.e. their instincts and emotions that possibly guide human behavior.

Other Determinants of Planned Investment

- The decision of a firm on how much to invest depends, among other things, on its expectation of future sales.
- Higher aggregate output (income) implies that people are richer, and hence investment is likely to be profitable.
- If capital becomes more “productive” due to better technology, more investment is likely to be undertaken.

Investment Function

- We now introduce the Investment Function:

$$I = I_0 + I_1 Y \quad \text{with } I_1 > 0$$

I_0 is autonomous/exogenous investment

I_1 is the sensitivity of investment to change in income.

- It tells us how I will change when Y change, e.g.
if $I_1 = 2$, then when Y rises by 1 unit, I will rise by 2 units.
- However, to simplify the analysis, we will assume $I = I_0$.
That is, the planned investment equals to some constant.

The Determination of Equilibrium Output

- **equilibrium** In the macroeconomic goods market, equilibrium occurs when aggregate expenditure is equal to aggregate output (demand equals supply).
- Equilibrium Condition: $Y = AE$
- Recall that $AE = C + I$
- So, equilibrium can also be written:

$$Y = C + I$$

The Determination of Equilibrium Output

- Find the equilibrium level of output (income) algebraically:

$$\begin{aligned} Y &= C + I && \text{(equilibrium)} \\ C &= 100 + 0.75Y && \text{(consumption function)} \\ I &= 25 && \text{(planned investment)} \end{aligned}$$

$$Y = \underbrace{100 + 0.75Y}_C + \underbrace{25}_I$$

Rearranging terms, we get the equilibrium Y:

$$\begin{aligned} Y - 0.75Y &= 100 + 25 \\ 0.25Y &= 125 \\ Y &= \frac{125}{0.25} = 500 \end{aligned}$$

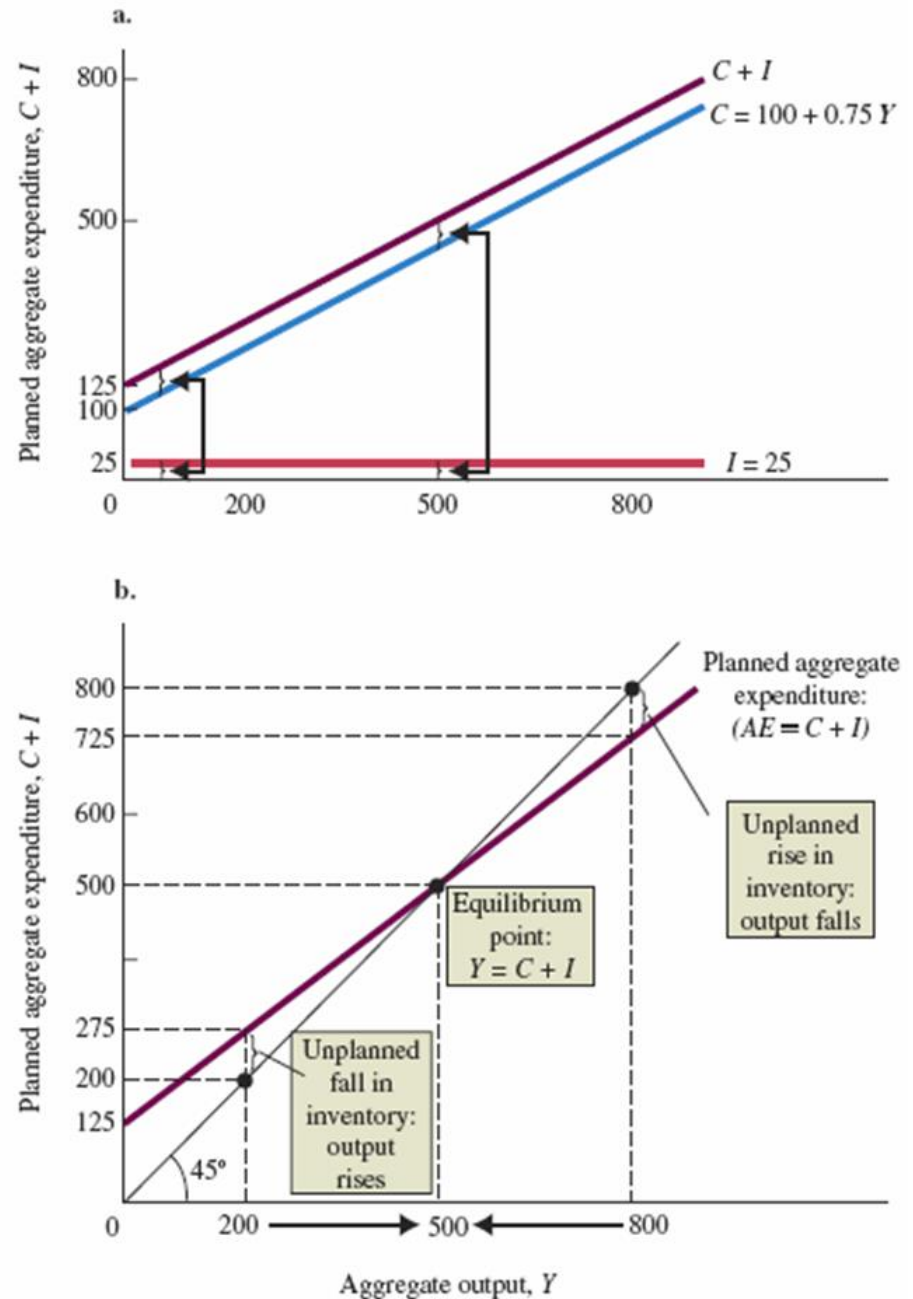
Equilibrium Aggregate Output

Equilibrium occurs when planned aggregate expenditure and aggregate output are equal.

Planned aggregate expenditure is the sum of consumption spending and planned investment spending.

The planned aggregate expenditure function crosses the 45° line at a single point, where $Y = 500$.

The point at which the two lines cross is sometimes called the **Keynesian Cross**.



The Determination of Equilibrium Output

- Note that the goods market may not be in equilibrium.
- However, the market force will automatically move the market towards the equilibrium.
- This process is called “**adjustment towards equilibrium**”.
- In the Keynesian Cross, such adjustment occurs via **changes in inventories**, which induces change in output.

Adjustment towards Equilibrium

$$Y > C + I$$

aggregate output > planned aggregate expenditure

Here, the goods market is not in equilibrium.

If current output exceeds the equilibrium, inventories (unsold output) accumulate, encouraging businesses to cut back on production, moving the economy towards equilibrium.

Adjustment towards Equilibrium

$$C + I > Y$$

planned aggregate expenditure > aggregate output

Once again, the goods market is not in equilibrium.

Similarly, if the level of production is below the equilibrium, then inventories decline, encouraging an increase in production and thus a move towards equilibrium.

Deriving the Planned Aggregate Expenditure Schedule and Finding Equilibrium*

(1) Aggregate Output (Income) (Y)	(2) Aggregate Consumption (C)	(3) Planned Investment (I)	(4) Planned Aggregate Expenditure (AE) $C + I$	(5) Unplanned Inventory Change $Y - (C + I)$	(6) Equilibrium? (Y = AE?)
100	175	25	200	- 100	No
200	250	25	275	- 75	No
400	400	25	425	- 25	No
500	475	25	500	0	Yes
600	550	25	575	+ 25	No
800	700	25	725	+ 75	No
1,000	850	25	875	+ 125	No

* The figures in column 2 are based on the equation $C = 100 + 0.75Y$.

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 $I = 50$.

The Leakage/Injection Approach to Equilibrium

- $Y \equiv C + S$ is an identity. It is always true by definition.
- The equilibrium condition is $Y = C + I$, but this is untrue outside the equilibrium.
- We can substitute $Y \equiv C + S$ into the equilibrium condition:

$$C + S = C + I$$

$$S = I$$

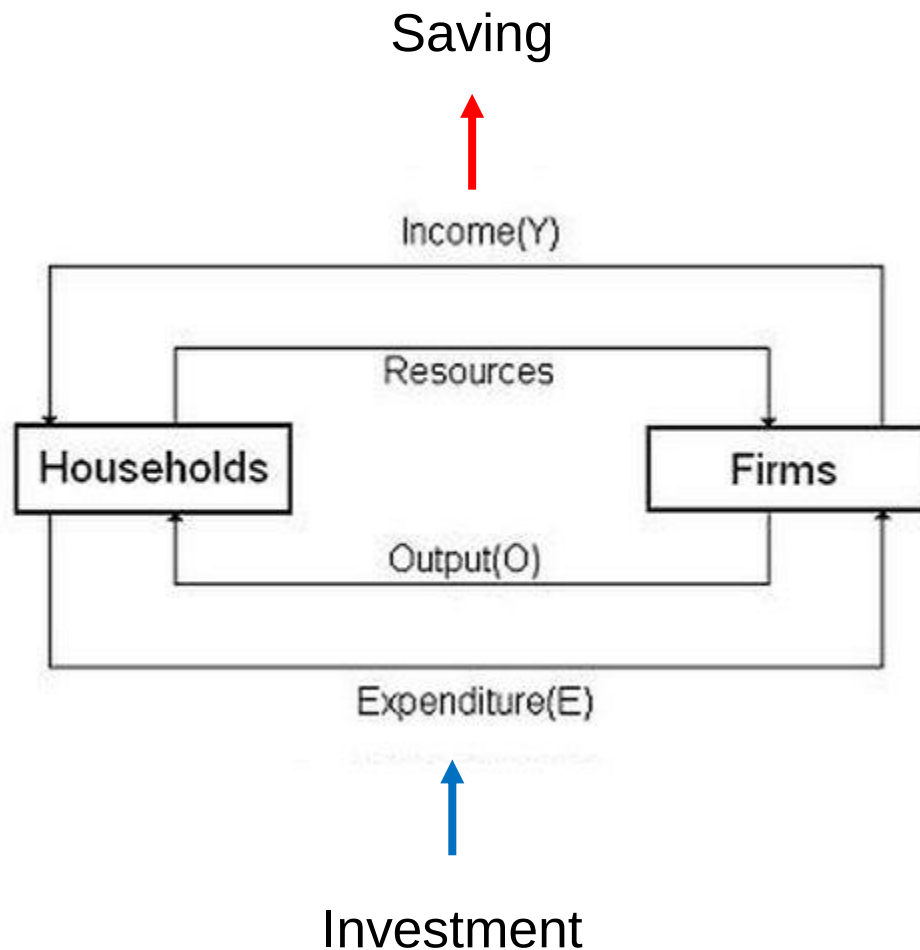
- This is another way to write the equilibrium condition.

The Leakage/Injection Approach to Equilibrium

$$S = I$$

- We call this the “leakage = injection” approach.
- **Leakage means withdrawal from the circular flow**, and it reduce the flow of income.
- When households save incomes, it constitutes leakage.
- **Injection means introduction of income into the flow**, and hence it increase the flow of income.
- When firms borrow savings to finance their investment, it constitutes injection.

The Leakage/Injection Approach to Equilibrium



The Saving/Investment Approach to Equilibrium

$$S = I$$

- Equilibrium occurs only when planned investment equals saving.

$$S = -100 + 0.25Y$$

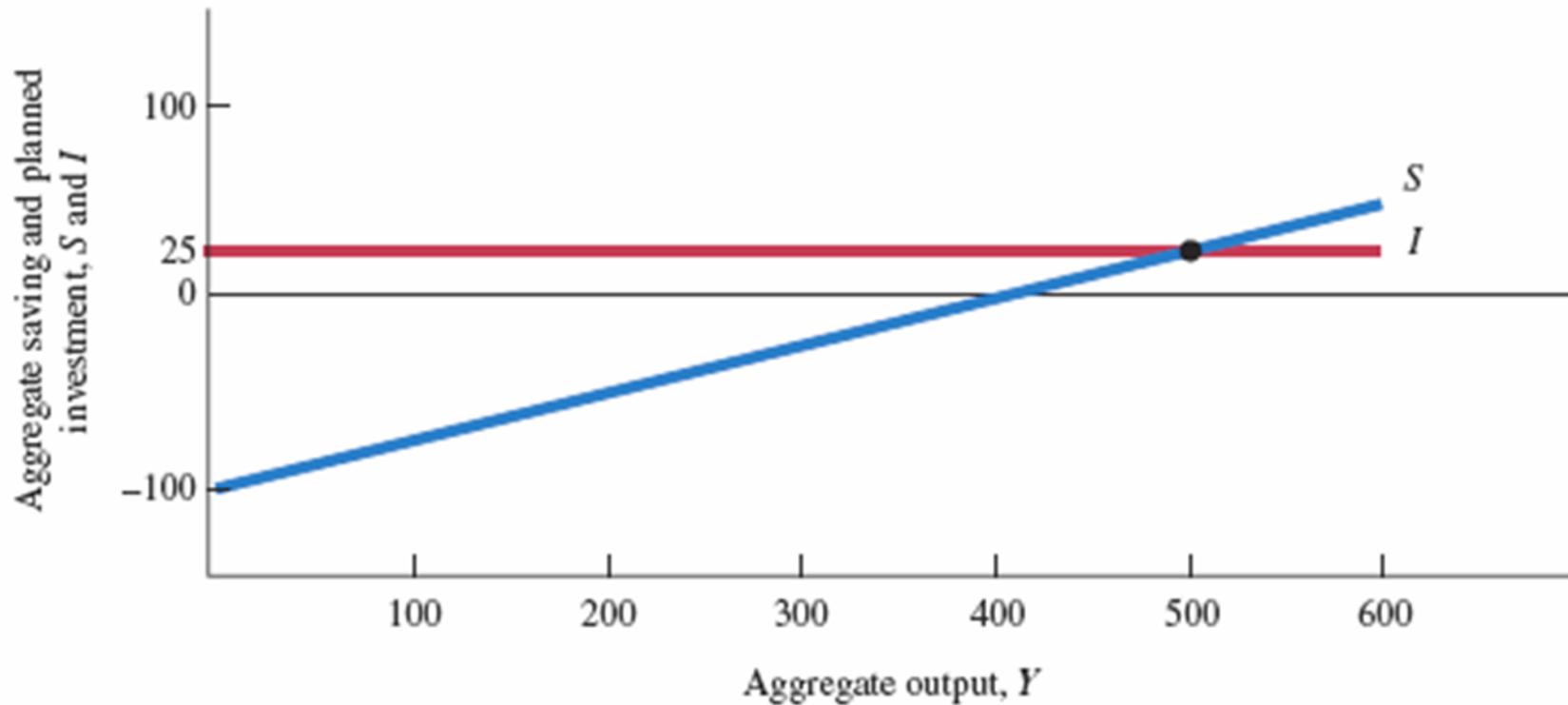
$$I = 25$$

$$25 = -100 + 0.25Y$$

$$125 = 0.25Y$$

$$Y = 500$$

The $S = I$ Approach to Equilibrium



Aggregate output is equal to planned aggregate expenditure only when saving equals planned investment ($S = I$).

Saving and planned investment are equal at $Y = 500$.

ECONOMICS IN PRACTICE

General Motors' Silverado

In 2011, GM increased production of its most profitable pickup truck, the Silverado. But the economy did not recover as fast as business people had expected.

As a result, the inventory of Silverados rose to the level equivalent to 122 days of sales, compared with the normal inventory levels of about 90 days.



THINKING PRACTICALLY

Do you expect inventory turns for the average firm in the economy to increase or decrease as we enter a recession?

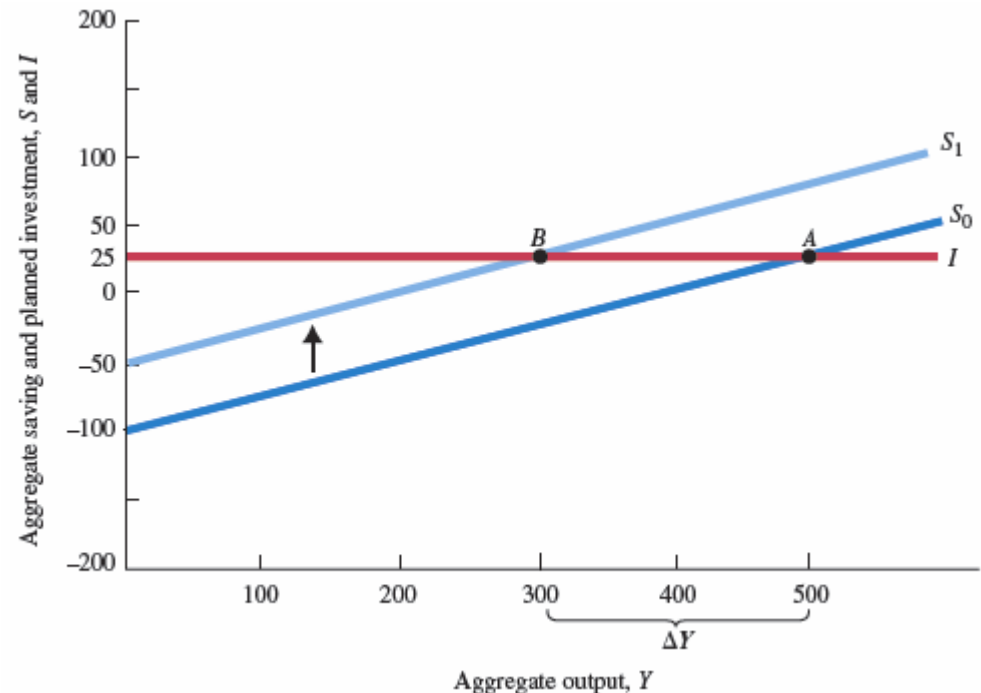
ECONOMICS IN PRACTICE

The Paradox of Thrift

An increase in planned saving from S_0 to S_1 causes equilibrium output to decrease from 500 to 300.

The corresponding decreased consumption leads to a reduction of income.

Increased efforts to save have caused a drop in income but no overall change in saving.



The Paradox of Thrift

The paradox states that

- An increase in autonomous saving leads to a decrease in aggregate expenditure, and thus a decrease in aggregate output.
- Because people now have lower income (= output), the savings they make become smaller.