

# Instituto Universitário de Lisboa (ISCTE-IUL) - Economics Department

Course: Macroeconomics | Program: Management

## Week IV: The IS Curve

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These slides do not cover all the contents of the theoretical classes. They only provide a summary of the subjects which will be used in the practical exercises. This means you should attend theoretical classes as well.

# The components of expenditure/aggregate demand

- Consumption expenditure:

$$C = \bar{C} + cY_D - br$$

- Investment:

$$I = \bar{I} - dr_i \Leftrightarrow I = \bar{I} - d(r + \bar{f})$$

- Government spending:

$$G = \bar{G}$$

- Taxes:

$$T = \bar{T}$$

- Net exports:

$$NX = \bar{NX} - xr$$

## Identity equations in the goods market

- Aggregate demand equilibrium:

$$D \equiv C + I + G + NX$$

- Equilibrium between output (income) and aggregate demand:

$$Y \equiv D$$

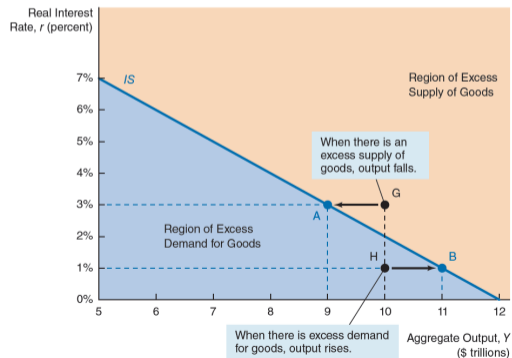
- Disposable income definition:

$$Y_D \equiv Y - T$$

# The IS curve

## Definition and graphical representation

- IS curve:** relationship between the aggregate product ( $Y$ ) and the real interest rate ( $r$ ) for a given level of autonomous demand ( $\bar{A}$ ) for which the equilibrium of the goods and services market occurs.



# The IS curve

## Derivation

- The identity equations along with the expressions for the expenditure components are used:

$$\begin{aligned}
 Y &\equiv D \equiv C + I + G + NX \Rightarrow \\
 &\Rightarrow Y = \bar{C} + cY_D - br + \bar{I} - d(r + \bar{f}) + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow Y = \bar{C} + c(Y - T) - br + \bar{I} - d(r + \bar{f}) + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow Y = \bar{C} + c(Y - \bar{T}) - br + \bar{I} - d(r + \bar{f}) + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow Y = \bar{C} + cY - c\bar{T} - br + \bar{I} - dr - d\bar{f} + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow Y - cY = \bar{C} - c\bar{T} - br + \bar{I} - dr - d\bar{f} + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow (1 - c)Y = \bar{C} - c\bar{T} - br + \bar{I} - dr - d\bar{f} + \bar{G} + \bar{N}X - xr \Leftrightarrow \\
 &\Leftrightarrow Y = \frac{1}{1 - c} (\bar{C} + \bar{I} - c\bar{T} - d\bar{f} + \bar{G} + \bar{N}X) - \frac{(b + d + x)}{1 - c} r \Leftrightarrow \\
 &\Leftrightarrow Y = \frac{1}{1 - c} \bar{A} - \frac{(b + d + x)}{1 - c} r
 \end{aligned}$$

# The IS curve

## Compact formula

$$Y = m \times \bar{A} - m \times \phi \times r,$$

where

$$m = \frac{1}{1 - c}, \bar{A} = (\bar{C} + \bar{I} - c\bar{T} - d\bar{f} + \bar{G} + \bar{N}X) \text{ and } \phi = b + d + x$$

# The (Keynesian) multiplier of autonomous expenditures

Economic and mathematical concepts.

- **Economic concept:** an increase/decrease in autonomous demand leads to an increase/decrease in equilibrium product by an amount greater than the first change – i.e., an aggregate demand shock is amplified (multiplied) by the effects it has on expenditure components.
- **Mathematical concept:**

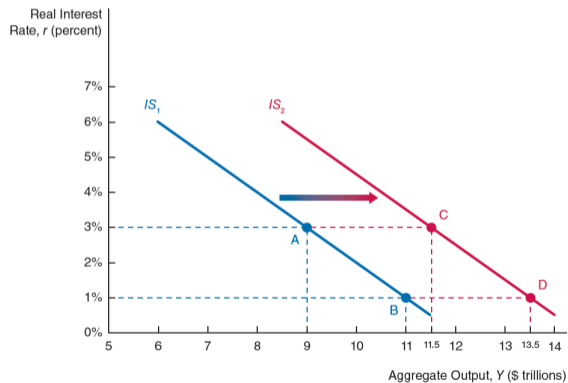
$$\Delta Y = \frac{1}{1-c} \times \Delta \bar{A}, \quad \text{with } m = \frac{1}{1-c} > 1, \text{ because } 0 < c < 1$$

- When the autonomous demand changes due to one of its components, the IS curve shifts, meaning that **for the same real interest rate GDP increases or decreases.**

# The (Keynesian) multiplier of autonomous expenditures

Shifts in the IS curve.

- Graphical representation of an **increase** in the autonomous demand ( $\bar{A}$ ) in the IS curve:

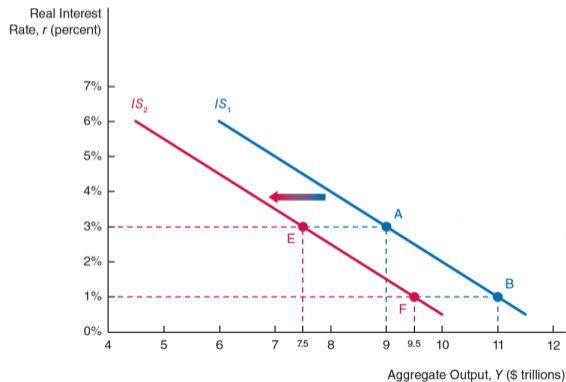




# The (Keynesian) multiplier of autonomous expenditures

Shifts in the IS curve.

- Graphical representation of an **decrease** in the autonomous demand ( $\bar{A}$ ) in the IS curve:



## Quantify $\Delta\bar{A}$ having an $\Delta Y$ as goal

- **Remember:** when autonomous demand changes due to one of its components, the IS curve shifts which means that **for the same real interest rate GDP increases or decreases.**
- We can quantify the variation in autonomous demand necessary to obtain a given change in GDP, considering that it varies for the same real interest rate:

$$\Delta\bar{A} = \frac{\Delta Y}{m}$$

- We choose a point on the initial curve and another point on the final curve for which the real interest rate is the same. Then, we look at the GDP change verified for this same interest rate and quantify  $\Delta\bar{A}$ .

# References

- Mishkin, F. S. (2014), *Macroeconomics: Policy and Practice*, 2nd Edition, Pearson, Addison-Wesley, New York.