Universidad de Valladolid

ECO - UVa

Topic 6

Aggregate Demand

Prof. David A. Sánchez-Páez

Outline

1. Circular-flow diagram.

2. Aggregate demand.
   - Slope of the aggregate demand curve.
   - Shifts of the aggregate demand curve.

3. Aggregate demand and consumption function.

4. Aggregate demand and saving and investment.

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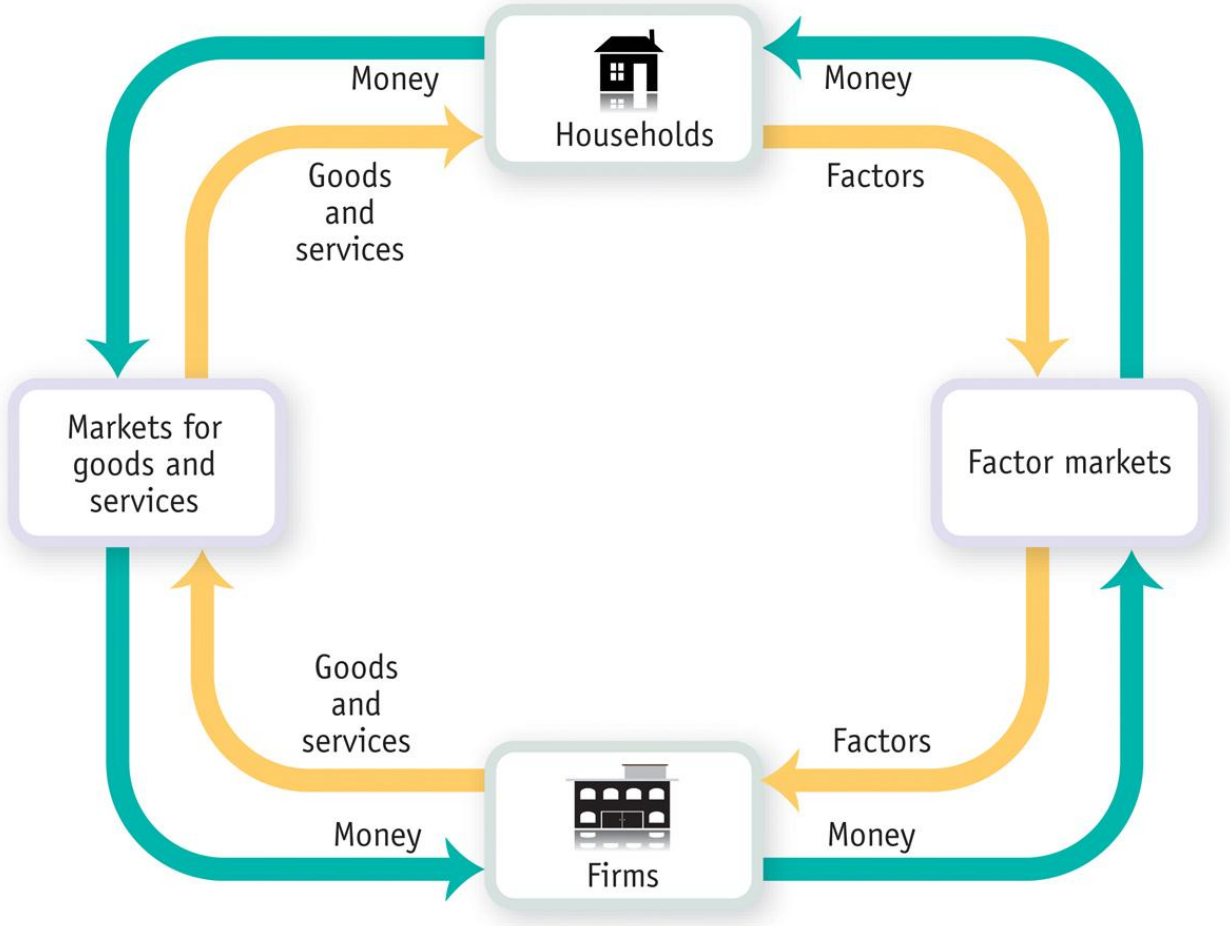
Circular-flow diagram

- **Let us recall** what we studied in Topic 1 of this course.



Source: Krugman and Wells (2015)

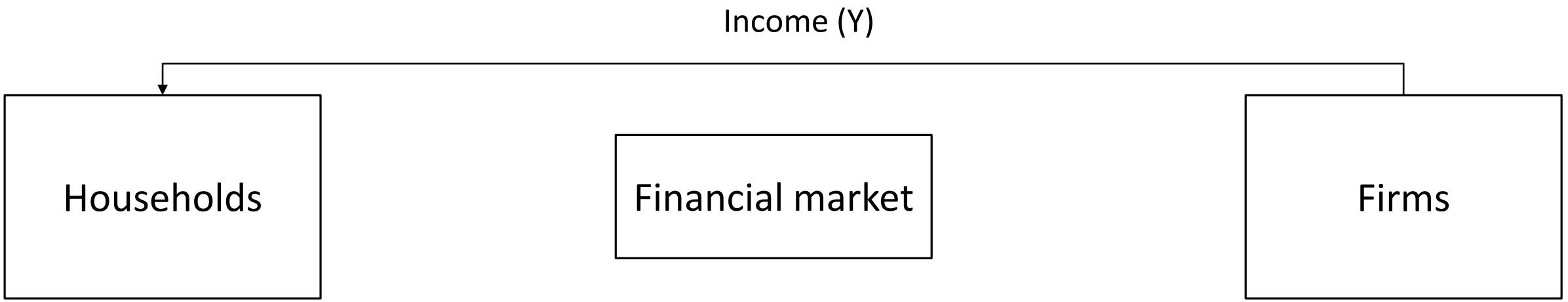
Circular-flow diagram

- Now we are going to focus on the financial flow.

- We will start from a simple model: **economy with no government and no international trade**.

Circular-flow diagram: no government, no international trade

Circular-flow diagram: no government, no international trade



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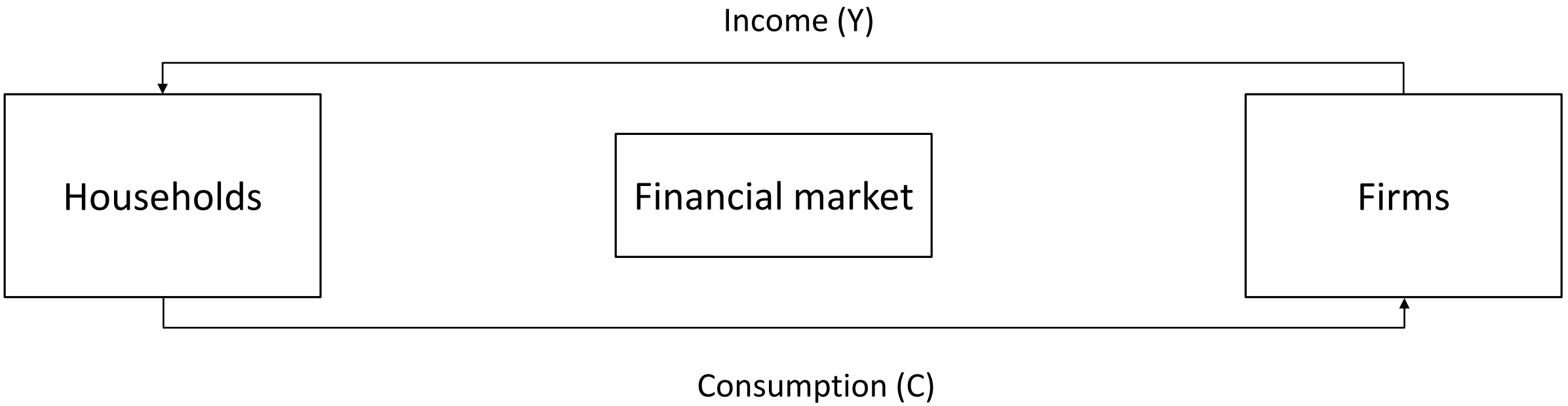

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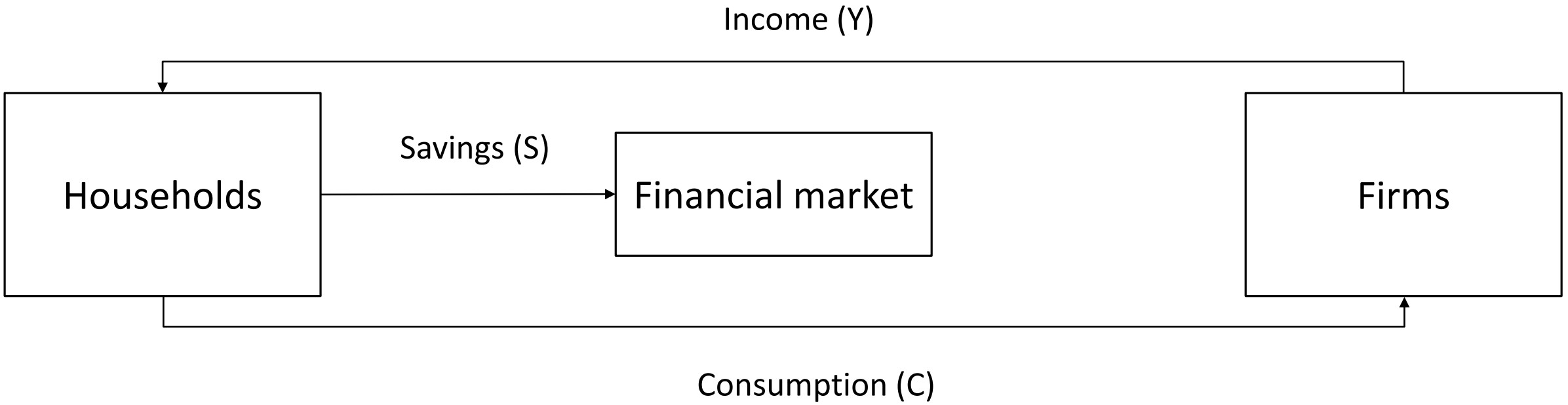

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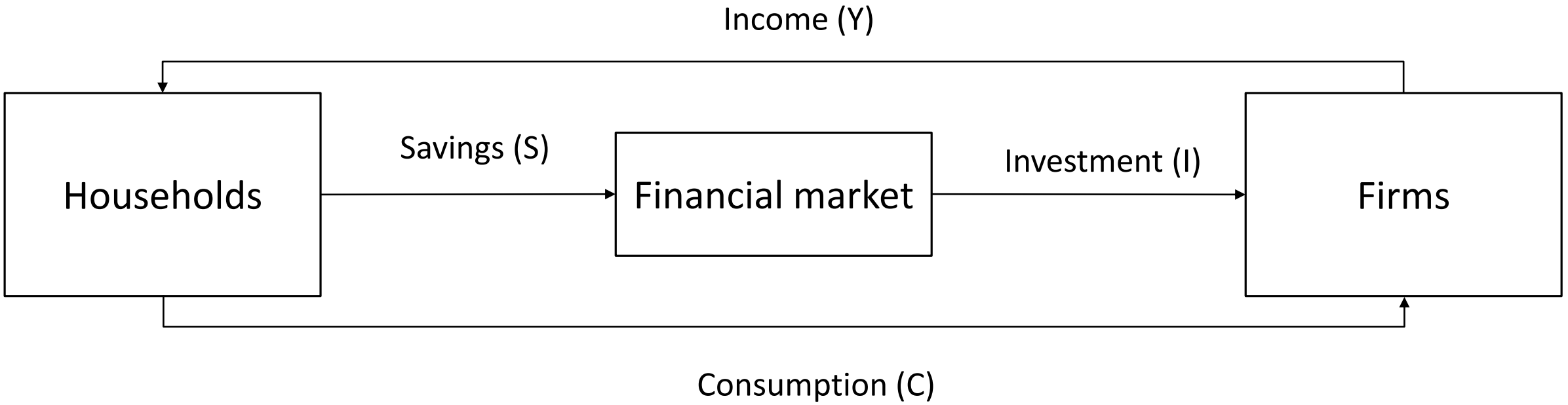


Circular-flow diagram: no government, no international trade

	Income flow		Payments flow
Households	Y		C + S
Firms	C + I		Y
Financial market	S		I

Circular-flow diagram: no government, no international trade

	Income flow	=	Payments flow
Households	Y	=	C + S
Firms	C + I	=	Y
Financial market	S	=	I

Income flow must be equal to payments flow

Circular-flow diagram: no government, no international trade

	Income flow	=	Payments flow
Households	Y	=	C + S
Firms	C + I	=	Y
Financial market	S	=	I

Households: $Y = C + S$

Firms: $Y = C + I$

Circular-flow diagram: no government, no international trade

	Income flow	=	Payments flow
Households	Y	=	C + S
Firms	C + I	=	Y
Financial market	S	=	I

Households: $Y = C + S$

Firms: $Y = C + I$

$$C + S = C + I$$

Circular-flow diagram: no government, no international trade

	Income flow	=	Payments flow
Households	Y	=	C + S
Firms	C + I	=	Y
Financial market	S	=	I

Households: $Y = C + S$

Firms: $Y = C + I$

$C + S = C + I \rightarrow S = I$

Circular-flow diagram: no government, no international trade

	Income flow	=	Payments flow
Households	Y	=	C + S
Firms	C + I	=	Y
Financial market	S	=	I

Households: $Y = C + S$

Firms: $Y = C + I$

$C + S = C + I \rightarrow S = I$

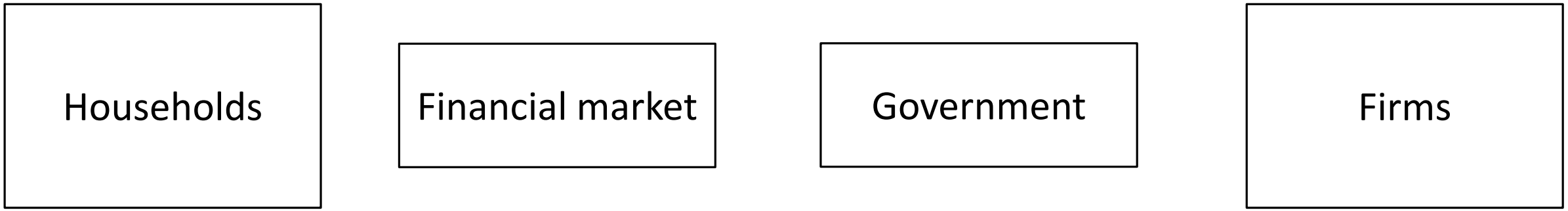
The investment needs of firms **are equal** to the savings of households.

Circular-flow diagram

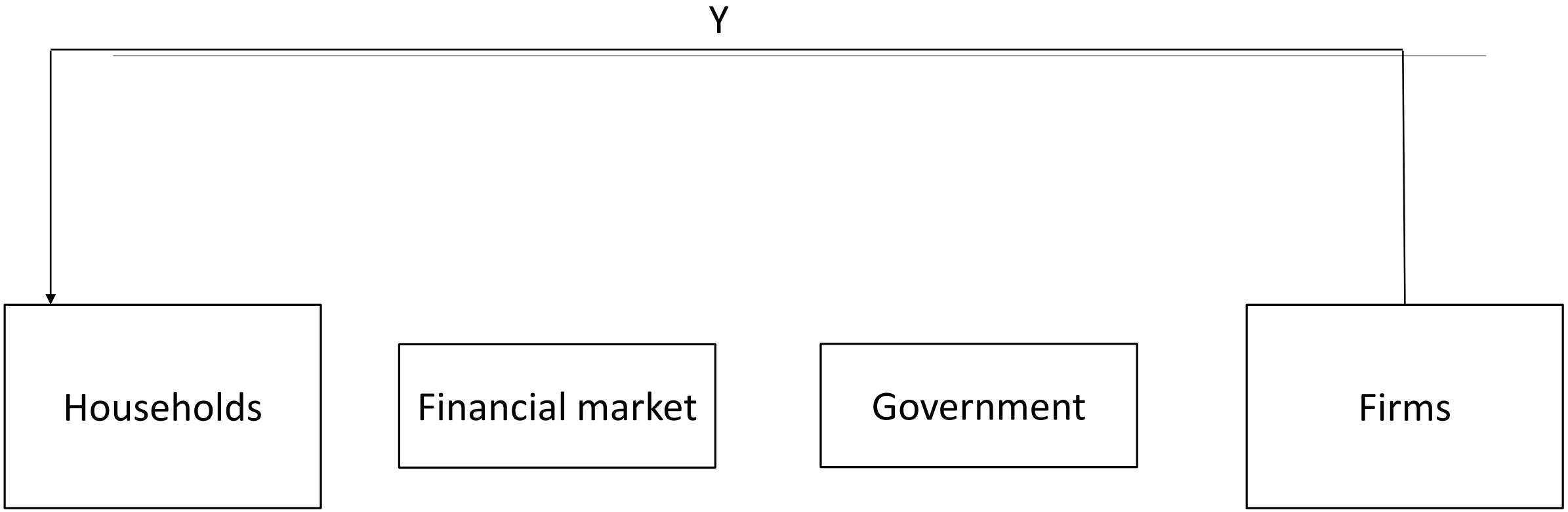
- Now we are going to include the government.

- The model is now: **economy with government, but no international trade**.

Circular-flow diagram: with government, no international trade



Circular-flow diagram: with government, no international trade



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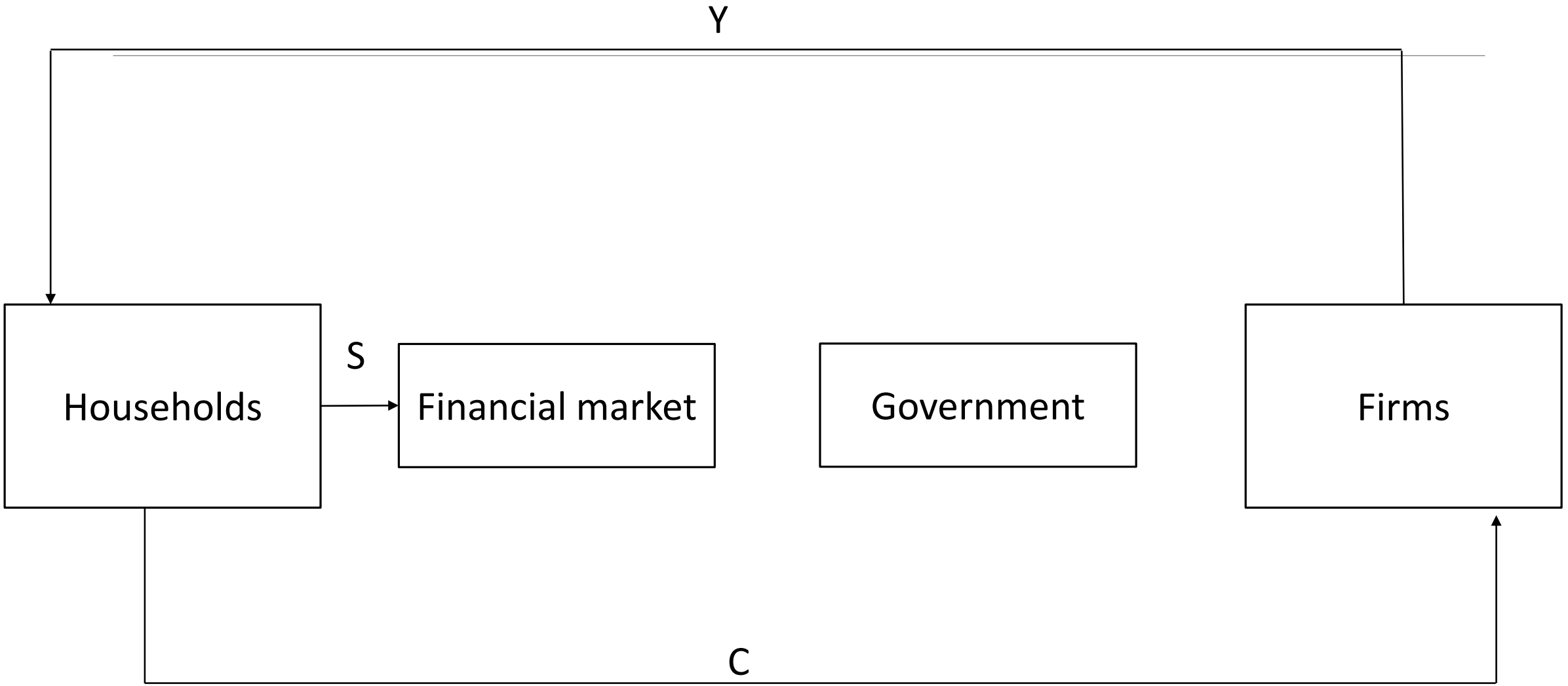

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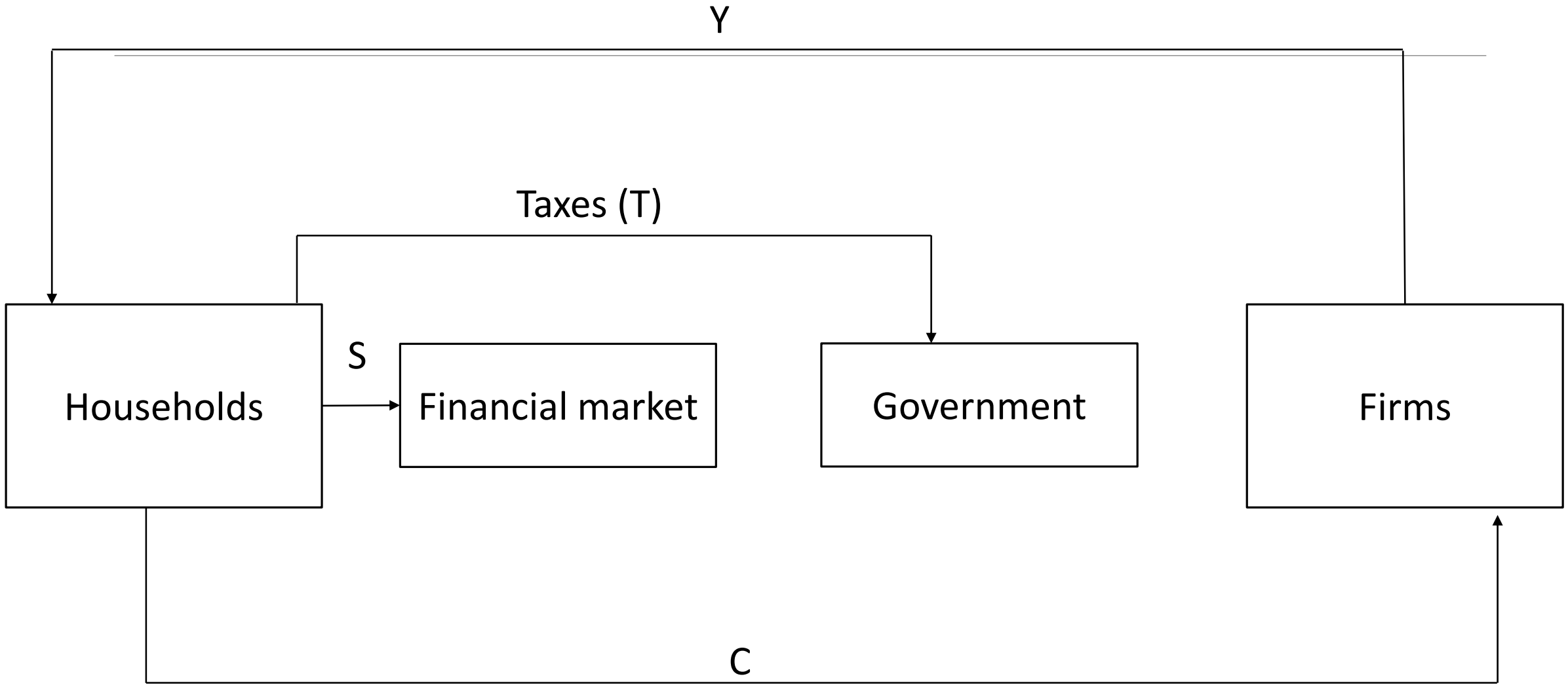
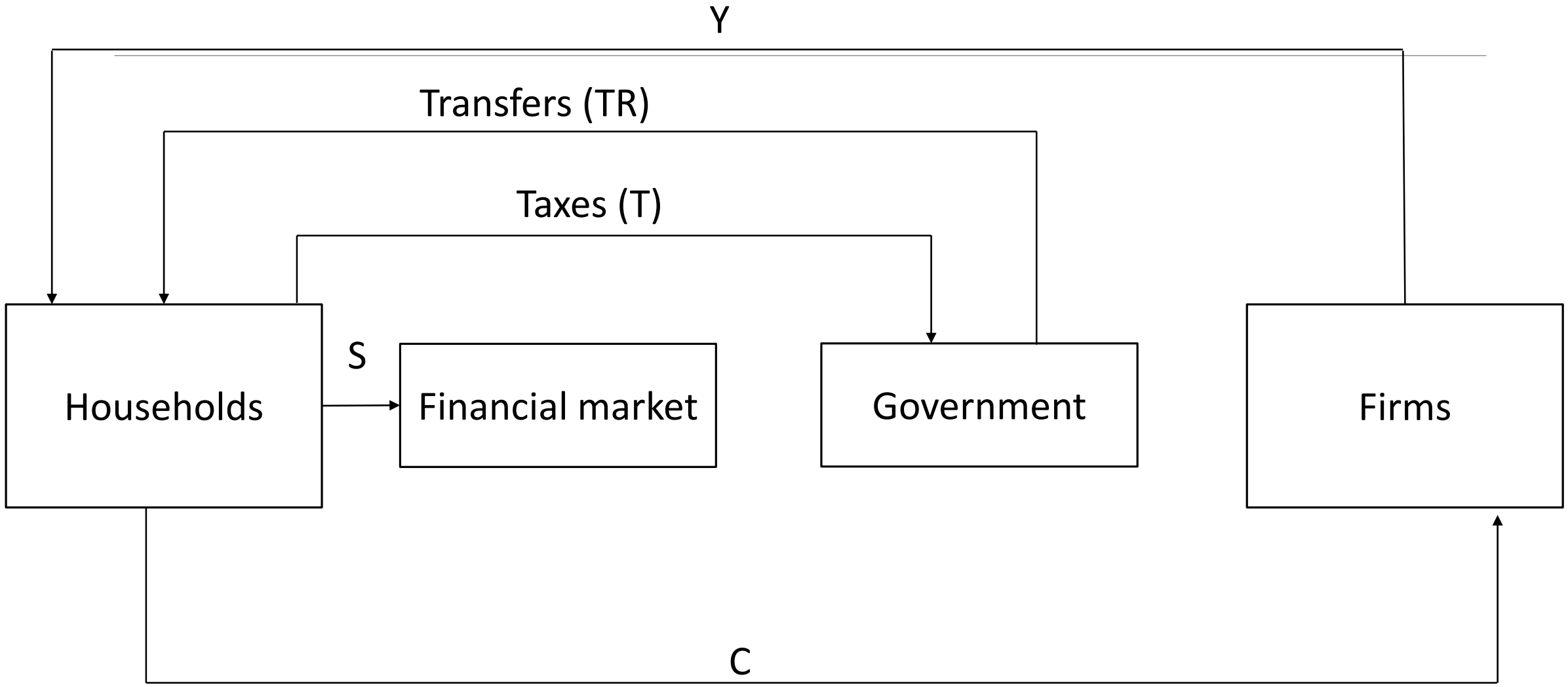


Circular-flow diagram: with government, no international trade



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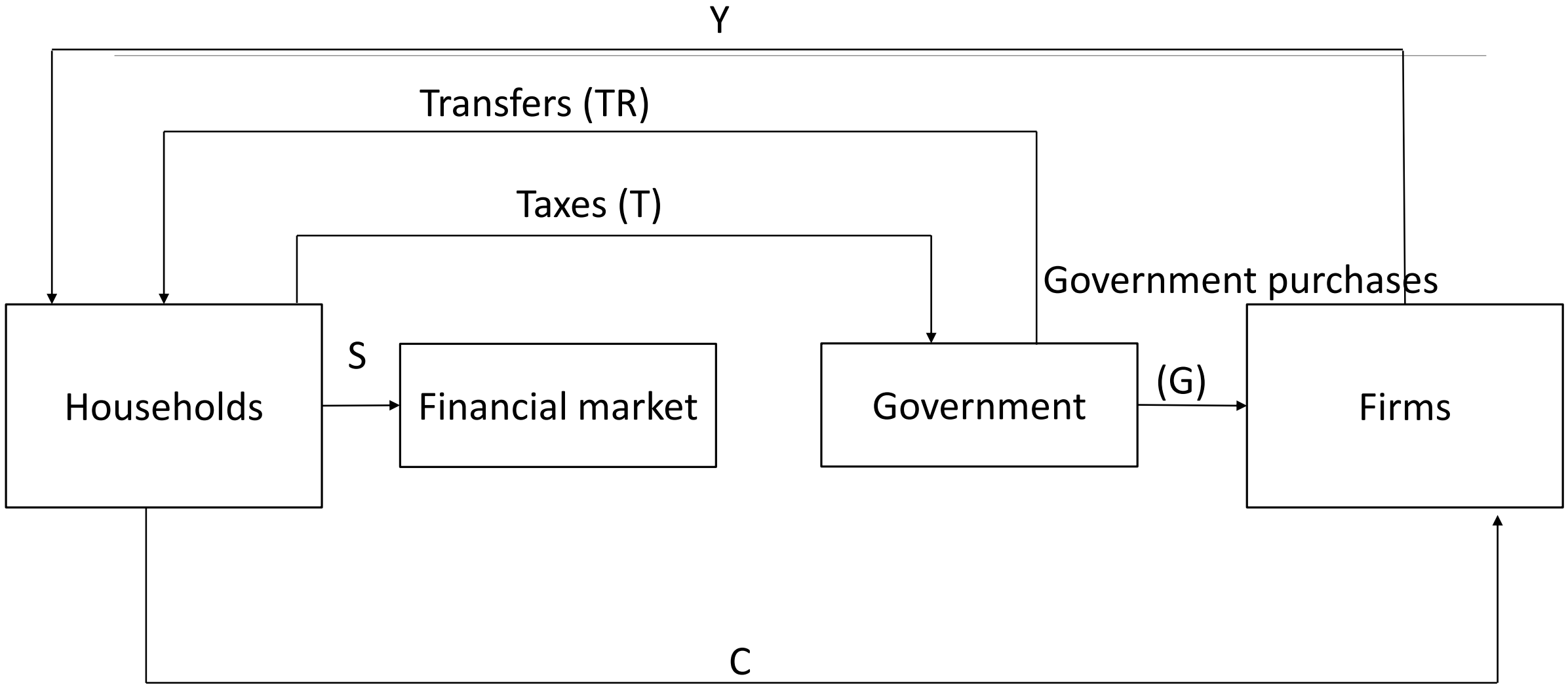

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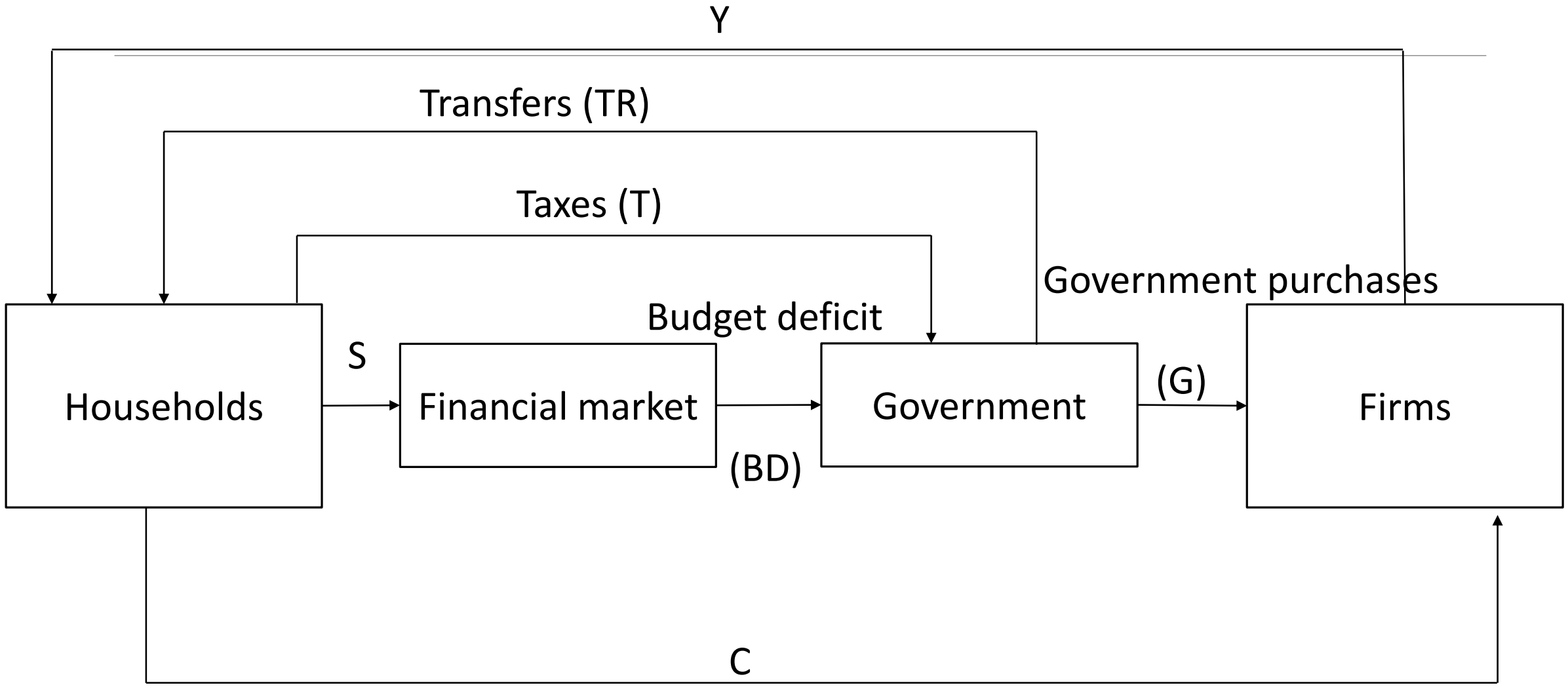

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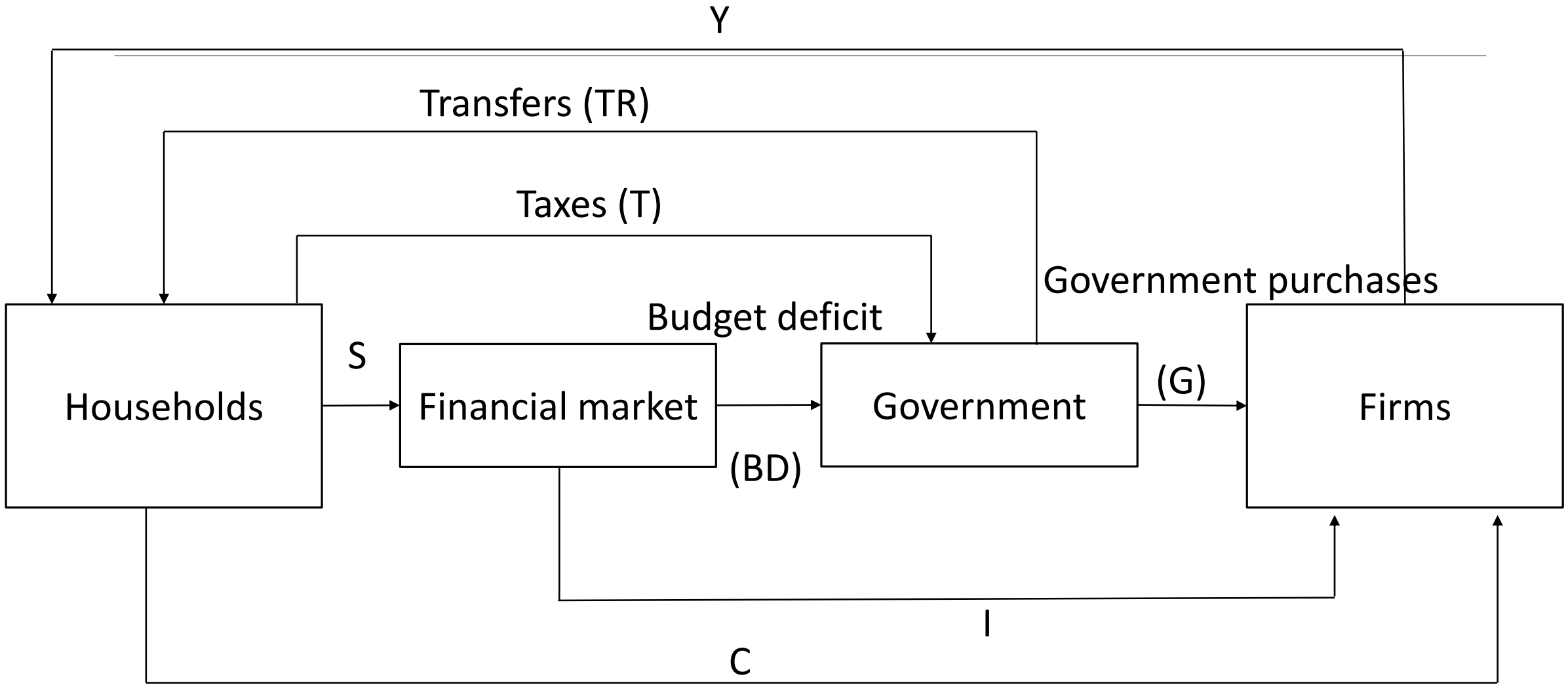

Circular-flow diagram: with government, no international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G	=	Y
Government	T + BD	=	TR + G
Financial market	S	=	I + BD

Circular-flow diagram: with government, no international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G	=	Y
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Financial market	S	=	I + BD

Firms: Y (national product or aggregate demand, AD) = C + I + G

Households: Disposable income (Y_D) = Y – T + TR = C + S

Government: BD = G + TR – T

Circular-flow diagram: with government, no international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G	=	Y
Government	T + BD	=	TR + G
Financial market	S	=	I + BD

$$(Y + TR) + (C + I + G) + (T + BD) = (C + S + T) + (Y) + (G + TR)$$

Circular-flow diagram: with government, no international trade

	Income flow	=	Payments flow
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$$(Y + TR) + (C + I + G) + (T + BD) = (C + S + T) + (Y) + (G + TR)$$

$$I + BD = S$$

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Financial market	S	=	I + BD

$$(Y + TR) + (C + I + G) + (T + BD) = (C + S + T) + (Y) + (G + TR)$$

$$I + BD = S$$

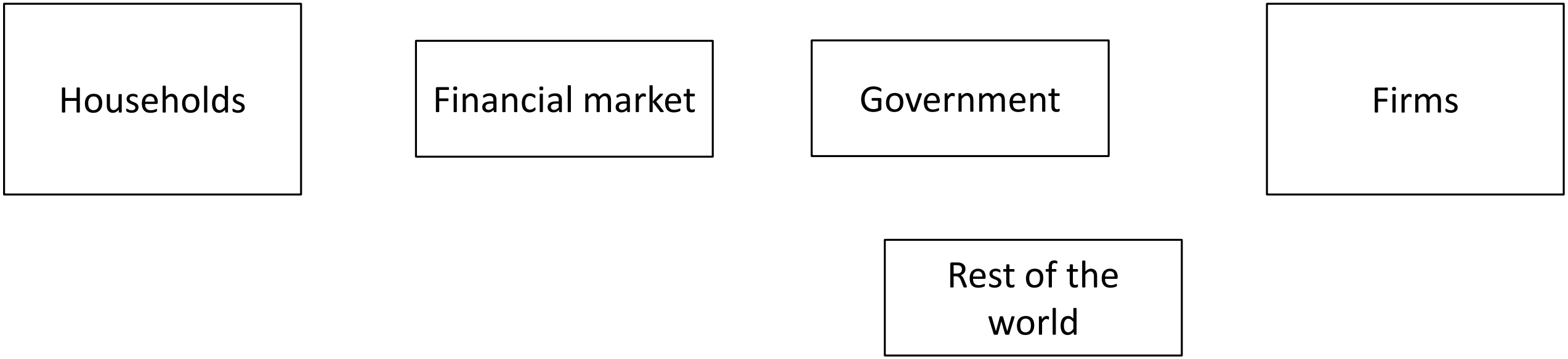
$$(S - I) = (G + TR - T)$$

Circular-flow diagram

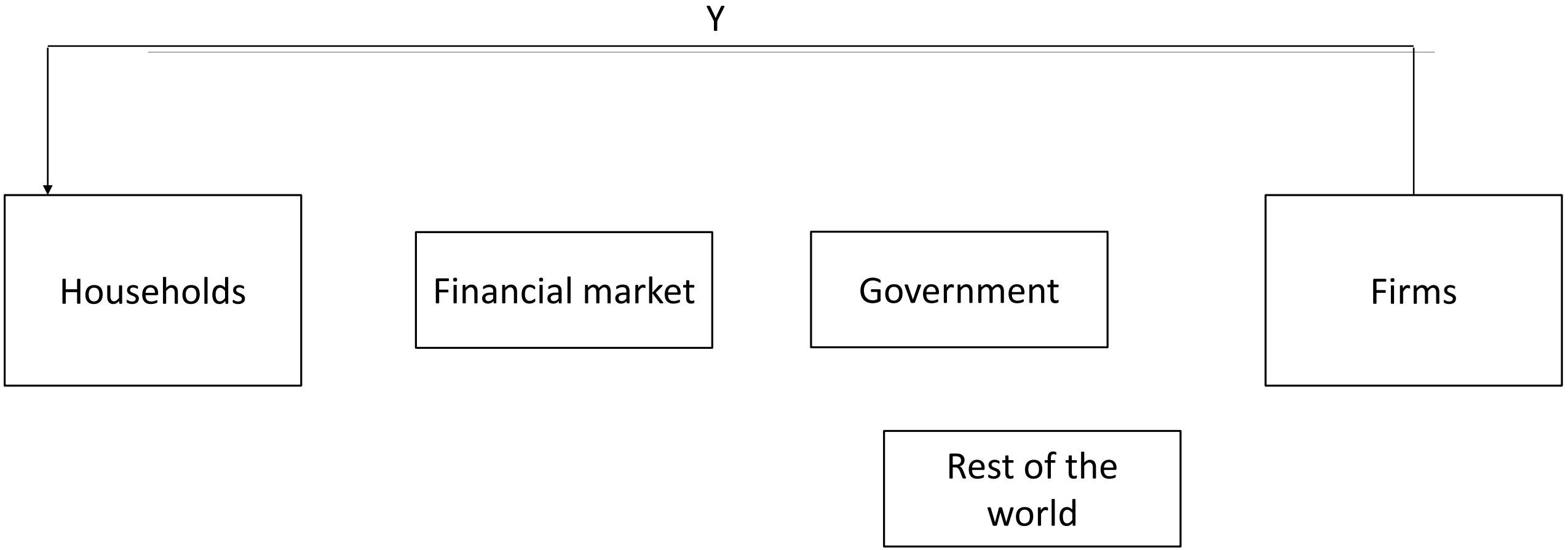
- Now we are going to include international trade.

- The model is now: **economy with government and international trade**.

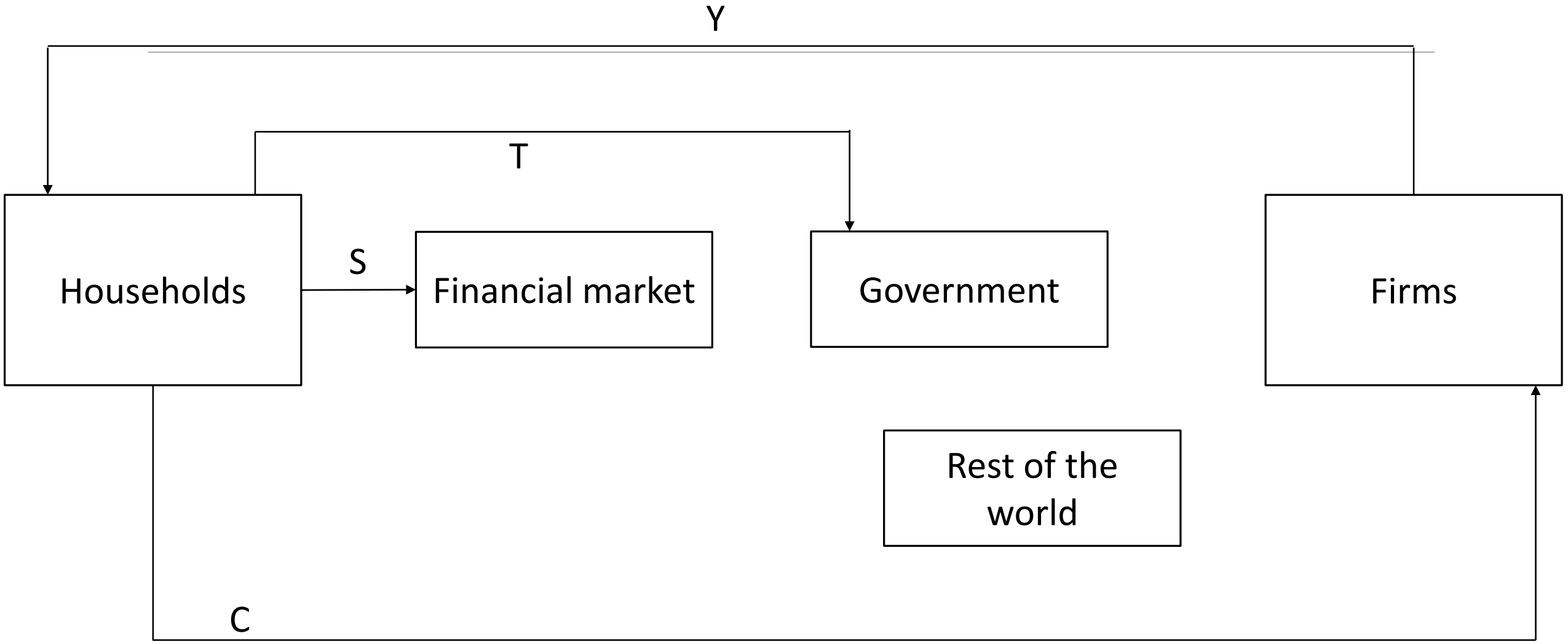
Circular-flow diagram: with government, with international trade



Circular-flow diagram: with government, with international trade



Circular-flow diagram: with government, with international trade



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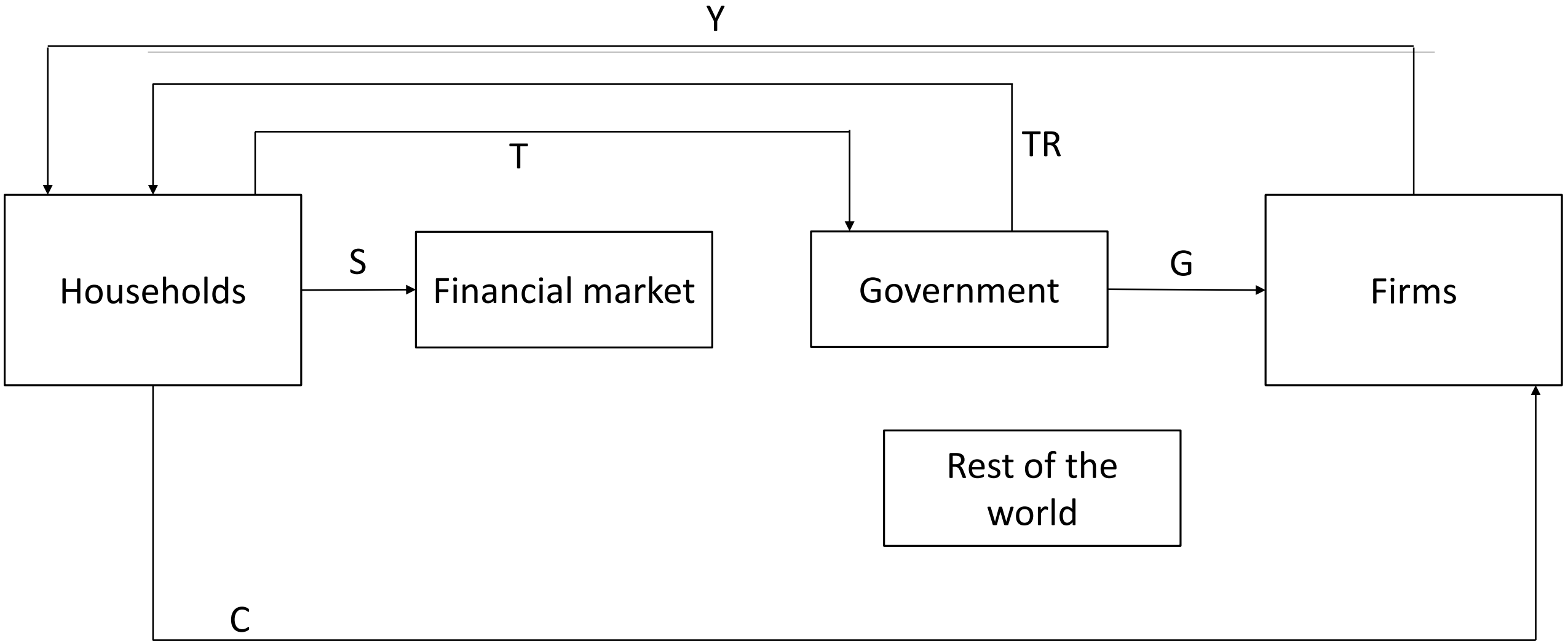

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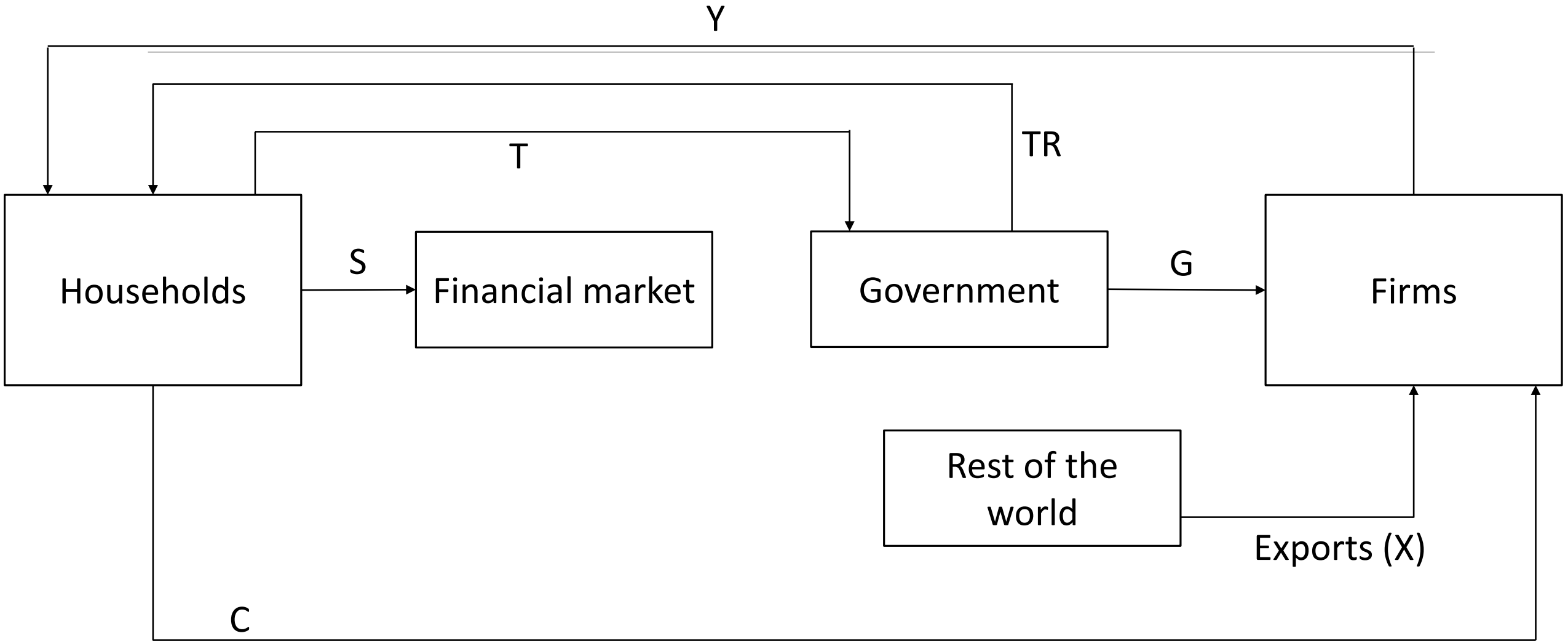

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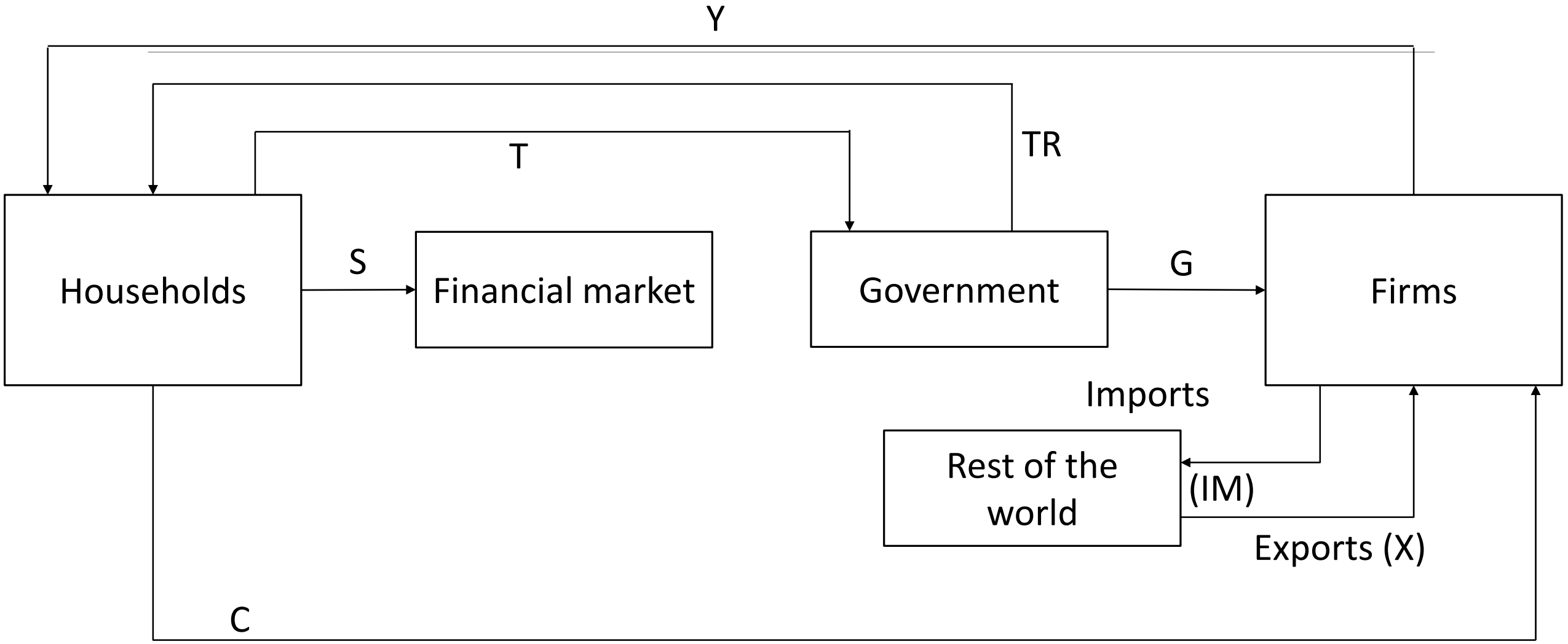

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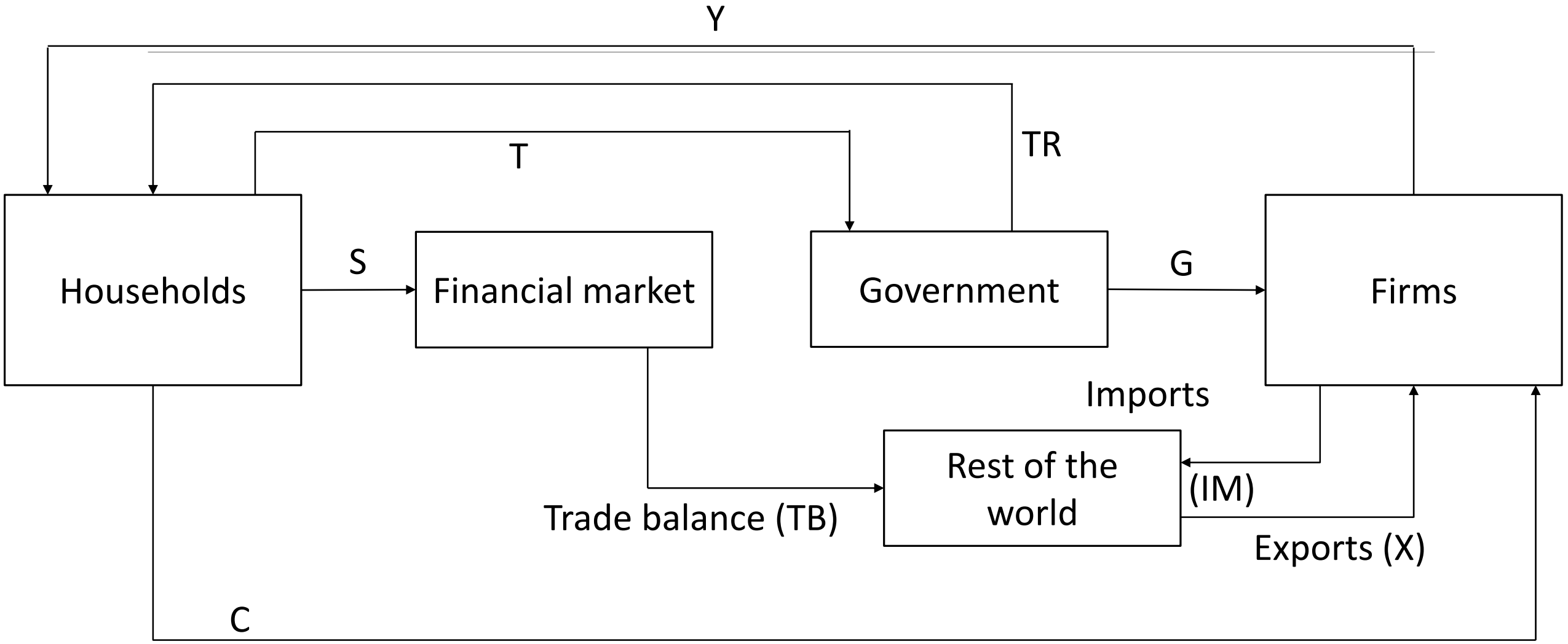

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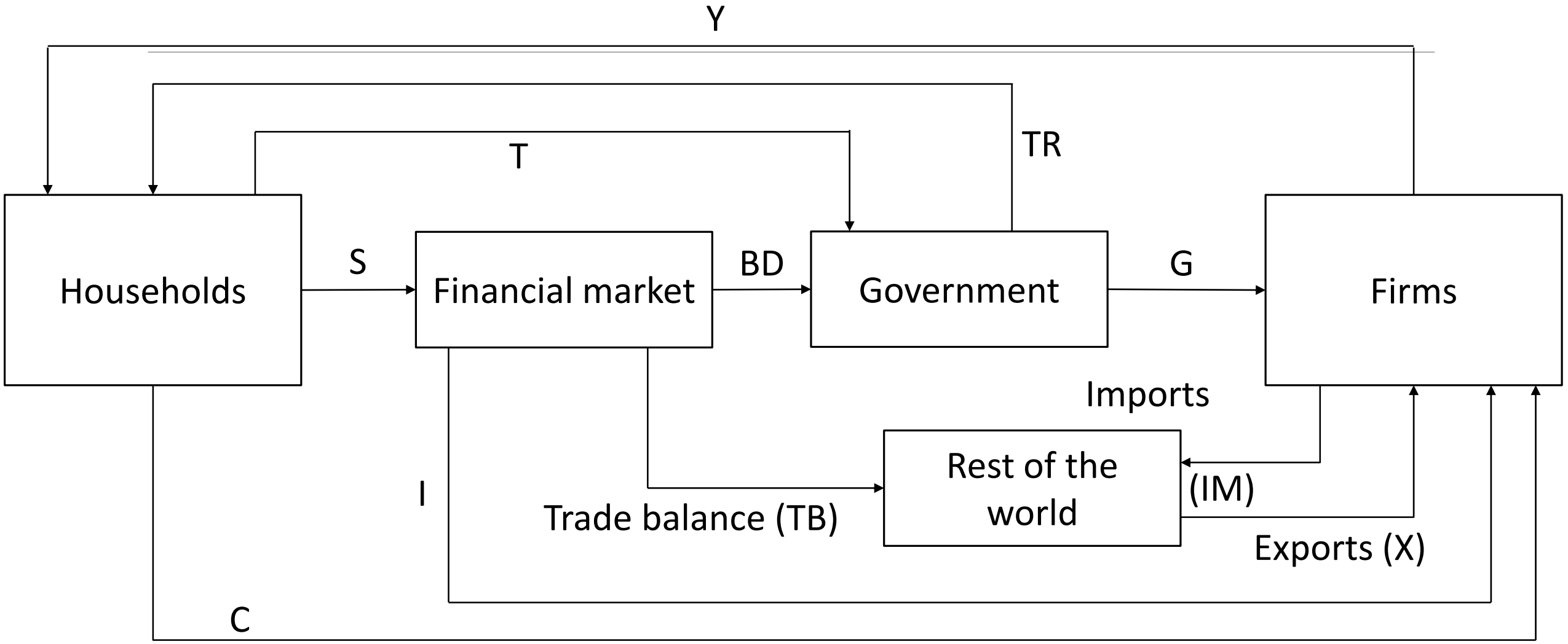

Circular-flow diagram: with government, with international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G + X	=	Y + IM
Government	T + BD	=	TR + G
Rest of the world	TB + IM	=	X
Financial market	S	=	I + BD + TB

Circular-flow diagram: with government, with international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G + X	=	Y + IM
Government	T + BD	=	TR + G
Rest of the world	TB + IM	=	X
Financial market	S	=	I + BD + TB

Firms: $Y = C + I + G + (X - IM) = GDP$

$TB = X - IM$

$TB = Y - C - I - G$

Circular-flow diagram: with government, with international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
Firms	C + I + G + X	=	Y + IM
Government	T + BD	=	TR + G
Rest of the world	TB + IM	=	X
Financial market	S	=	I + BD + TB

Firms: $Y = C + I + G + (X - IM) = GDP$

$TB = (Y - T + TR - C) - I + (T - TR - G)$

$TB = X - IM$

$TB = Y - C - I - G$

Circular-flow diagram: with government, with international trade

	Income flow	=	Payments flow
Households	Y + TR	=	C + S + T
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Circular-flow diagram: with government, with international trade

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$TB = X - IM$

$TB = Y - C - I - G$

$TB = (Y - T + TR - C) - I + (T - TR - G)$

S $\quad$ $-BD$

$TB = (S - I) + (T - TR - G)$

Circular-flow diagram: with government, with international trade

	Income flow	=	Payments flow
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Government	T + BD	=	TR + G
Rest of the world	TB + IM	=	X
Financial market	S	=	I + BD + TB

$$(Y + TR) + (C + I + G + X) + (T + BD) + (TB + IM) = (C + S + T) + (Y + IM) + (G + TR) + X$$

$$(S - I) = (G + TR - T) + TB$$

Outline

1. Circular-flow diagram.

2. Aggregate demand.
   - Slope of the aggregate demand curve.
   - Shifts of the aggregate demand curve.

3. Aggregate demand and consumption function.

4. Aggregate demand and saving and investment.

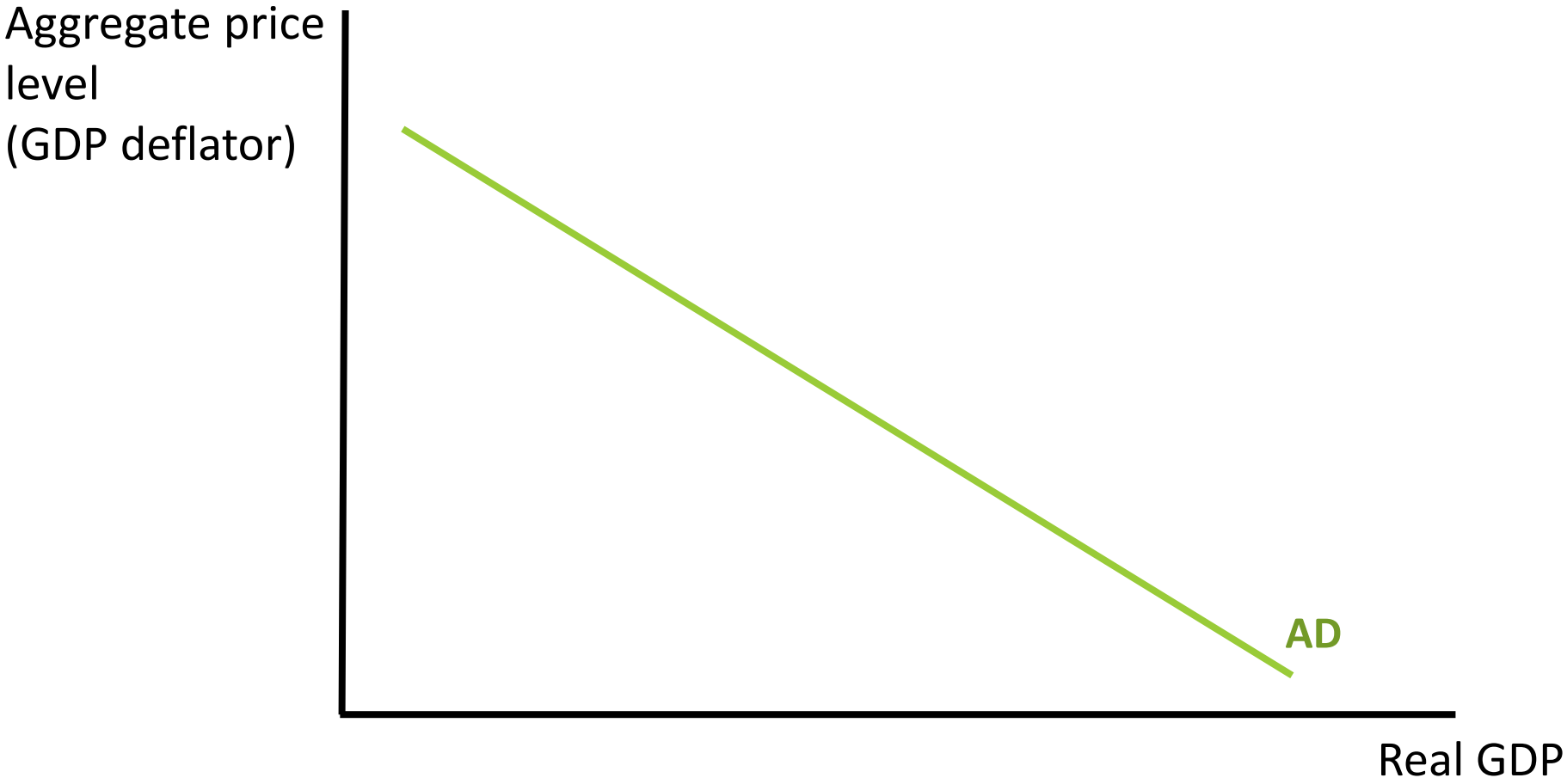
Aggregate demand

- **Aggregate demand curve**: shows the relationship between the aggregate price level and the quantity of aggregate output demanded by households, firms, government and the rest of the world.

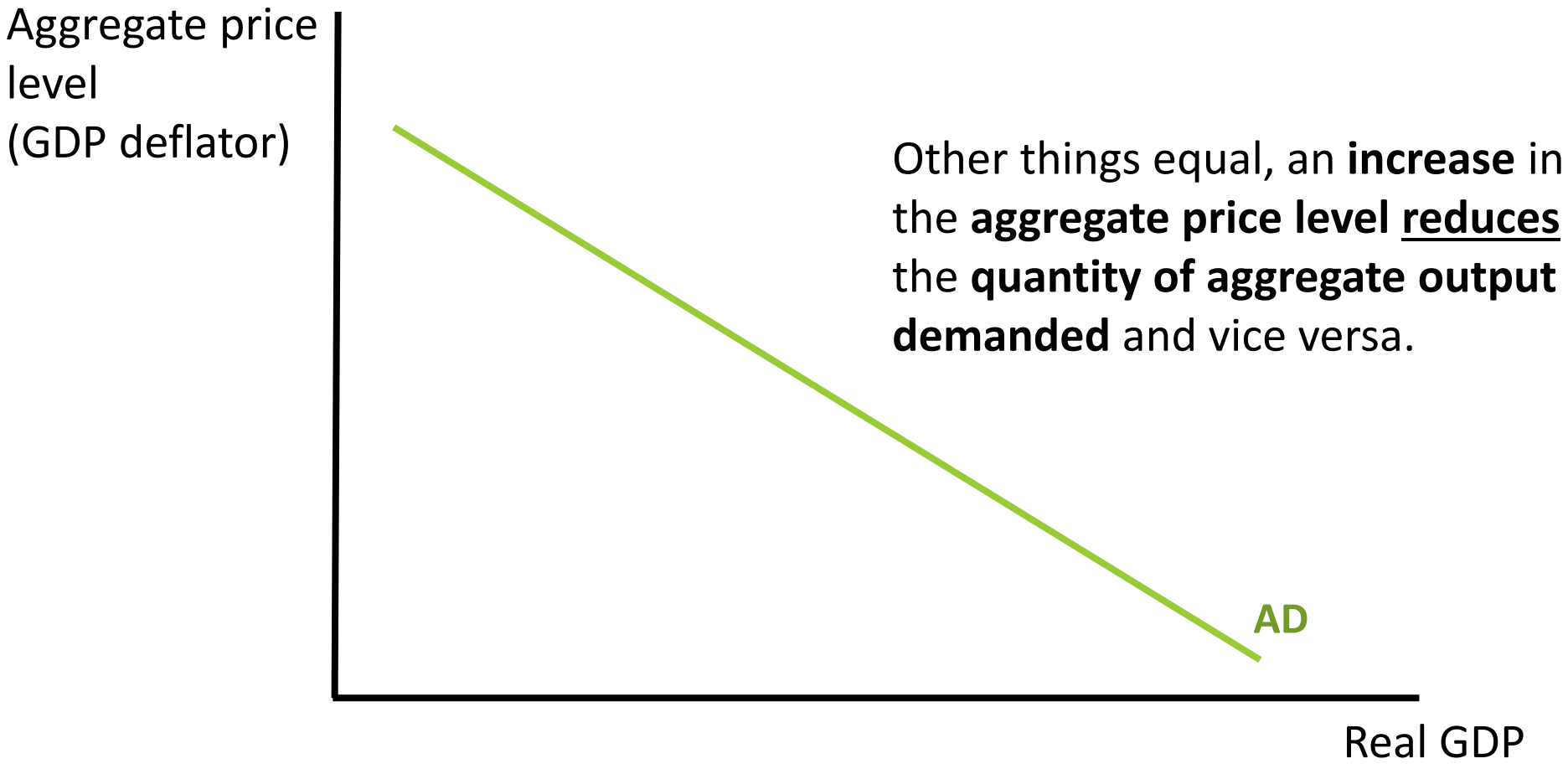
- **Real GDP** is used to measure the **quantity of aggregate output**.

- The **aggregate price level** is measured through the **GDP deflator**.

Aggregate demand

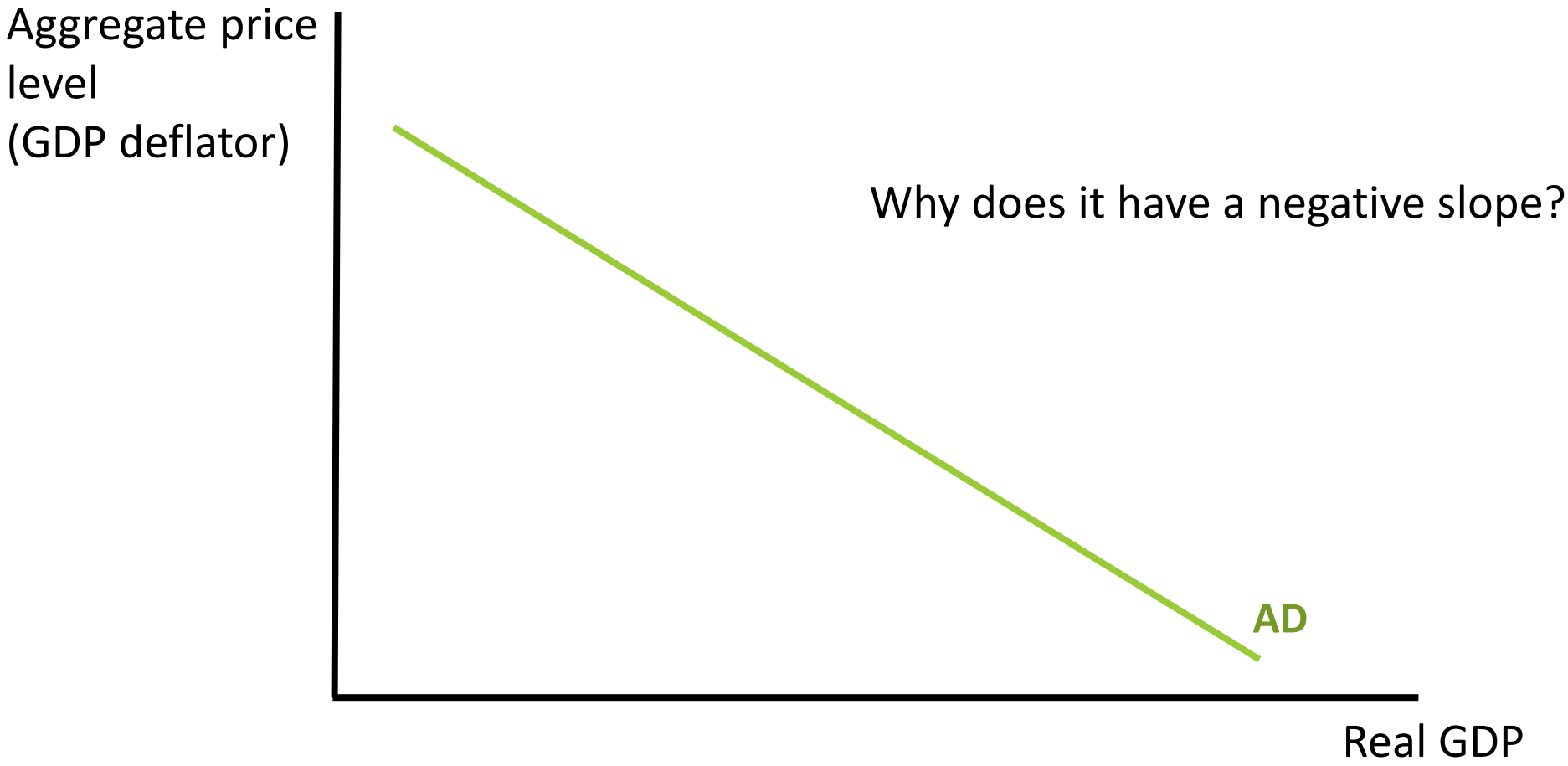


Aggregate demand



Other things equal, an **increase** in the **aggregate price level <u>reduces</u>** the **quantity of aggregate output demanded** and vice versa.

Aggregate demand



Slope of aggregate demand

- Recall:

$$GDP = C + I + G + X - IM$$

- Where:
  - C = consumer spending.
  - I = investment spending.
  - G = government spending.
  - X = exports.
  - IM = imports.

Slope of aggregate demand

- Recall:

$$GDP = C + I + G + X - IM$$

- Where:
  - C = consumer spending.
  - I = investment spending.
  - G = government spending.
  - X = exports.
  - IM = imports.

If these variables are measured in **real terms**, then C + I + G + X – IM is the quantity of final goods and services produced within an economy that are **demanded** in a given period.

Slope of aggregate demand

- Recall:

$$GDP = C + I + G + X - IM$$

- Where:
  - C = consumer spending.
  - I = investment spending.
  - G = government spending.
  - X = exports.
  - IM = imports.

If these variables are measured in **real terms**, then C + I + G + X – IM is the quantity of final goods and services produced within an economy that are **demanded** in a given period.

G is decided by the **government**, but the **rest of the variables** are **private sector** decisions.

Slope of aggregate demand

- To understand why the **slope** of **AD is negative**, it is necessary to understand why an **increase in the aggregate price level** leads to a **decrease** in **C** and **I**.

- To think that AD has a negative slope because there is a parallel with the market demand curve may be erroneous.
  - The market demand curve shows the relationship between the quantity demanded of a good and its price, *other things equal*.
  - **Quantity decreases when price increases because consumers shift consumption from that good to another good or service**.

Slope of aggregate demand

- However, when movements along the AD occur, the **simultaneous** variation of ***all*** final goods and services in the economy is considered.

- From the AD perspective, it is not relevant whether consumers stopped consuming a good or service when its price increased in order to consume another good and service since the aggregate quantity demanded will not necessarily change.

Slope of aggregate demand

- So why does AD have a negative slope?

1. **Wealth effect**: effect on consumer spending caused by the effect of a change in the aggregate price level on purchasing power of consumers' assets.

- If the aggregate price level increases, purchasing power is reduced.
  - Consumers can buy fewer final goods and services with the same amount of money.

- As a consequence, **C** decreases.

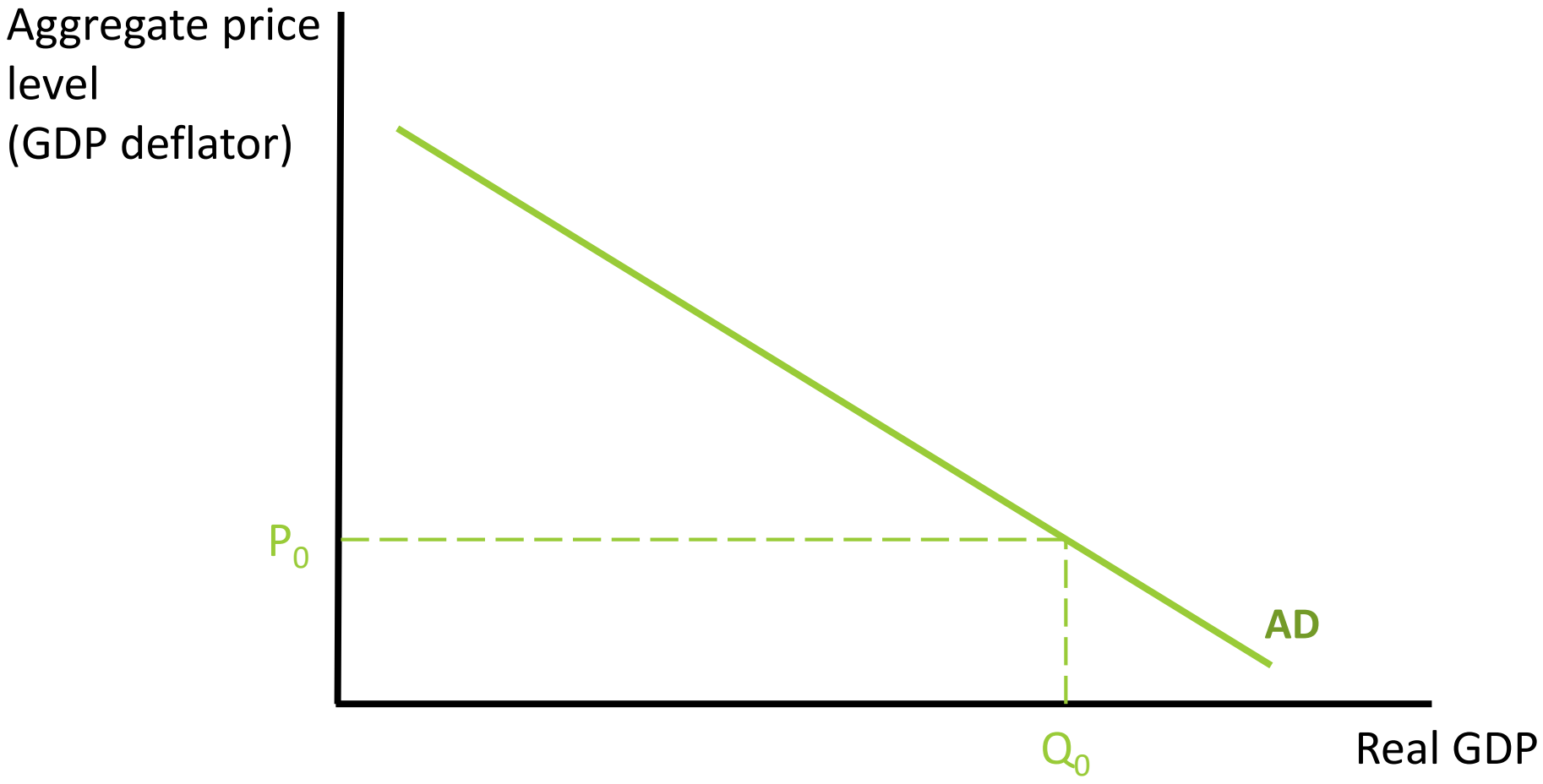
Slope of aggregate demand

- So why does AD have a negative slope?

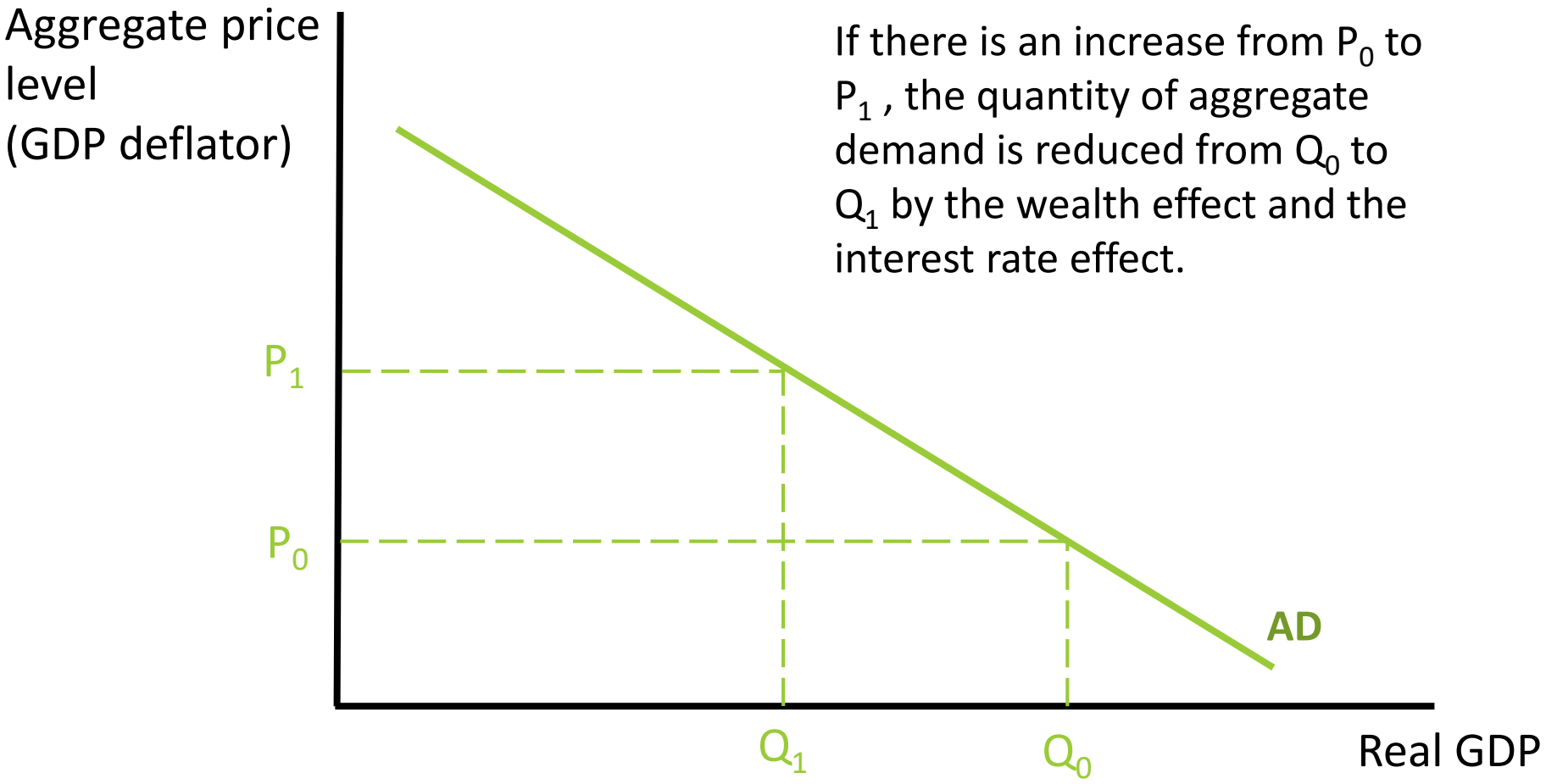
2. **Interest rate effect**: effect on consumer spending and investment spending caused by the effect of a change in the aggregate price level on the purchasing power of consumers' and firms' money holdings.

- If the aggregate price level rises, the purchasing power of a given amount of money is reduced.
  - To buy the same basket of goods, more money is needed.
  - Consumers and firms demand more money and the interest rate rises.
- As a consequence, **C** and **I** decrease.

Aggregate demand slope

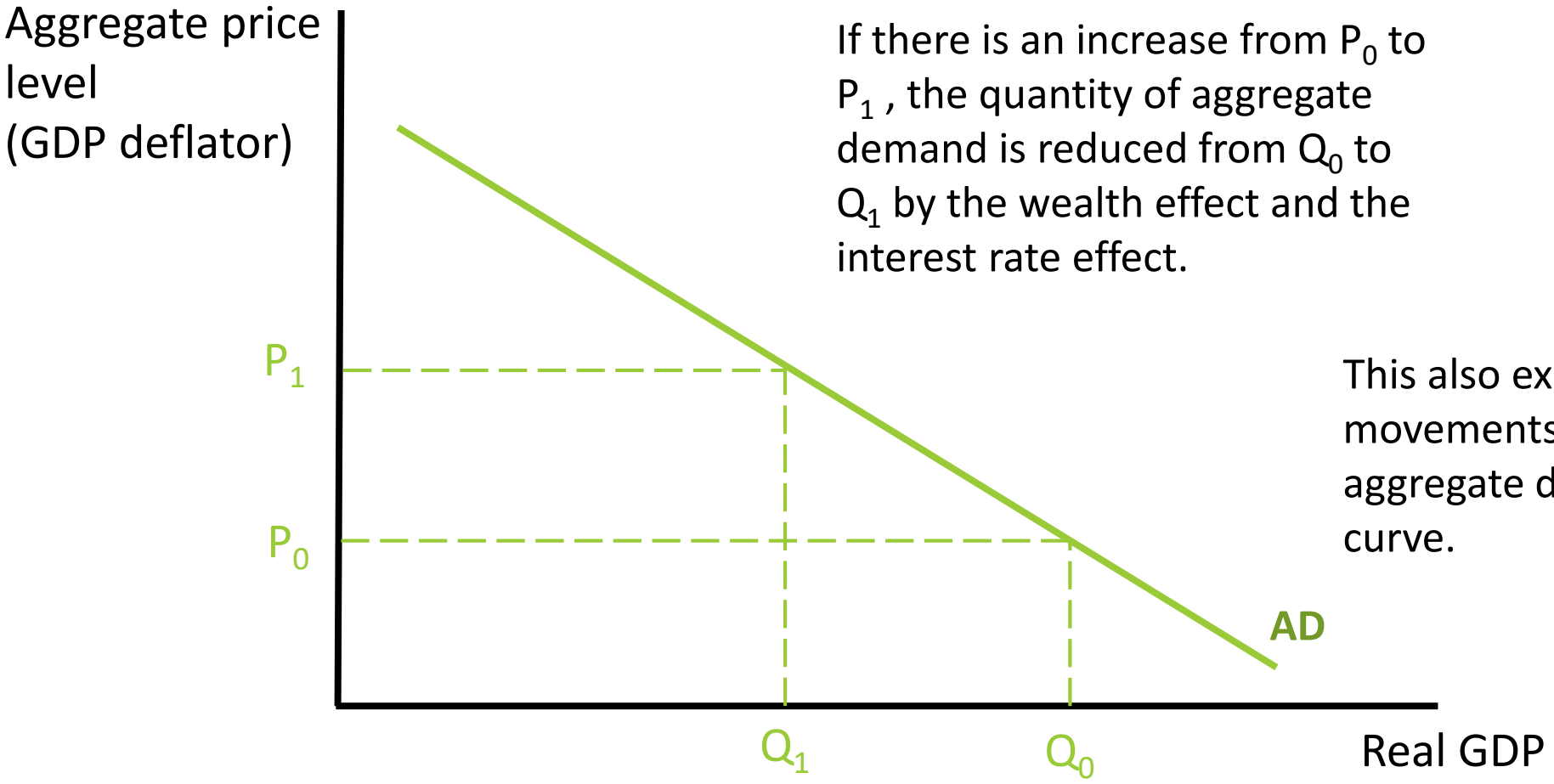


Aggregate demand slope



If there is an increase from P_0 to P_1 , the quantity of aggregate demand is reduced from Q_0 to Q_1 by the wealth effect and the interest rate effect.

Aggregate demand slope



If there is an increase from P_0 to P_1 , the quantity of aggregate demand is reduced from Q_0 to Q_1 by the wealth effect and the interest rate effect.

This also explains the movements along the aggregate demand curve.

Shifts of the aggregate demand curve

- Factors that shift aggregate demand: there are factors that cause changes in the aggregate quantity of goods and services demanded while keeping the aggregate price level constant.

- A shift of the AD to the right indicates an increase in the aggregate quantity demanded of output.

- A shift of the AD to the left indicates a decrease in the aggregate quantity demanded of output.

Shifts of the aggregate demand curve

1. Changes in expectations: both ***C*** and ***I*** depend on individuals' expectations about the future.

- Consumption is not only based on current income, but also on expected future income.

- Firms decide how much to invest based on the current and future state of the economy.

- The relationship is direct.

Shifts of the aggregate demand curve

2. Shifts in wealth: ***C*** depends on the level of wealth of individuals.

- Consumption depends in part on the value of assets held by individuals.
- If the value of assets increases, purchasing power increases.
- The relationship is direct.

Shifts of the aggregate demand curve

3. Size of the existing stock of physical capital: ***I*** increases the stock of physical capital.

- The investment plan to increase the stock of physical capital depends to a large extent on the stock that the firm already has.

- The more physical capital stock a firm has, the less need it has to add new capital, ceteris paribus.

- The greater the need for physical capital, the greater the investment.

Shifts of the aggregate demand curve

4. Fiscal policy: Fiscal policy is the use of government spending (***G***).

- Fiscal policy is:
  - Government spending: purchases of final goods and services by the public sector, and transfers to households.
  - Tax policy: tax collection.

- Fiscal policy tends to be countercyclical: spending increases in recession and decreases in expansion.

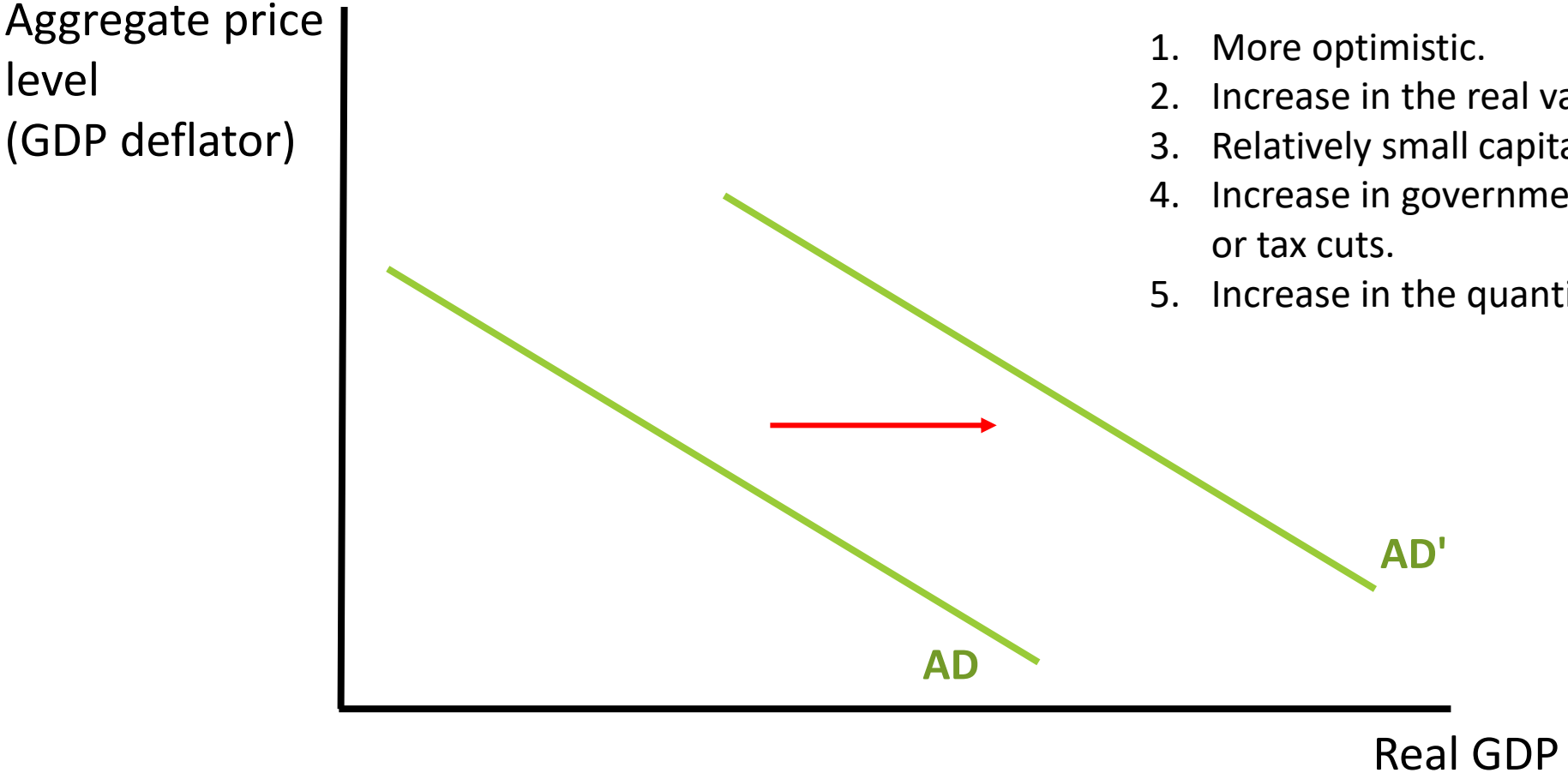
- The relationship is direct.

Shifts of the aggregate demand curve.

5. Monetary policy: Use of the quantity of money or the interest rate to stabilize the economy.

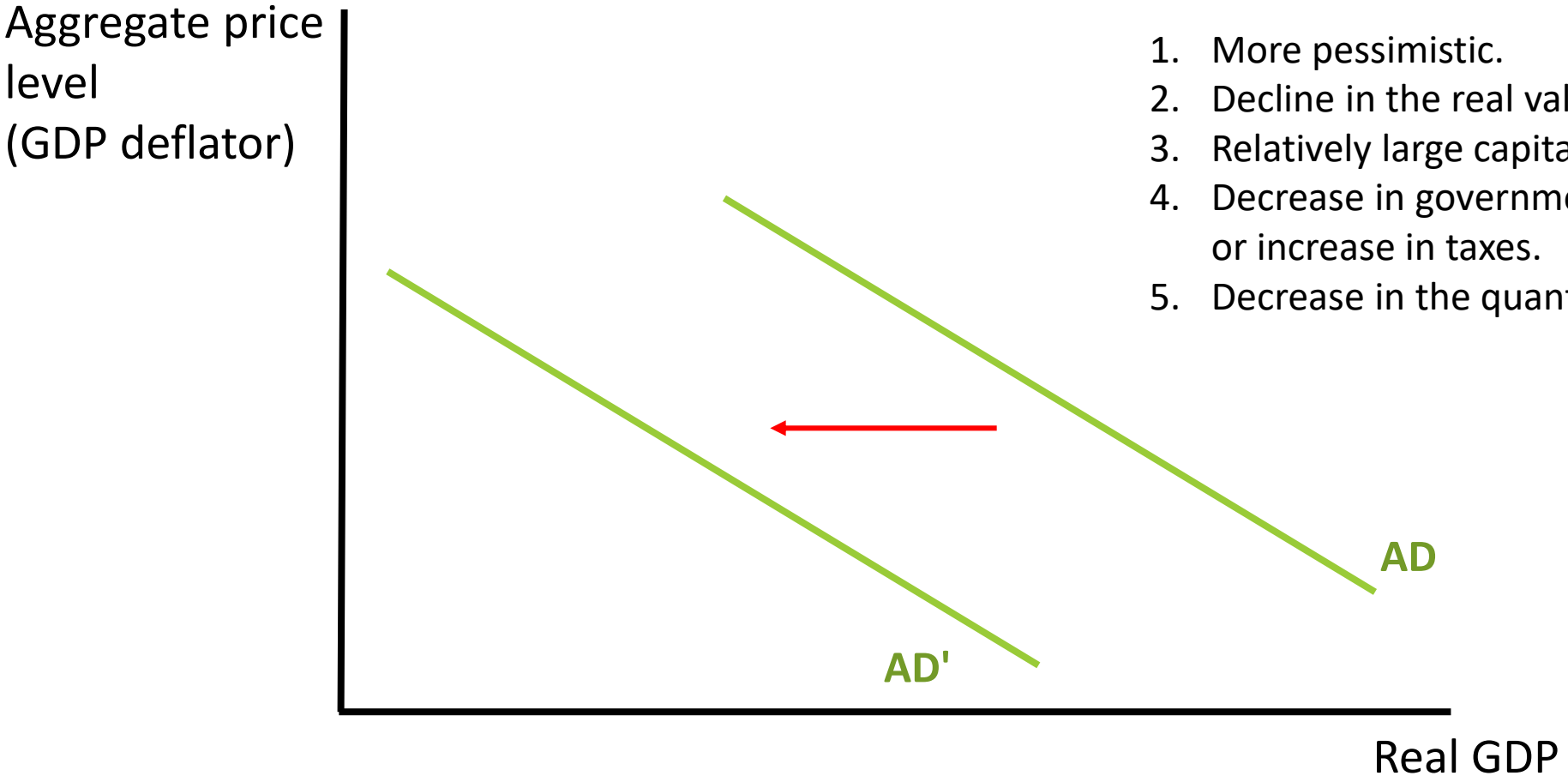
- Rising general price level reduces purchasing power and causes interest rate to rise, decreasing ***C*** and ***I***.
- If the quantity of money in the hands of households and firms increases, ***C*** and ***I*** change:
  - Households consume more and firms invest more without borrowing.
- If individuals and firms do not need to borrow, the interest rate falls. This leads to an increase in ***C*** and ***I***.
- The relationship is direct.

Shifts of the aggregate demand curve



1. More optimistic.
2. Increase in the real value of assets.
3. Relatively small capital stock.
4. Increase in government spending or tax cuts.
5. Increase in the quantity of money.

Shifts of the aggregate demand curve



1. More pessimistic.
2. Decline in the real value of assets.
3. Relatively large capital stock.
4. Decrease in government spending or increase in taxes.
5. Decrease in the quantity of money.

Outline

1. Circular-flow diagram.

2. Aggregate demand.
   - Slope of the aggregate demand curve.
   - Shifts of the aggregate demand curve.

3. Aggregate demand and consumption function.

4. Aggregate demand and saving and investment.

Aggregate demand and equilibrium output

- Aggregate demand (**AD**) is the **total amount** of goods **demanded** in the economy:

$$\mathbf{AD = C + I + G + NX = GDP}$$

Where,

- C = consumption
- I = investment
- G = government spending
- NX = net exports = X – IM

Aggregate demand and equilibrium production

- **Output** is at its **equilibrium level** when the **quantity of output produced is equal to the quantity demanded**.

- In equilibrium:

$$\mathbf{Y = AD} = C + I + G + NX$$

$$Y = P \times Q$$

If P=1, then Y = Q

- When AD ≠ Y, there is unplanned inventory investment or disinvestment:

$$IU = Y - AD$$

  - If Y > AD: unplanned inventory investment: IU > 0.
  - If Y < AD: unplanned inventory disinvestment: IU < 0.

Consumption function and aggregate demand

- **Consumption** (**C**) is **not** constant, but varies with **income** (**Y**).
- Families or countries with higher incomes consume more.
- The consumption function relates **C** and **Y**.

Consumption function

- The function:

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

Where,

- $\bar{C}$: autonomous consumption. $\bar{C} > 0$.
- c: marginal propensity to consume (MPC). $0 < c < 1$.
- MPC: increase in consumption per unit increase in income $= \frac{\Delta C}{\Delta Y} = \frac{\partial C}{\partial Y}$

Consumption function

Consumption function

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

Which geometric figure is it?

Consumption function

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

What is it?

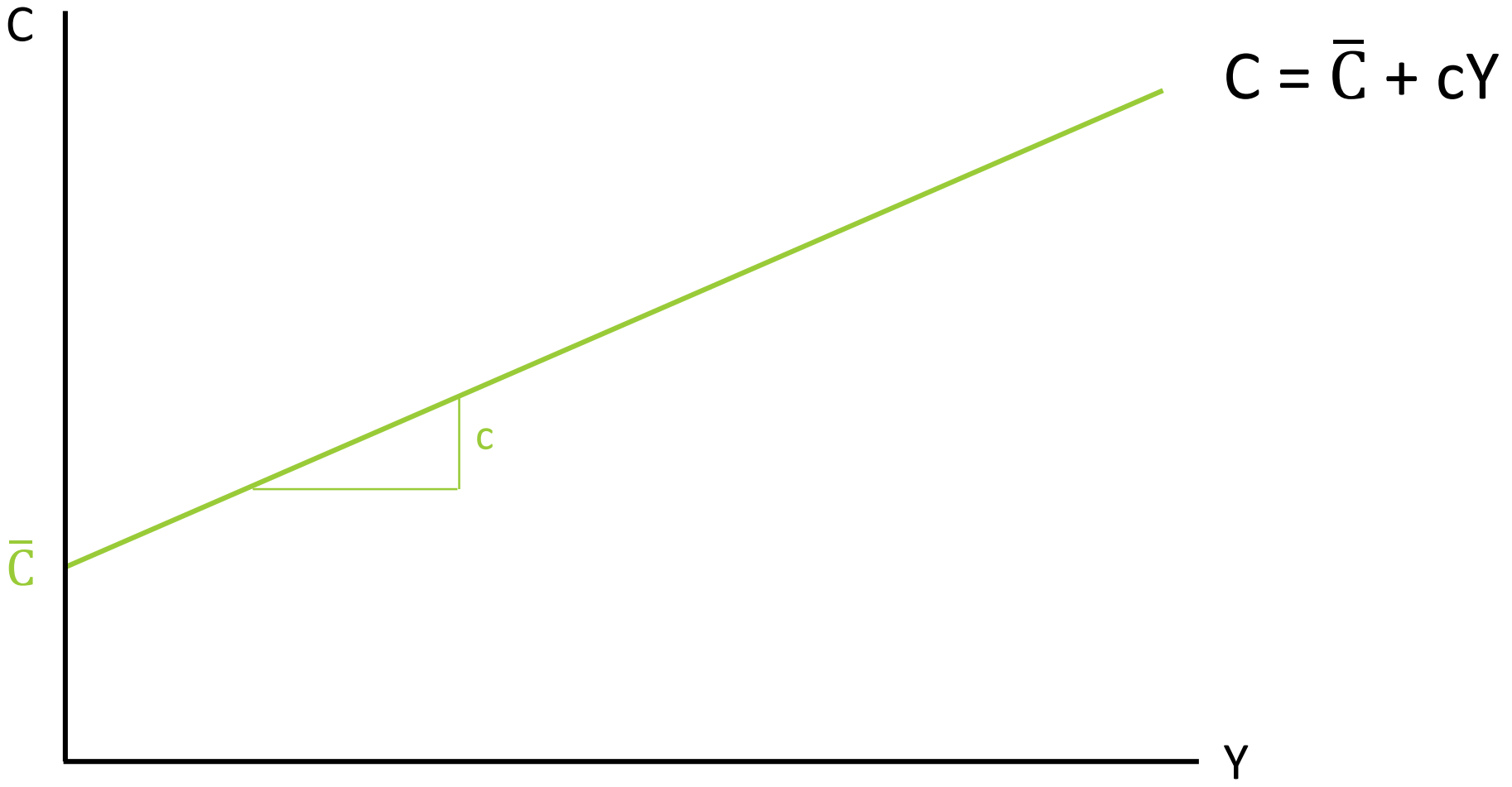
Consumption function

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

What is it?

What sign does it have?

Consumption function



Consumption and saving

- What happens to what is not consumed? It goes to **savings** (**S**).
- How much is saved? The fraction **(1 - c)**.
- This means that income is either spent or saved.
- Therefore, there is equivalence between **C** and **S**.

Consumption and saving

- Savings is therefore:

$$\mathbf{S = Y - C}$$

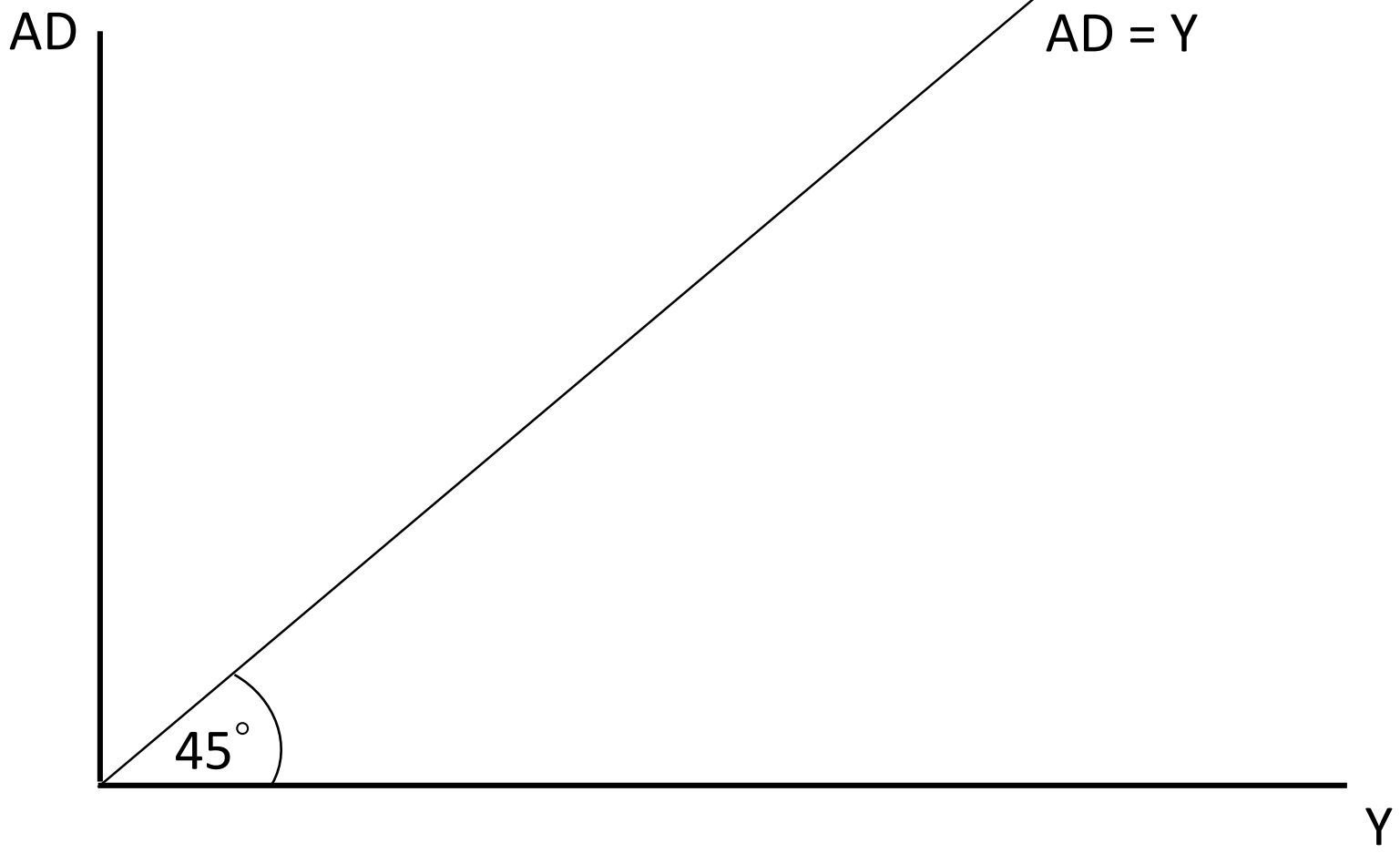
- Since $C = \bar{C} + cY$, then:

$$S = Y - C = Y - \bar{C} - cY = -\bar{C} + (1 - c)Y = -\bar{C} + sY$$

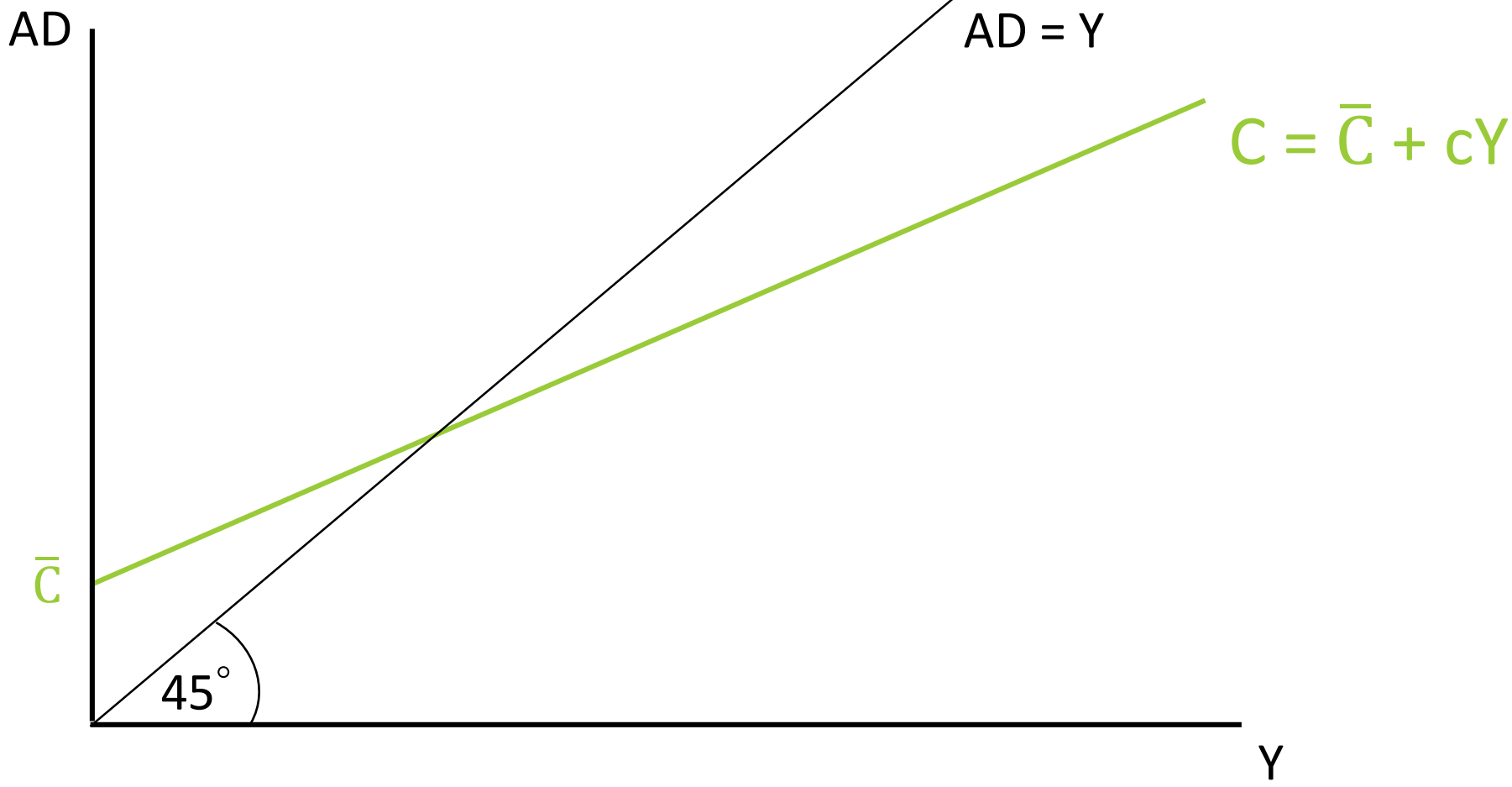
- s: marginal propensity to save = $(1 - c)$; $0 < s < 1$.

Consumption, aggregate demand and autonomous spending

Consumption, aggregate demand and autonomous spending



Consumption, aggregate demand and autonomous spending



Consumption, aggregate demand and autonomous spending

We are assuming no government and no international trade, therefore:

$AD = C + I$

But, $C = \bar{C} + cY$

So: $AD = \bar{C} + cY + I$

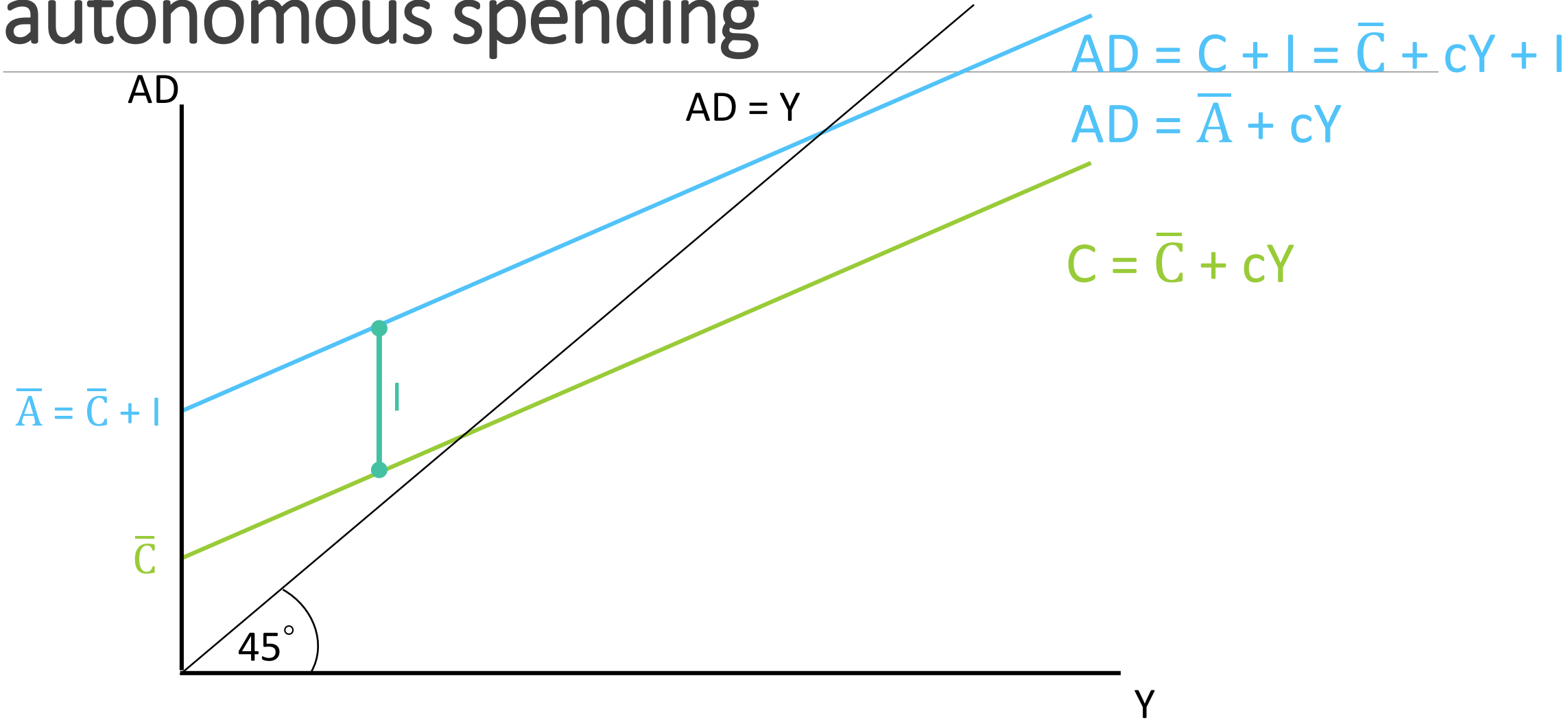
Then: $\mathbf{AD = \bar{A} + cY}$; where $\mathbf{\bar{A} = \bar{C} + I}$

Consumption, aggregate demand and autonomous spending

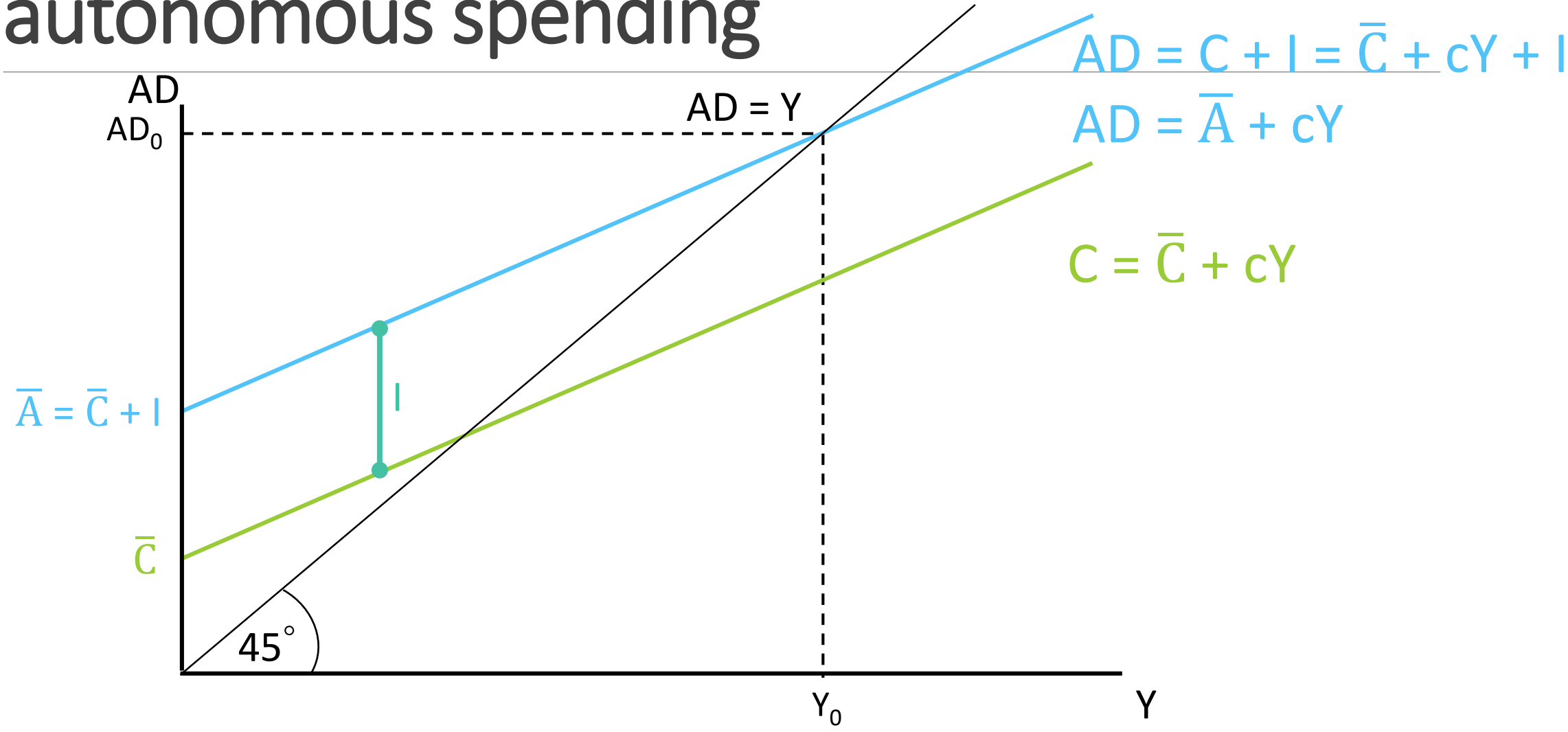
$AD = C + I = \bar{C} + cY + I$

$AD = \bar{A} + cY$

$C = \bar{C} + cY$



Consumption, aggregate demand and autonomous spending



Consumption, aggregate demand and autonomous spending

- Now, we include government and international trade, although we assume that they are independent of ***Y***:
- Now that there is government, ***C*** depends on $\boldsymbol{Y_D}$, not ***Y***.
- Recall: $Y_D = Y - T + TR$
- Therefore: $C = \bar{C} + cY_D = \bar{C} + c(Y - T + TR)$

Consumption, aggregate demand and autonomous spending

- Replacing in AD:

$$AD = C + I + G + NX$$

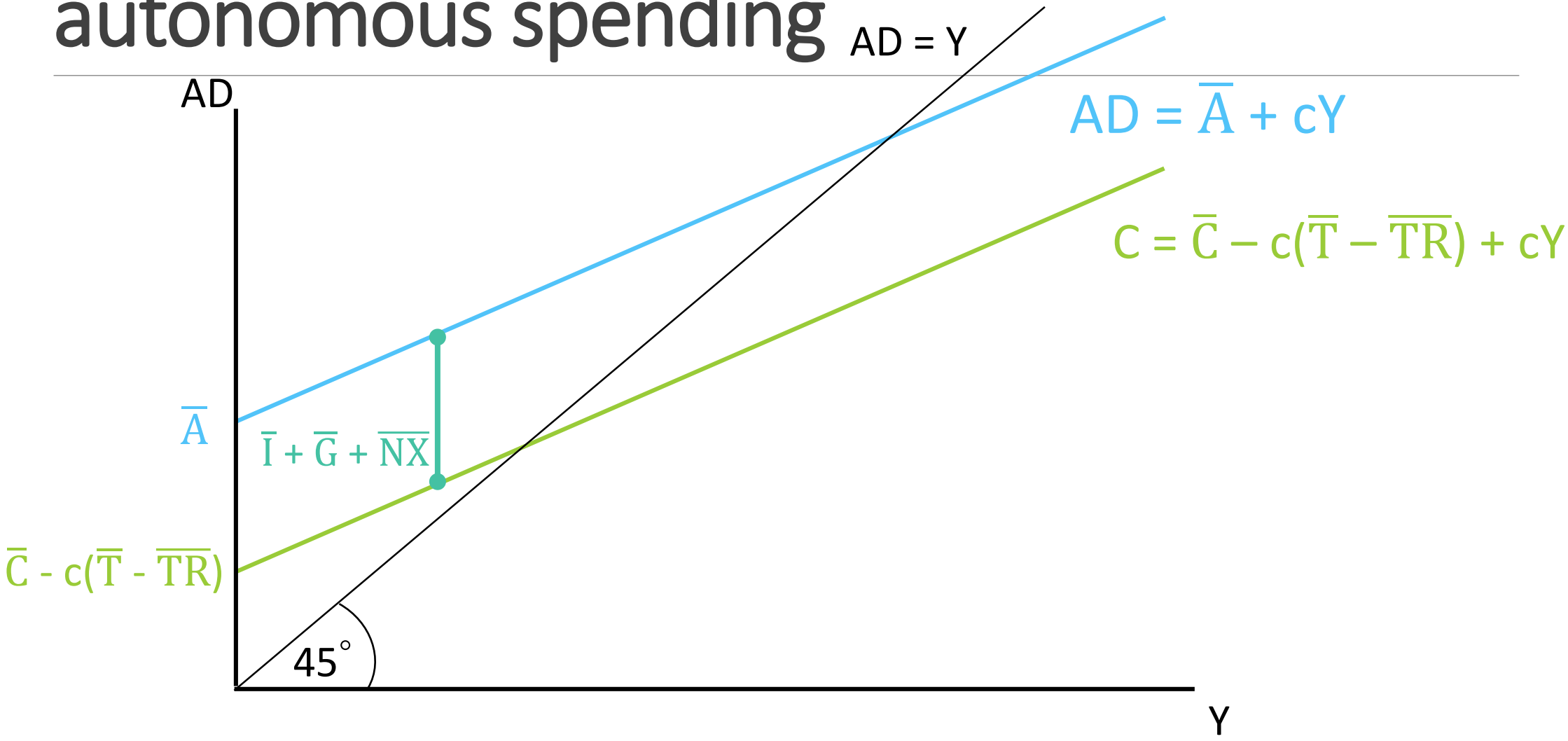
$$= \bar{C} + c(Y - \bar{T} + \overline{TR}) + \bar{I} + \bar{G} + \overline{NX}$$

$$= [\bar{C} - c\,(\bar{T} - \overline{TR}) + \bar{I} + \bar{G} + \overline{NX}] + cY$$

$$= \bar{A} + cY$$

Where, $\bar{A} = [\bar{C} - c\,(\bar{T} - \overline{TR}) + \bar{I} + \bar{G} + \overline{NX}]$

Consumption, aggregate demand and autonomous spending

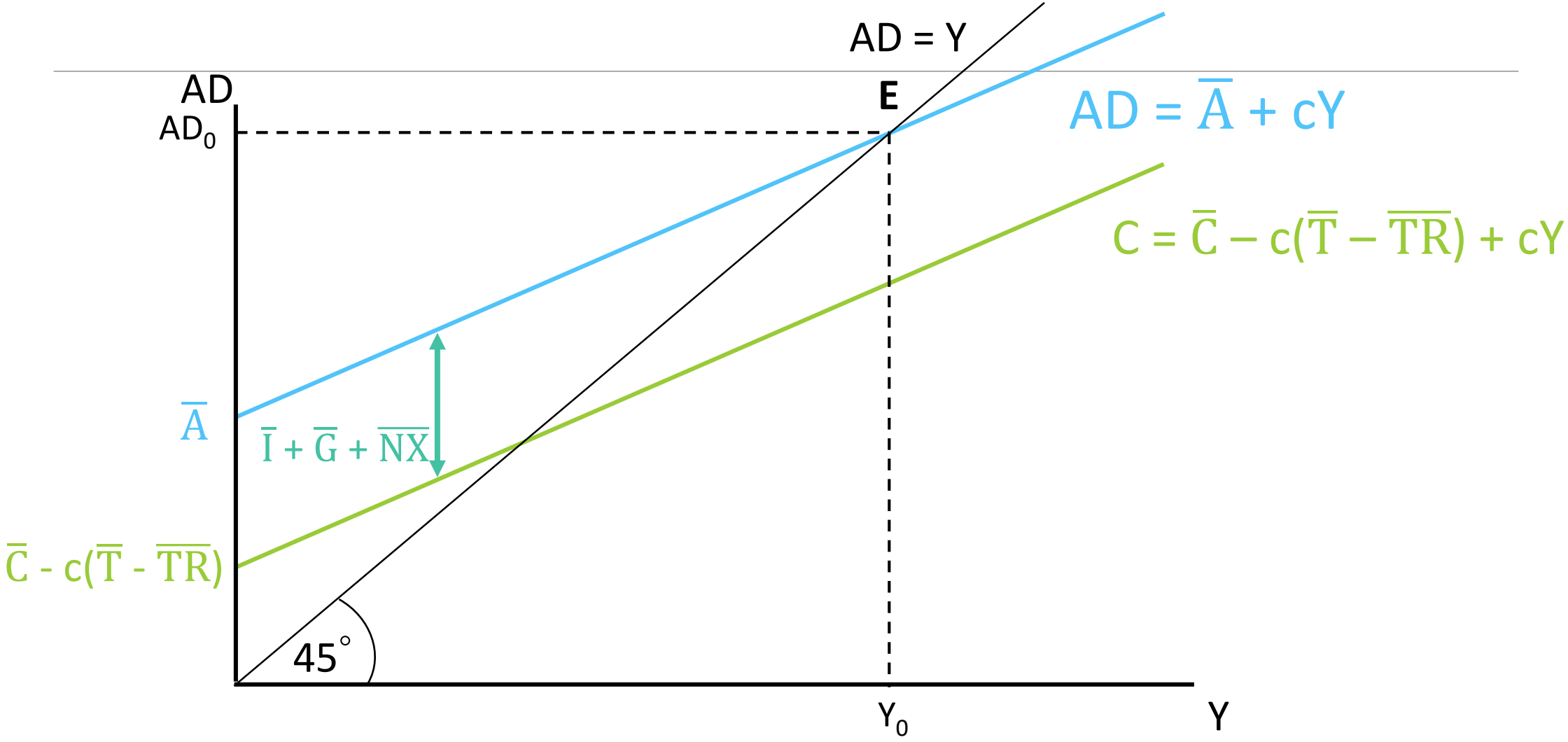


Equilibrium income and output

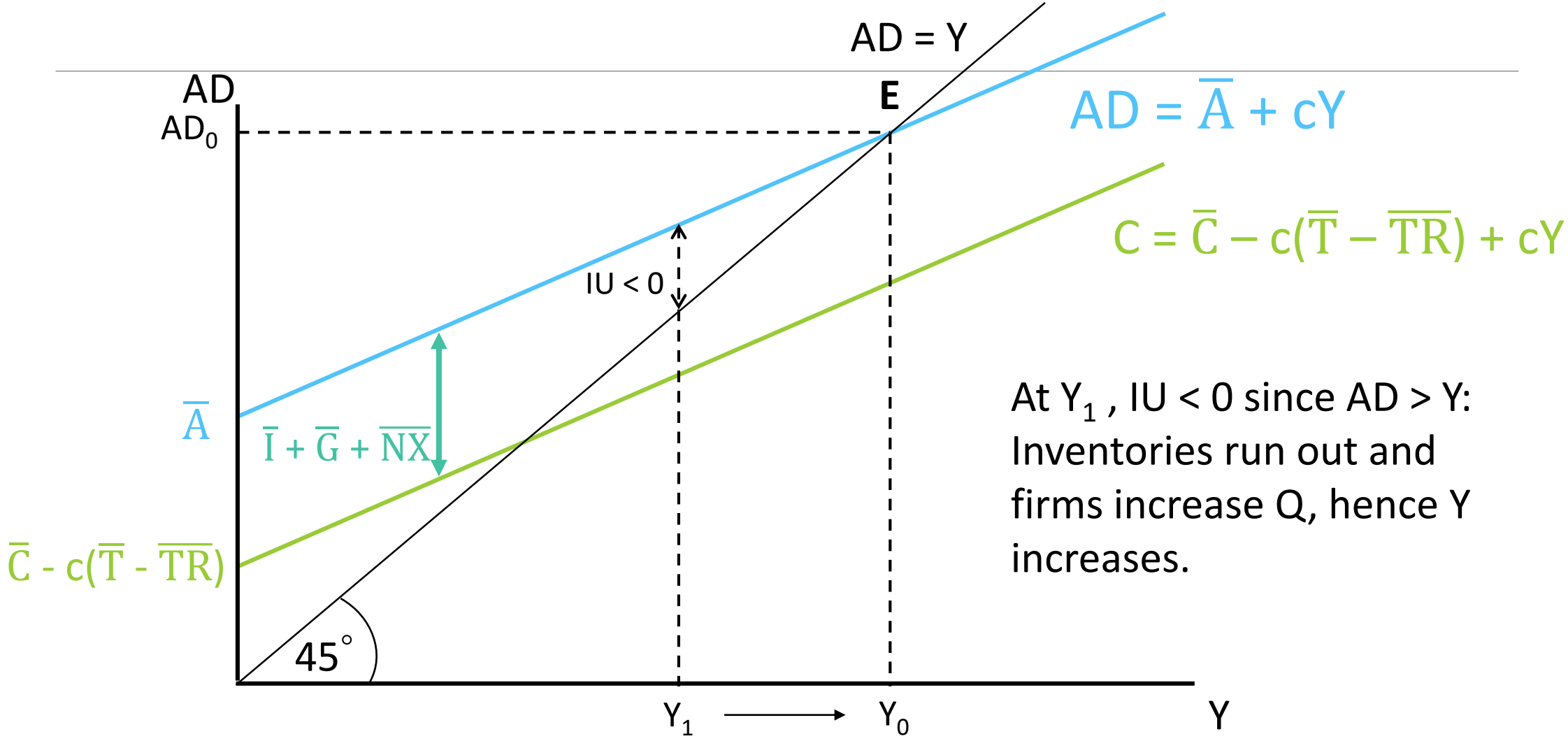
On the line of 45° it is satisfied that AD = Y.

Only at point E, AD = Y.

Equilibrium income and output

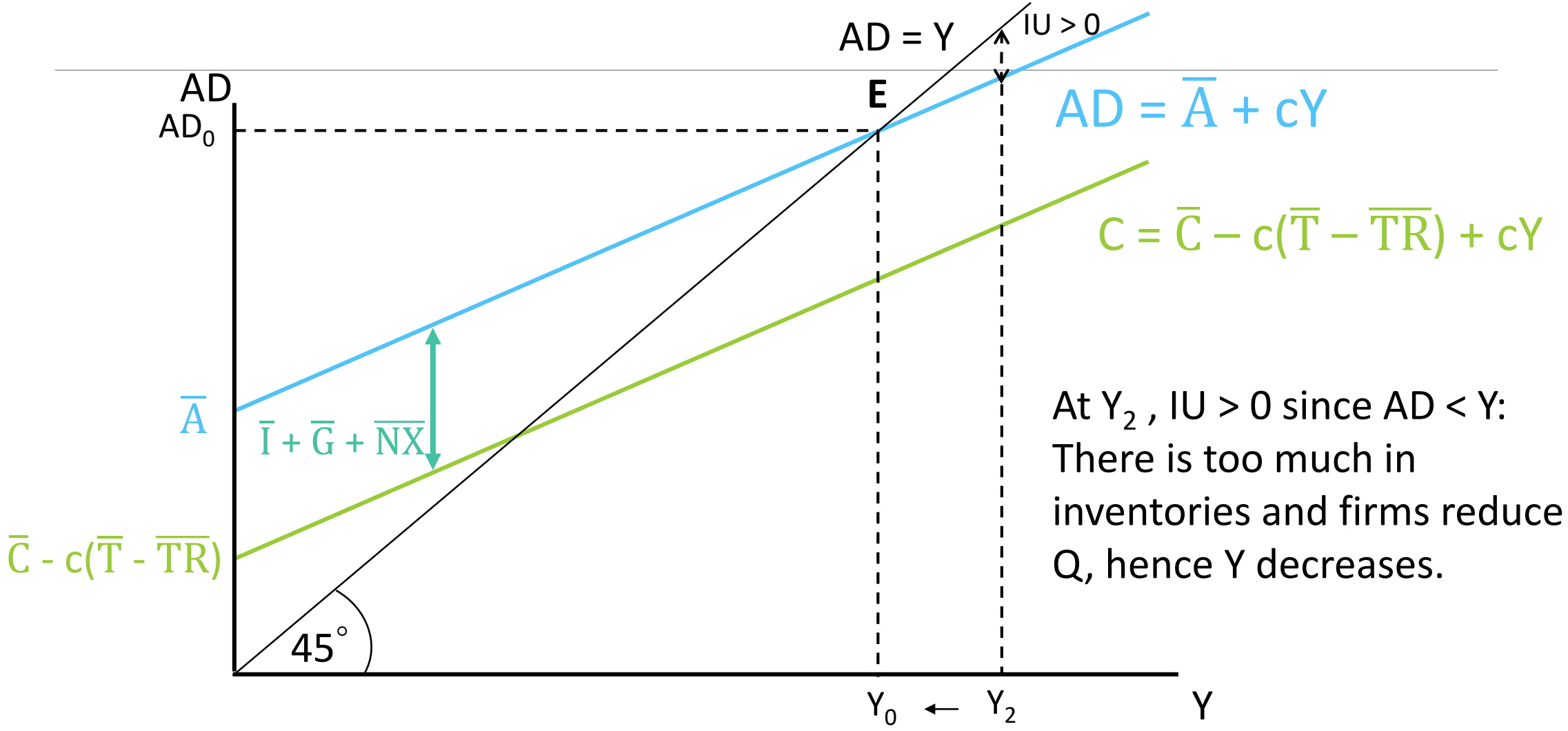


Equilibrium income and output

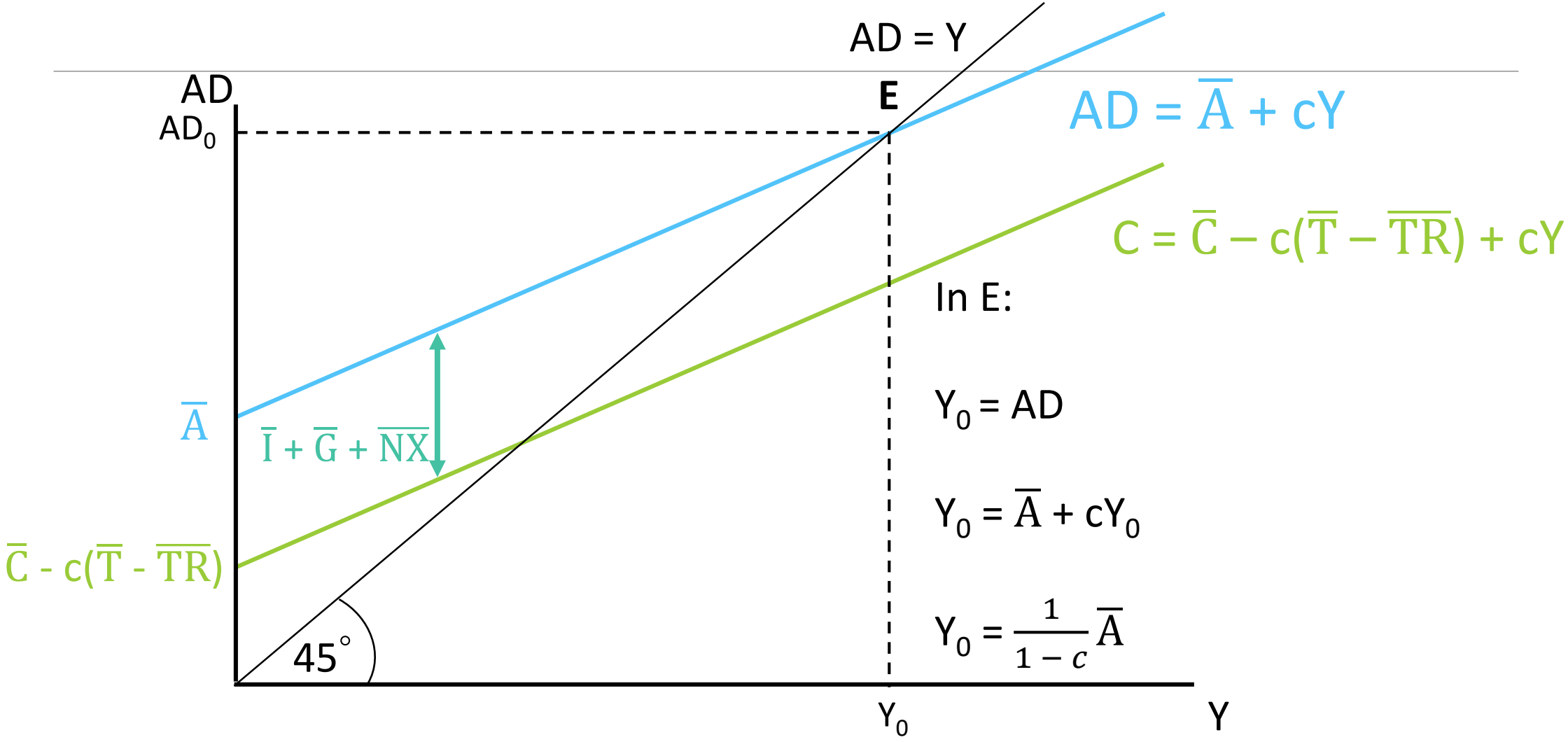


At Y_1 , IU < 0 since AD > Y: Inventories run out and firms increase Q, hence Y increases.

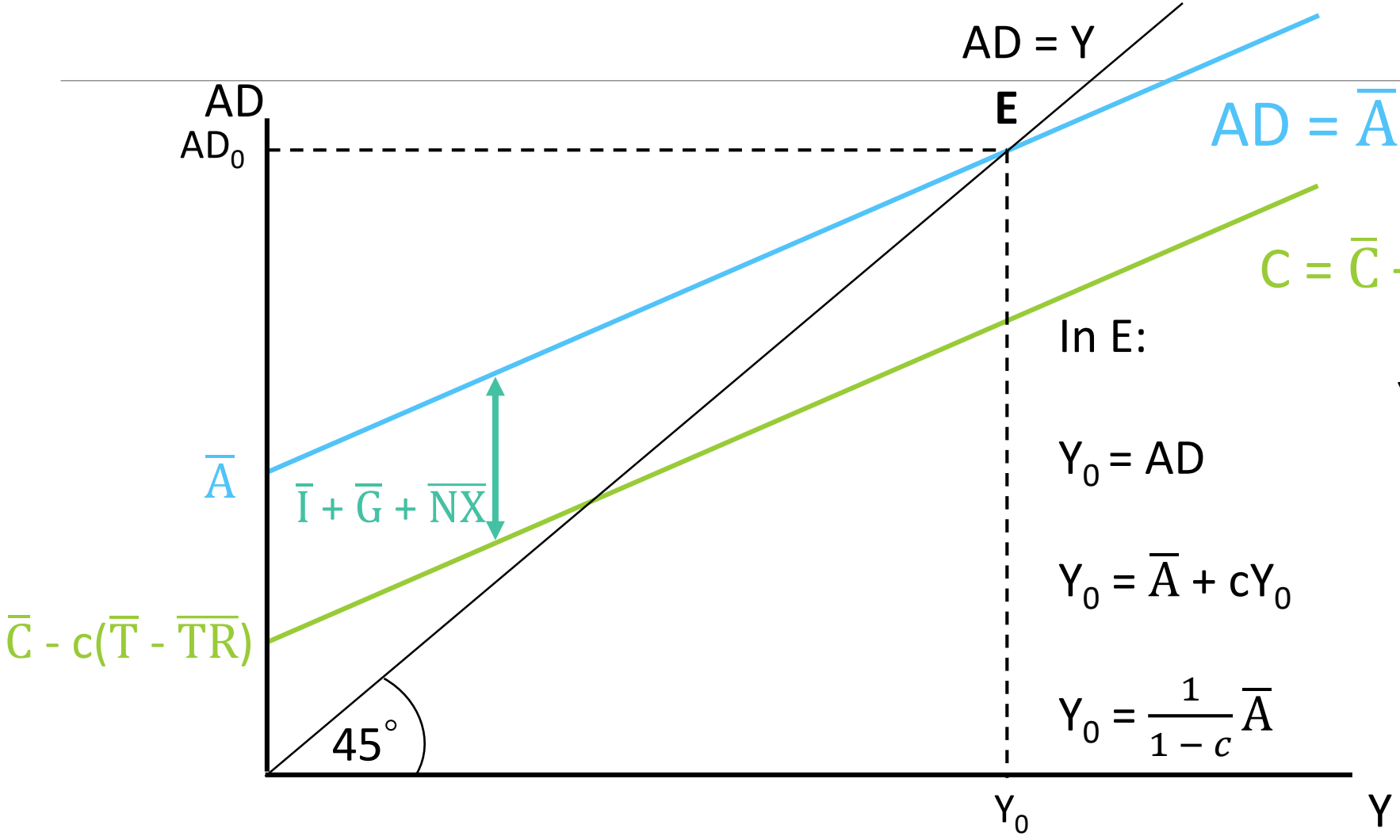
Equilibrium income and output



Equilibrium output



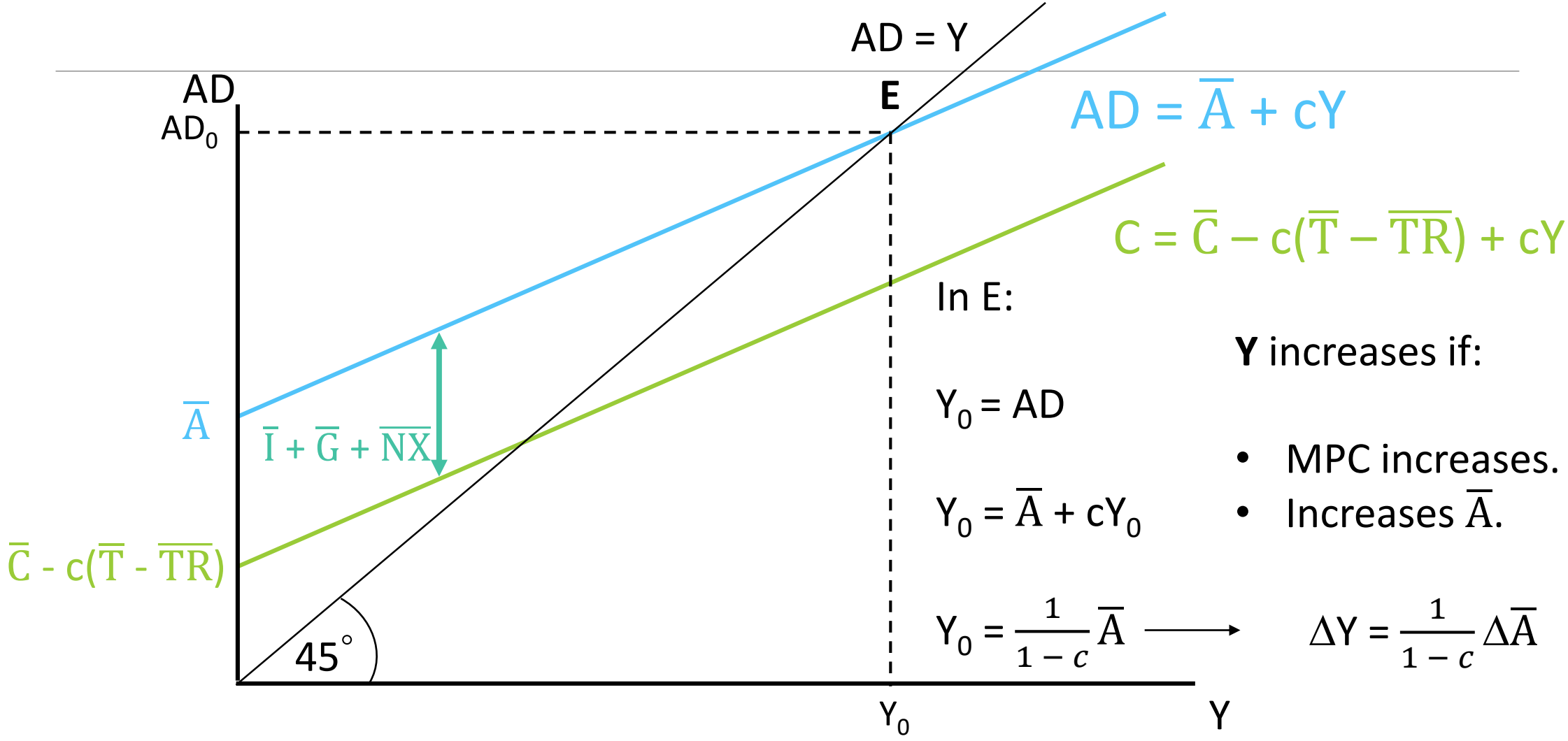
Equilibrium output



Y increases if:

- MPC increases.
- Increases $\overline{A}$.

Equilibrium output



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Outline

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2. Aggregate demand.
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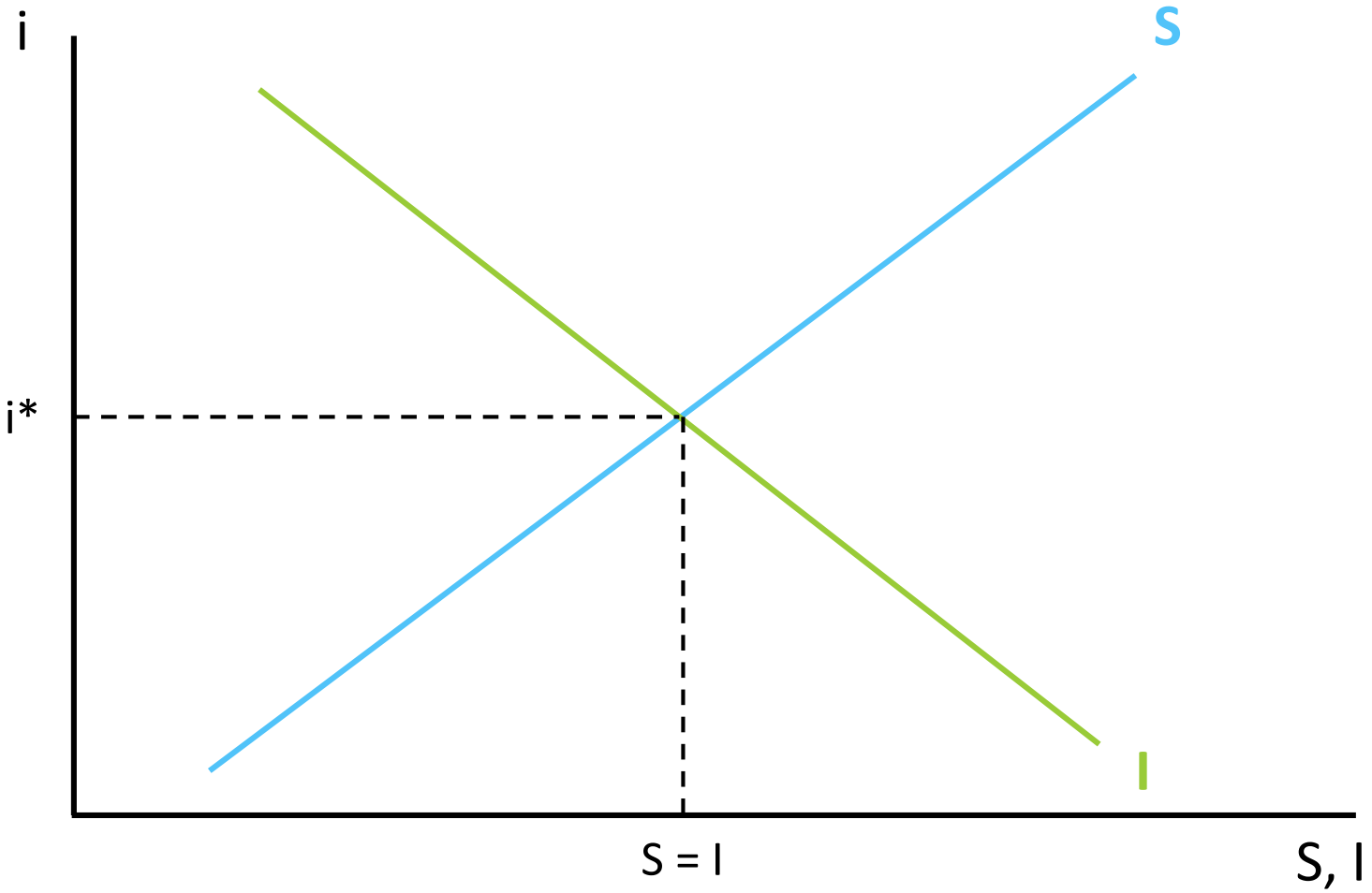
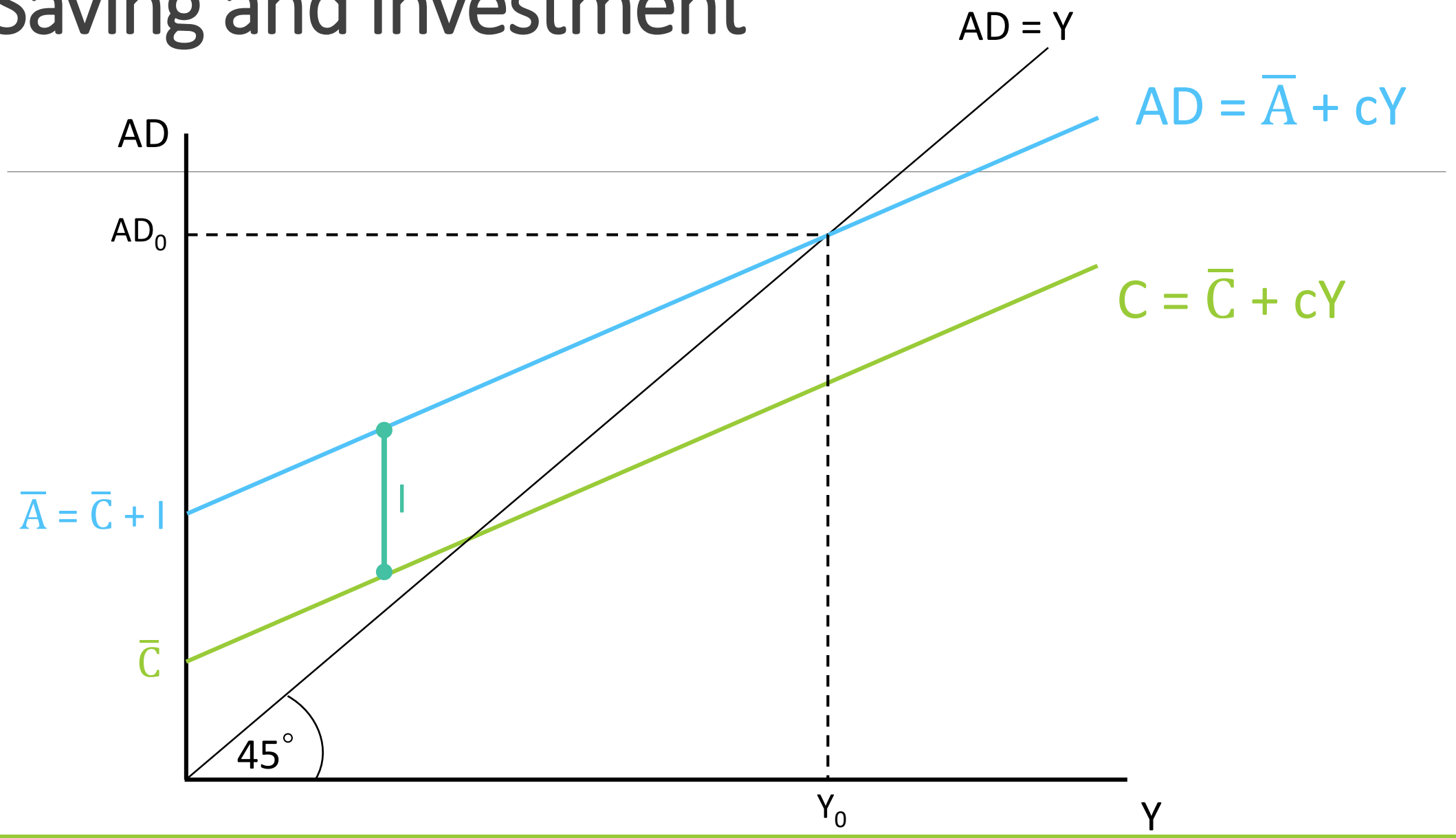
Saving and investment

- In equilibrium, with no government nor international trade, S = I.

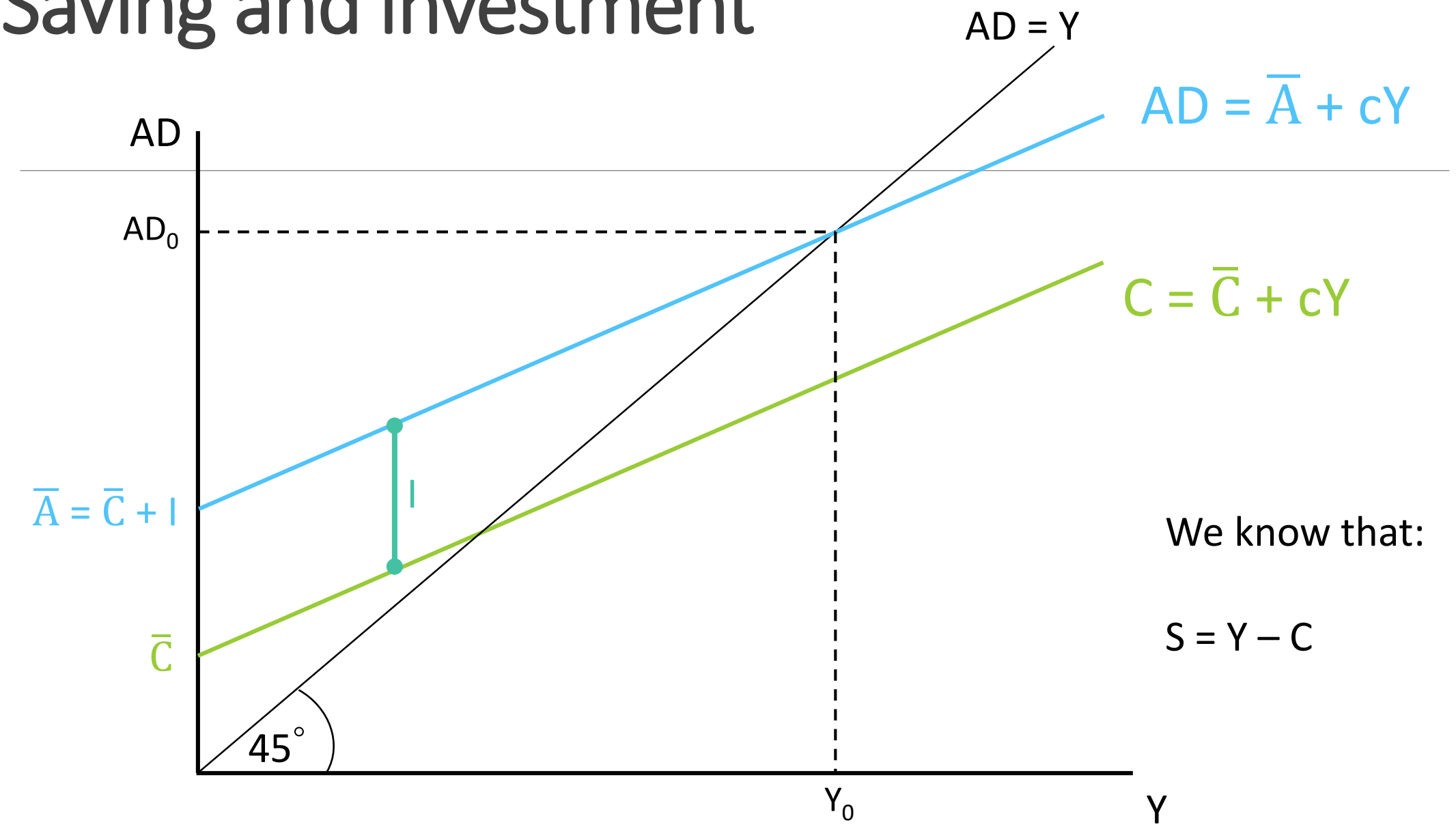
Saving and investment balance



Saving and investment



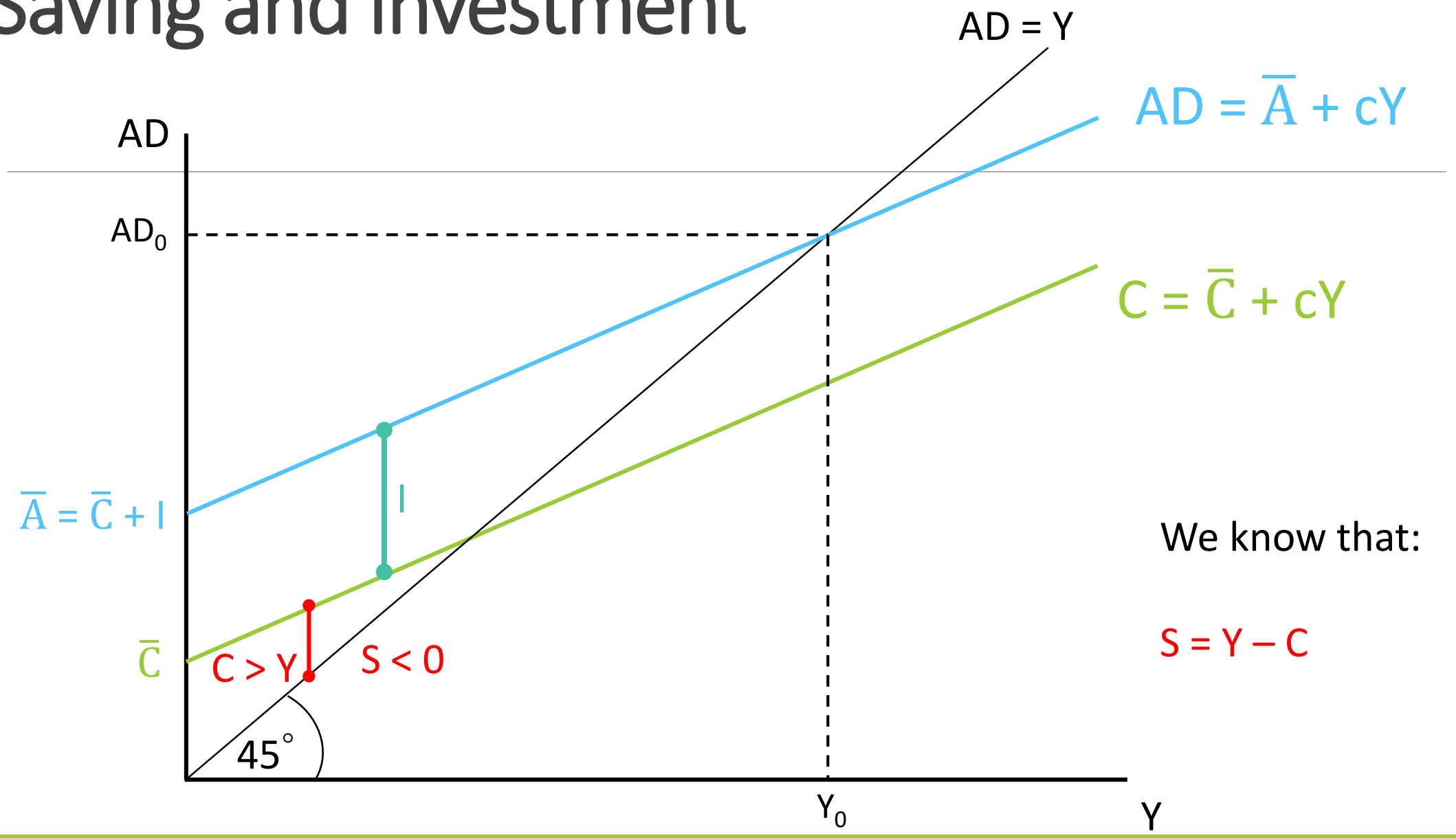
Saving and investment



We know that:

S = Y – C

Saving and investment



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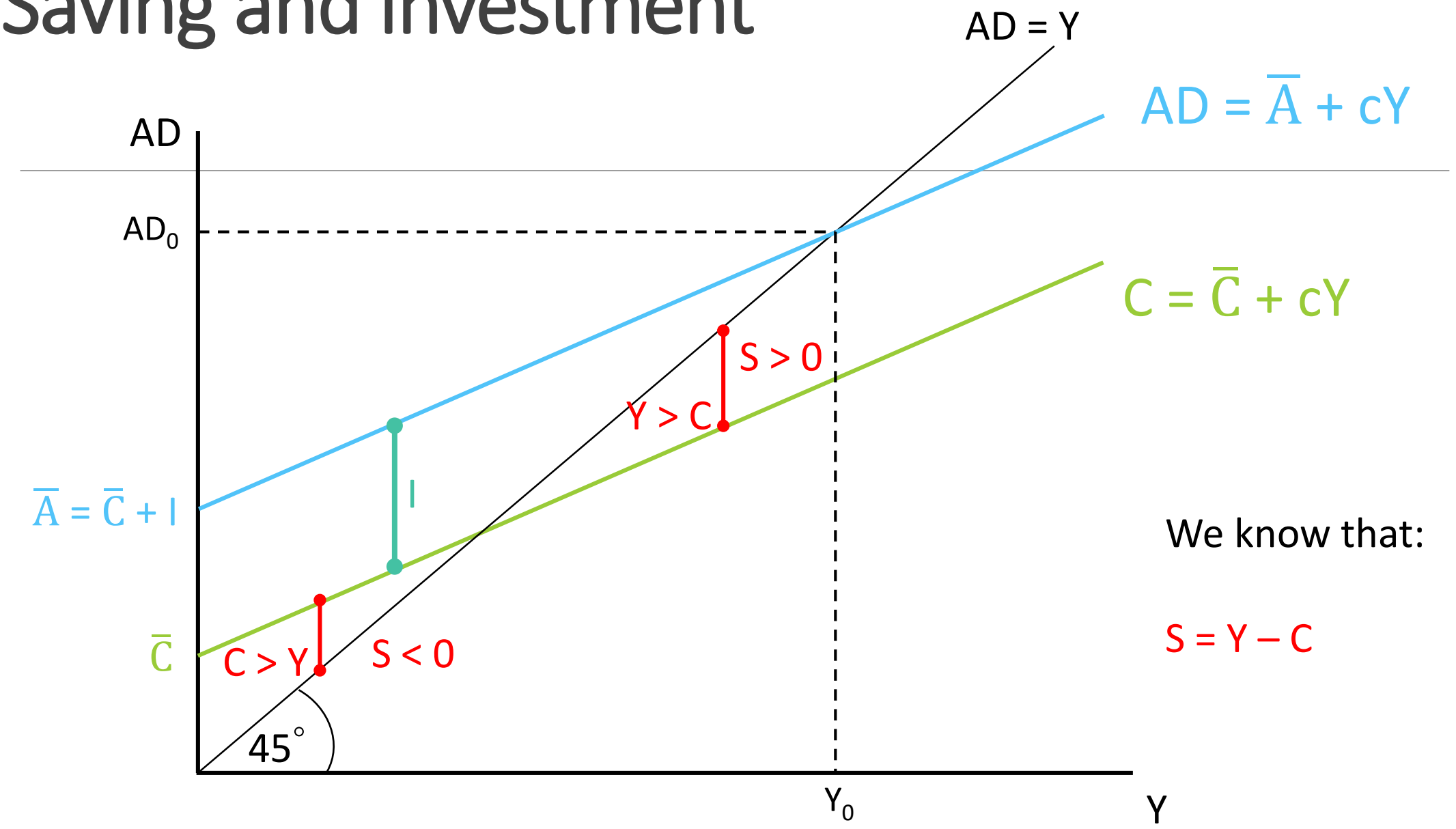
Saving and investment



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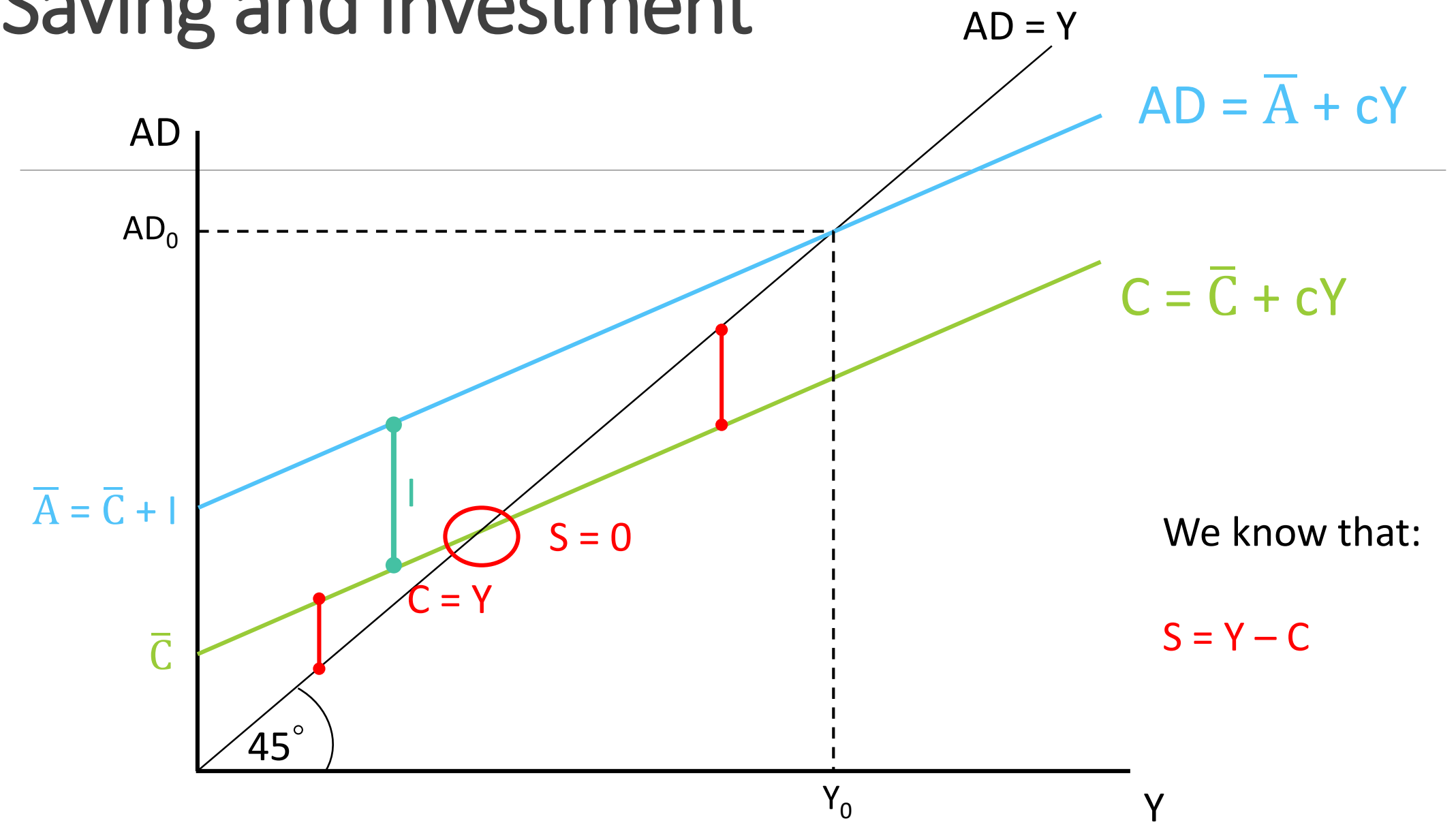
Saving and investment



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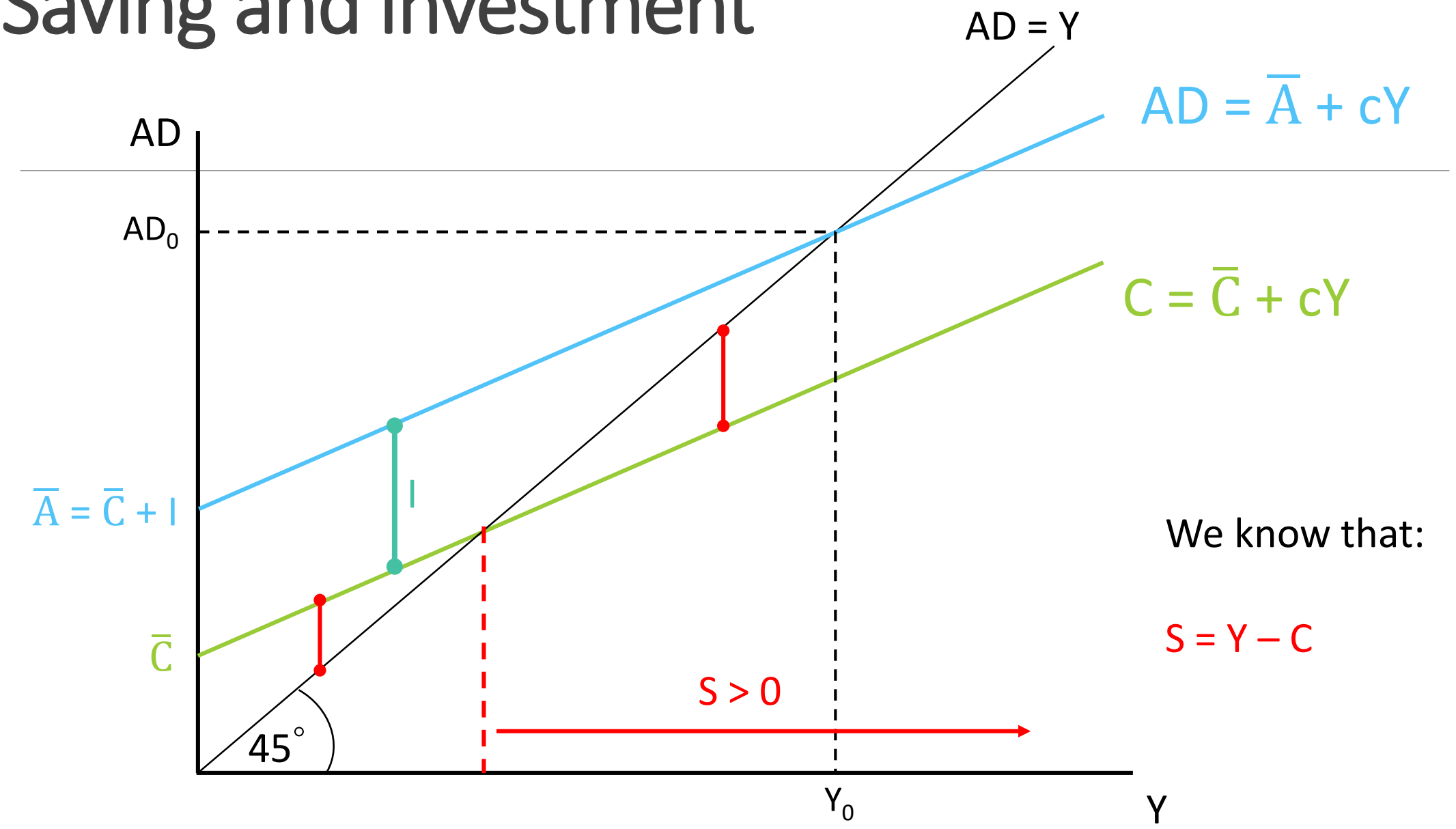

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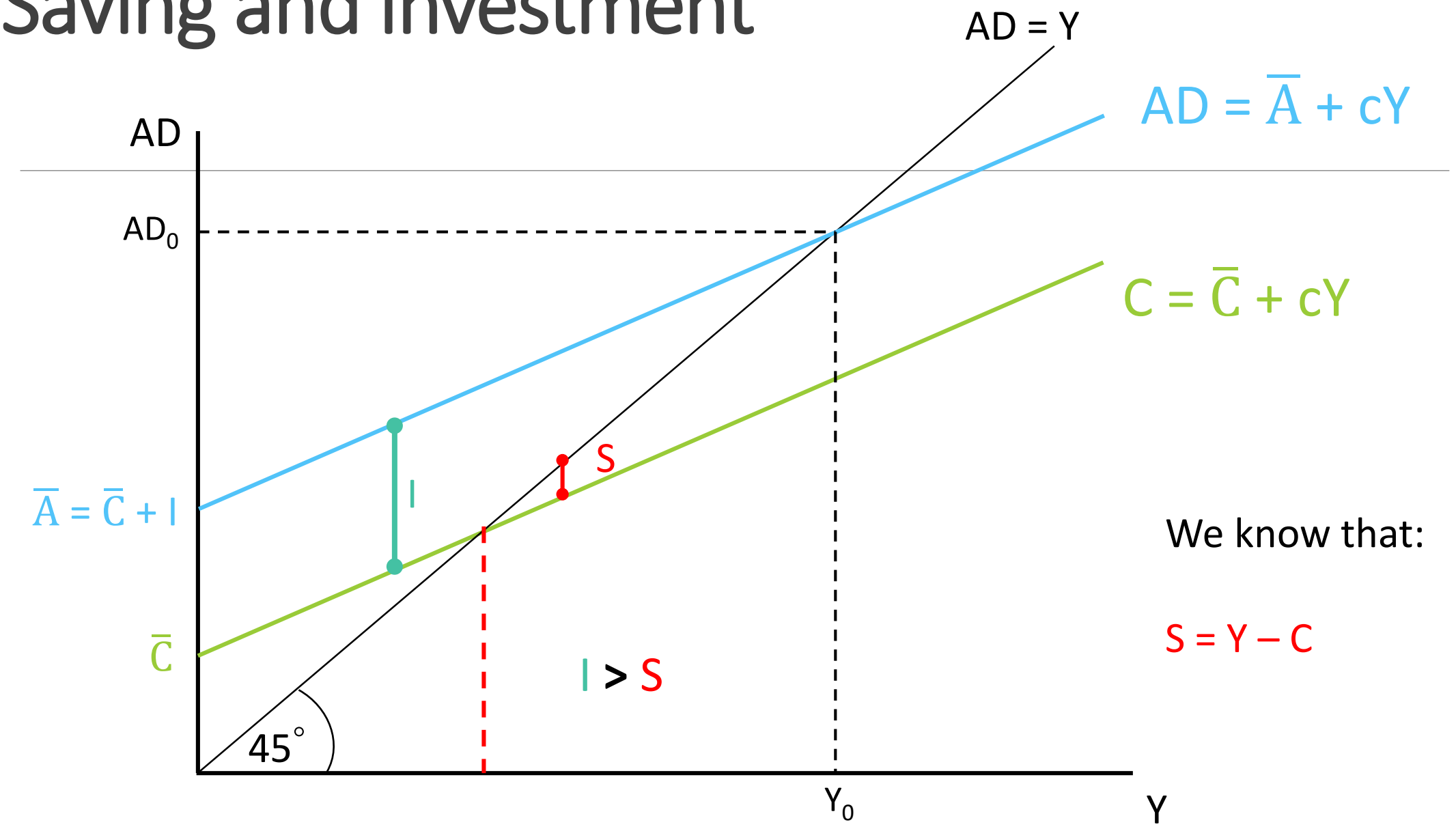

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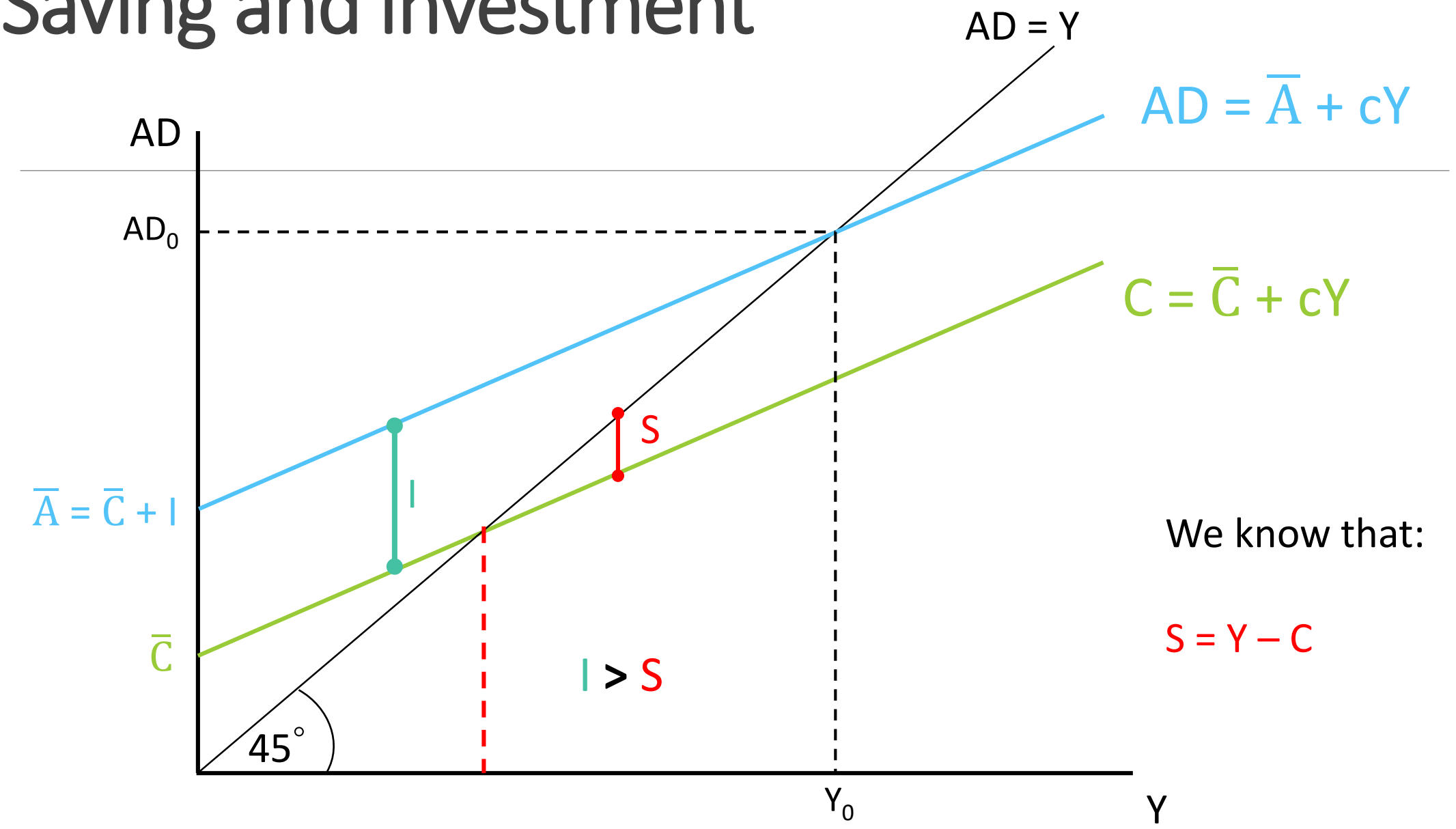

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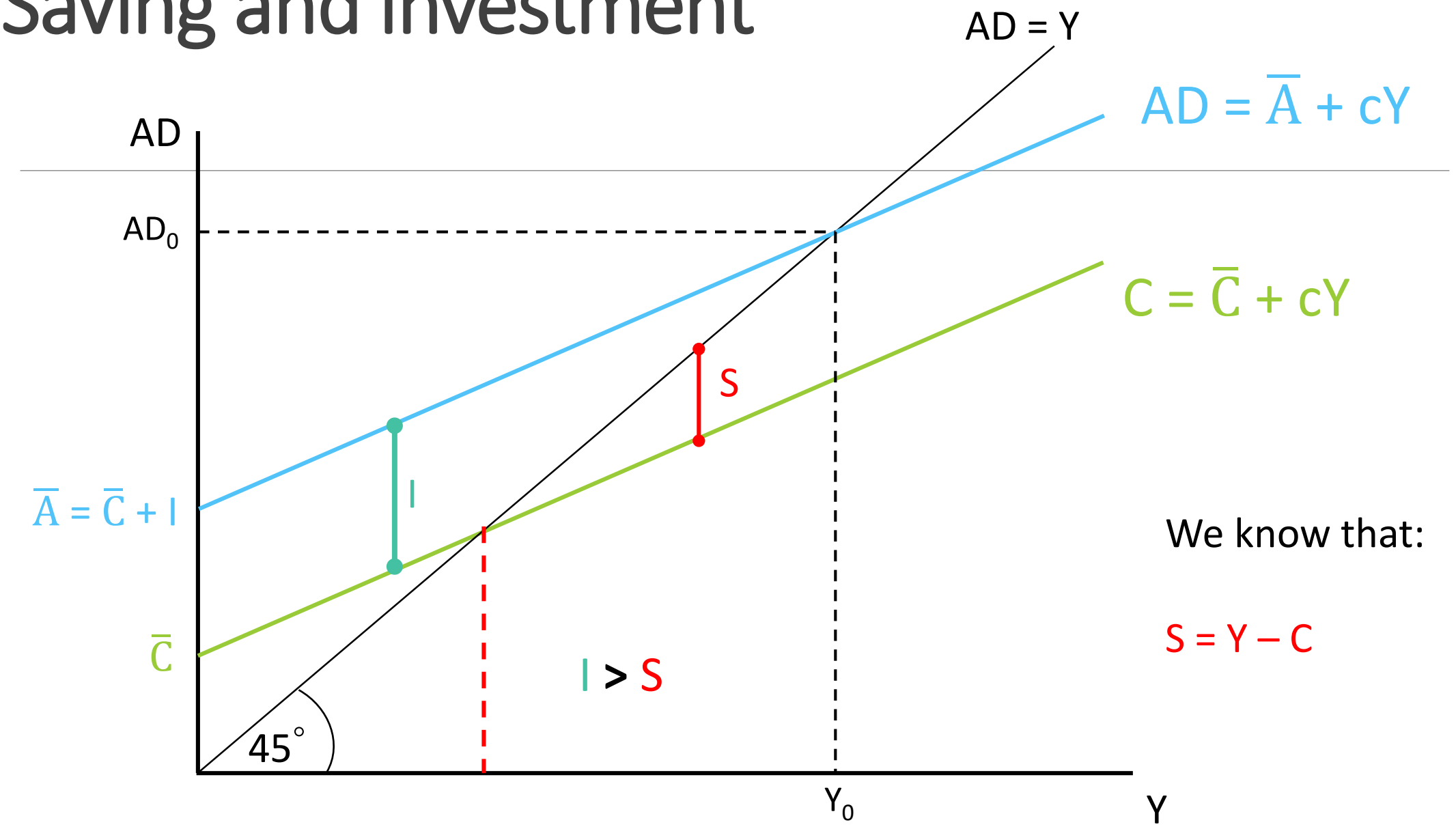

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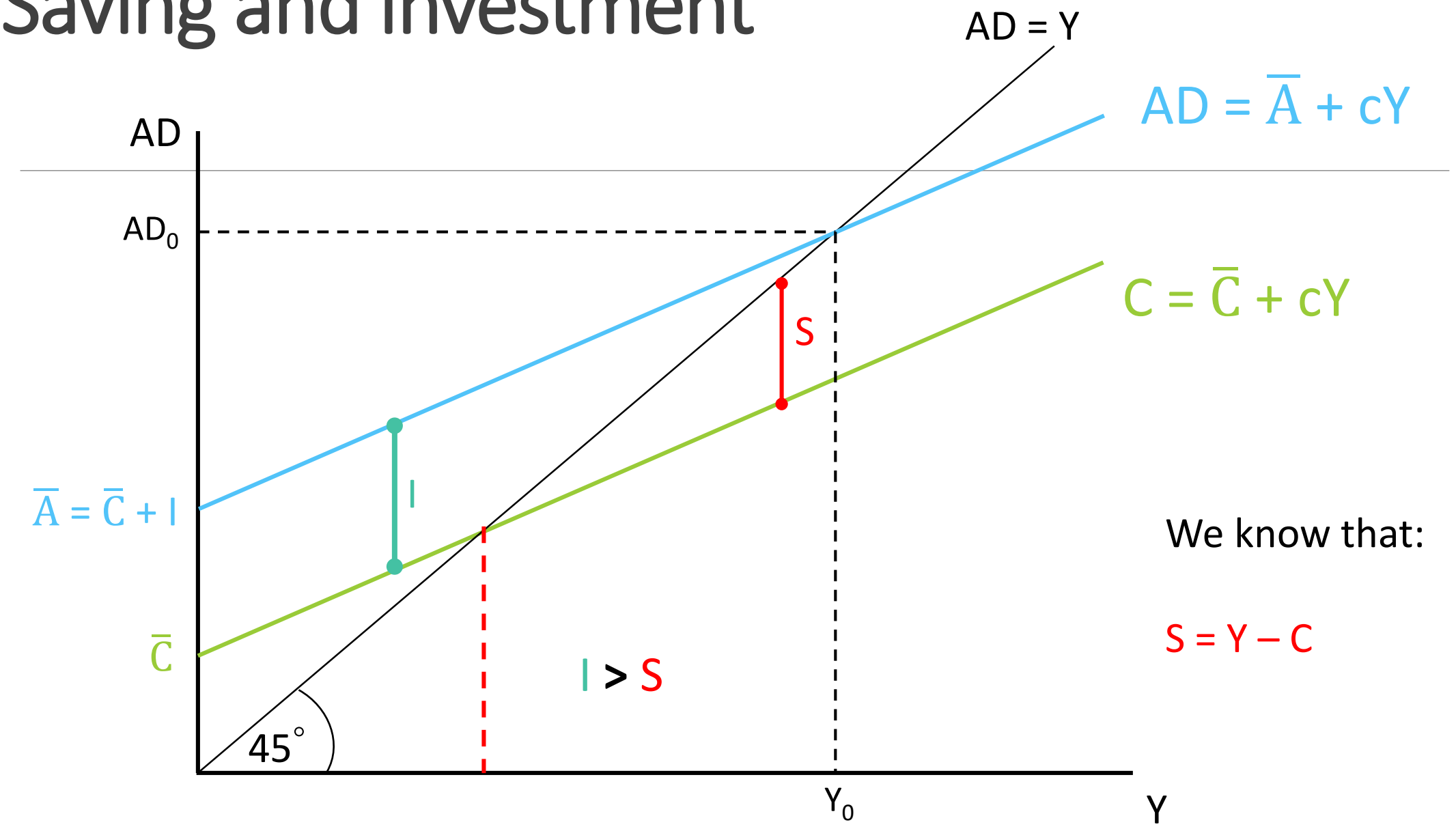

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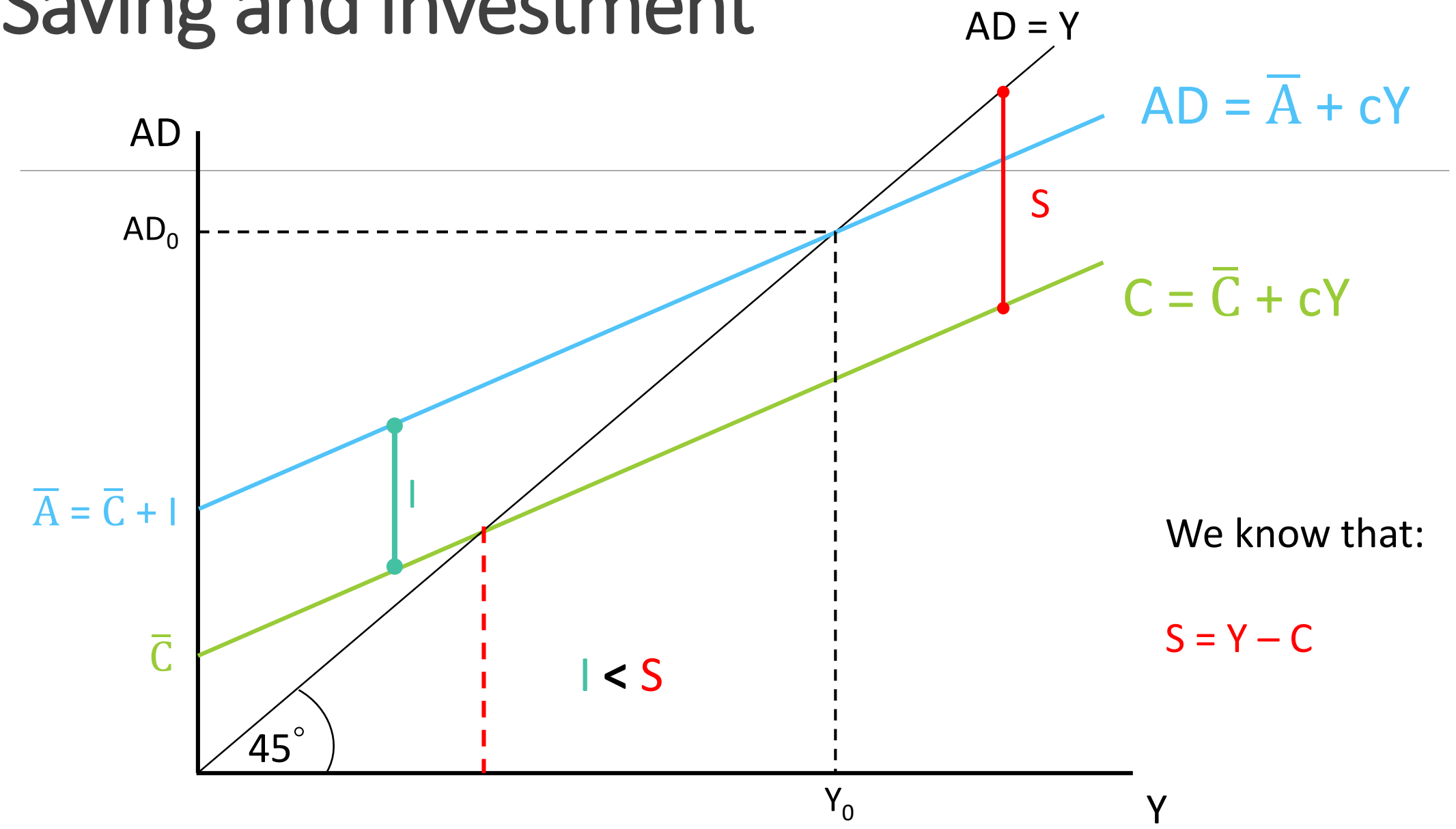

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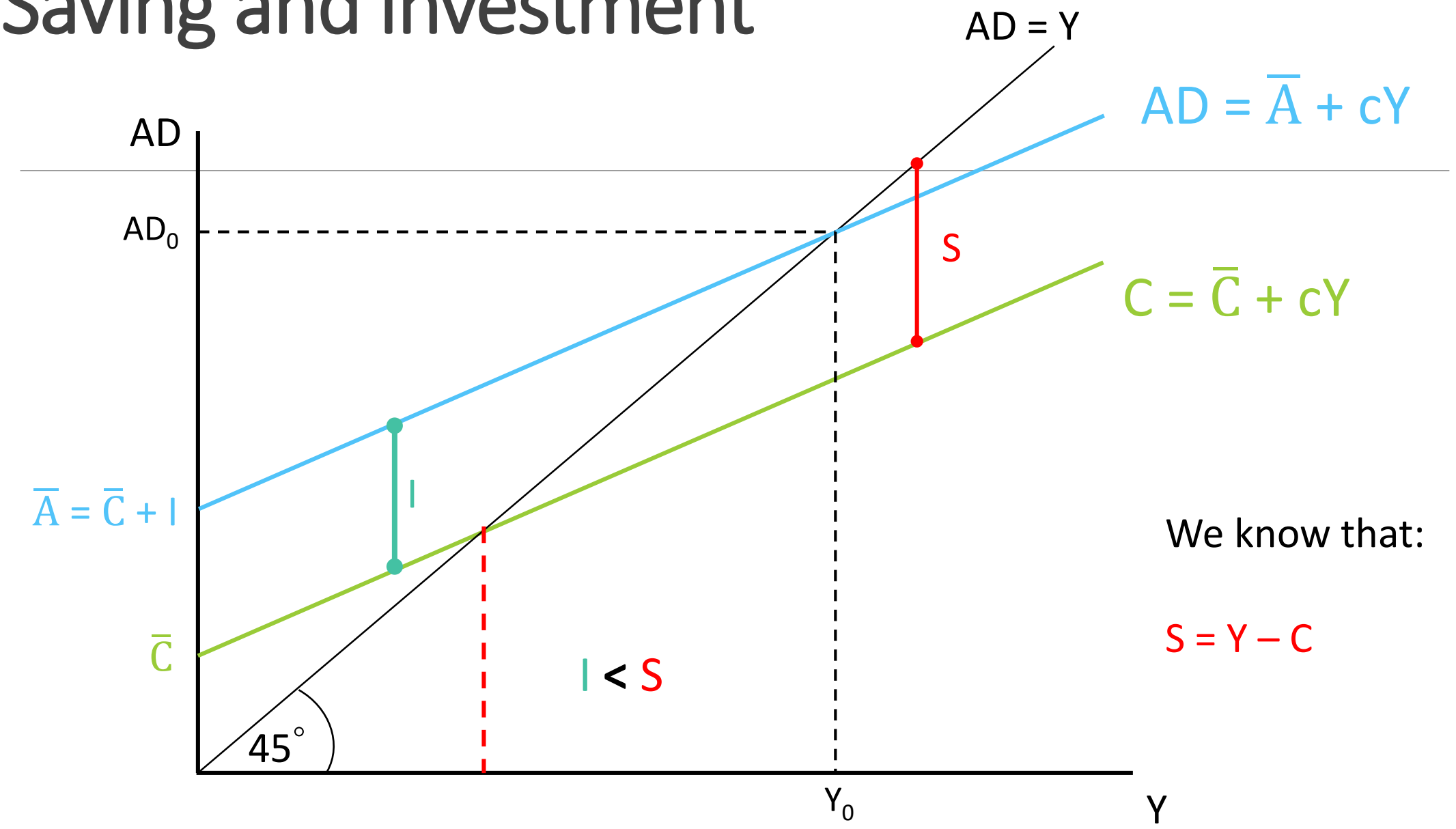

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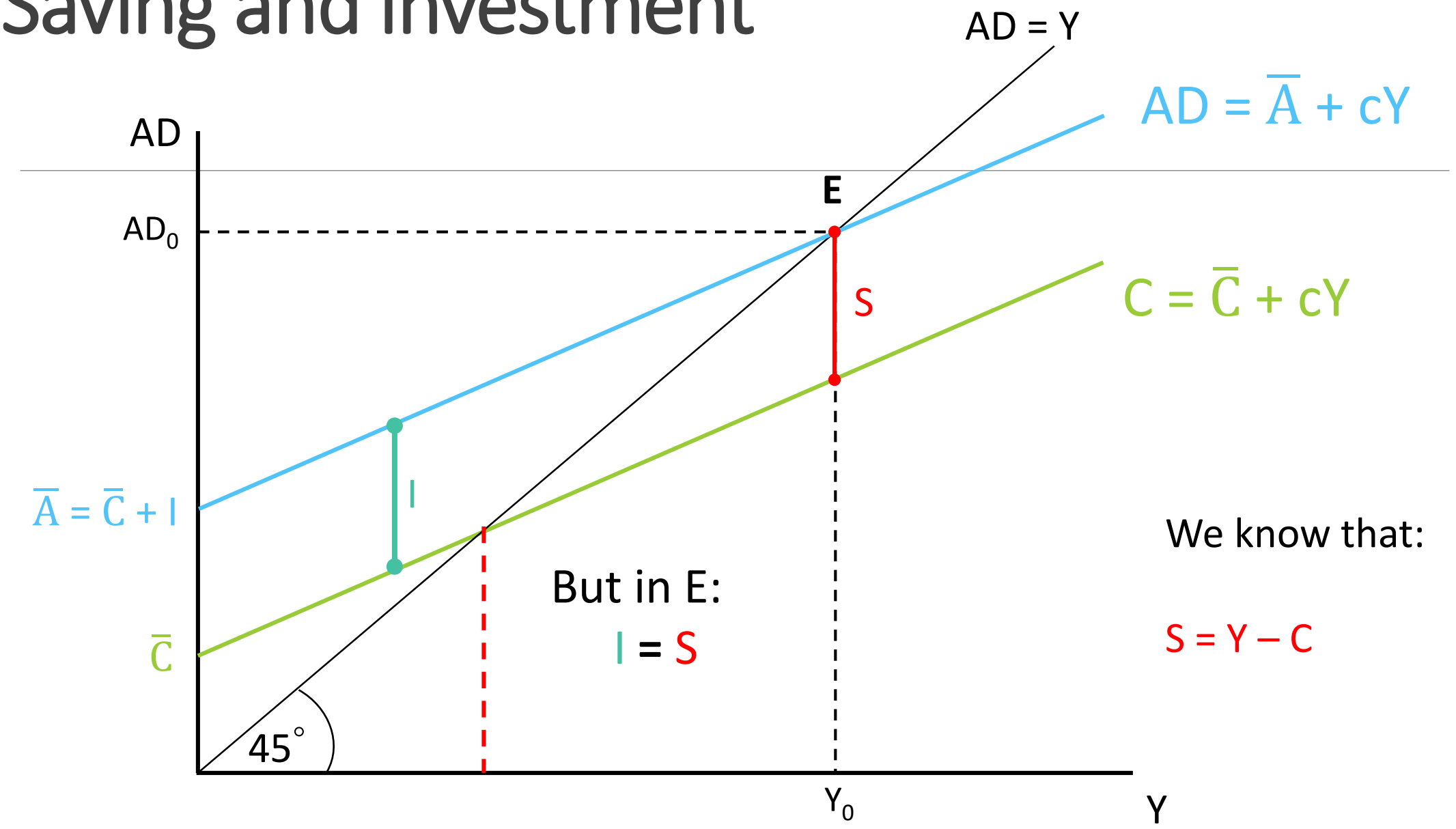
Saving and investment



Saving and investment

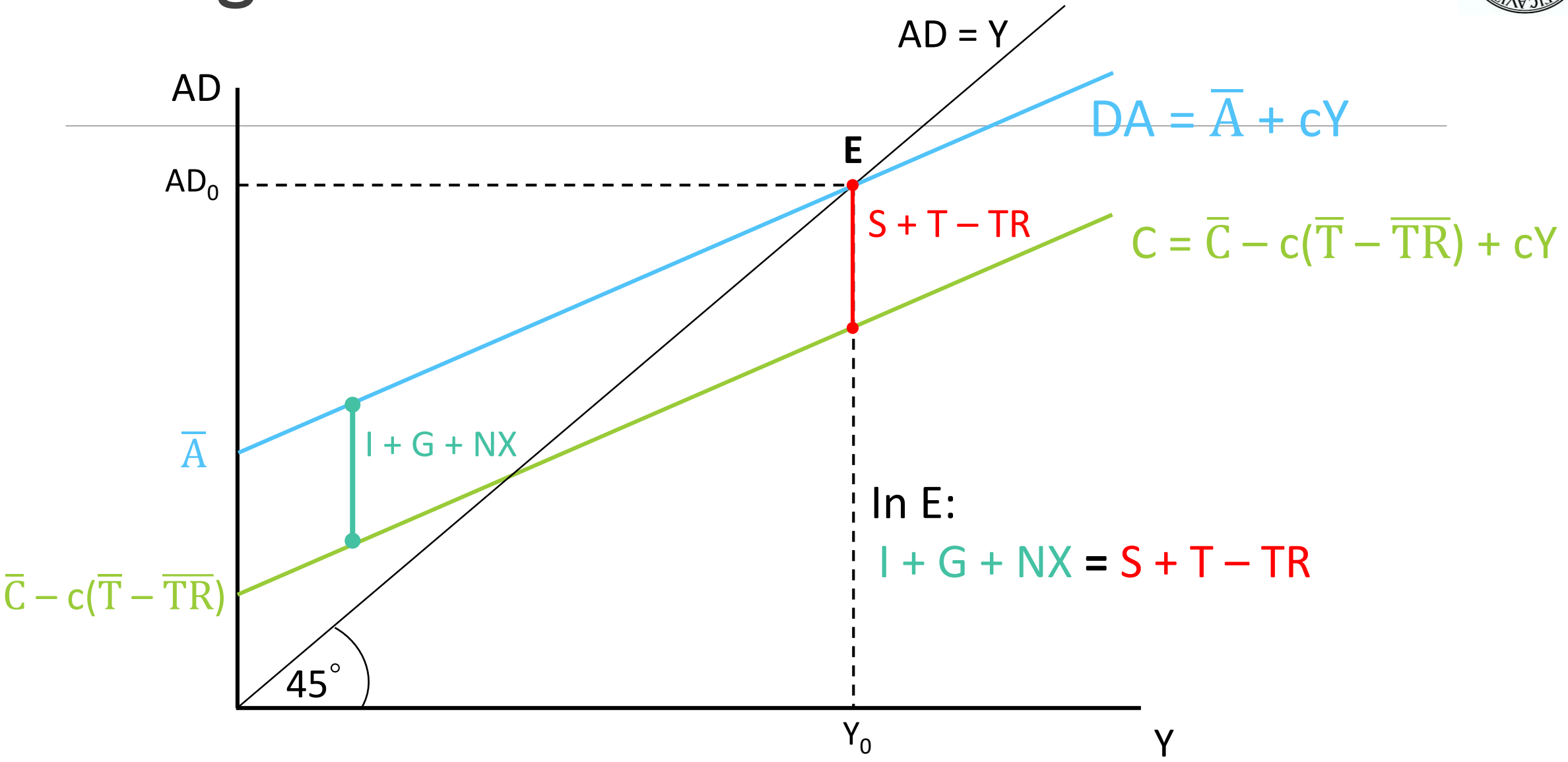
- On the households side: $Y = C + S$.
- On the firms side: $Y = C + I$.
- In equilibrium without government and without international trade: $S = I$.

Saving and investment

- Including the government and international trade:
- On the households side: $Y = C + S + T - TR$
- Now, $AD = Y = C + I + G + NX$.
- Therefore: $C + I + G + NX = C + S + T + T - TR$

$$I = S + \underbrace{(T - TR - G)}_{\text{Budget surplus / deficit (– BD)}} - NX$$

Saving and investment



Mandatory readings

- Krugman, P. and Wells, R. (2023). *Essentials of Economics*. MacMillan Learning. 6th edition.
  - Chapter 16: Aggregate demand and aggregate supply.

Mandatory readings

- Dornbusch, R., Fischer, S. and Startz, R. (2018). *Macroeconomics*. McGraw-Hill Education. 13th edition.
  - Chapter 5: Aggregate supply and demand.
  - Chapter 10: Income and spending.
  - Chapter 14: Consumption and saving.
  - Chapter 15: Investment spending.

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End of Topic 6

Aggregate Demand

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