

# Analysis of Business Cycles I: The Demand Side of the Economy

Bilgin Bari

*God put macroeconomists on earth not to propose and test elegant theories but to solve practical problems. The problems He gave us, moreover, were not modest in dimension.*

Gregory Mankiw

- 1 Effects of Interest Rate on Aggregate Demand
  - Derivation of Aggregate Demand
  
- 2 Monetary Policy and Aggregate Demand
  - Monetary Policy
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# Planned Expenditure

- Planned Expenditure : The total amount of spending on domestically produced goods and services.
- Planned Expenditure = Aggregate Demand
- $Y_{pe} = C + I + G + NX$

## Consumption Expenditure (C)

$$C = \bar{C} + (mpc \times Y_D) - cr$$

$\bar{C}$  : autonomous consumption expenditure

$mpc$  : marginal propensity to consume

$Y_D$  : disposable income (Y-T)

$c$  : a parameter reflects how consumption respond changes in the real interest rate

$r$  : real interest rate

⇒ Real interest rate affects on savings decisions.

## Planned Investment Spending (I)

$$I = \bar{I} - dr$$

$\bar{I}$  : Fixed Investment

$d$  : a parameter reflects how investment respond to changes in the real interest rate.

⇒ Real interest rate affects on investment decisions through cost of finance.

## Government Purchases and Taxes

Government Purchases :  $G = \bar{G}$

Taxes  $T = \bar{T} \rightarrow$  disposable income :  $Y - T$

## Net Exports (NX)

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

$\overline{NX}$  : autonomous net export

$x$  : a parameter reflects how net export respond to changes in the real interest rate

⇒ real interest rate affect net export through the exchange rate :

changes in real interest rate → changes in return → capital flow → changes in export and import prices → changes in net export

# Goods Market Equilibrium

$$Y = Y_{pe}$$

$$Y = C + I + G + NX$$

$$Y = \bar{C} + (mpc \times Y_D) - cr + \bar{I} - dr + \bar{G} + \overline{NX} - xr$$

$$Y = \bar{C} + \bar{I} + \bar{G} + \overline{NX} + (mpc \times Y) - (mpc \times \bar{T}) - (c + d + x)r$$

subtracting  $mpc \times Y$  from both sides of equation

$$Y - (mpc \times Y) = Y(1 - mpc) =$$

$$\bar{C} + \bar{I} + \bar{G} + \overline{NX} - (mpc \times \bar{T}) - (c + d + x)r$$

dividing both sides of equation  $(1 - mpc)$

$$Y = [\bar{C} + \bar{I} + \bar{G} + \overline{NX} - (mpc \times \bar{T})] \times \frac{1}{1 - mpc} - \frac{c + d + x}{1 - mpc} r$$



# IS Curve

$$Y = \underbrace{[\bar{C} + \bar{I} + \bar{G} + \bar{NX} - (mpc \times \bar{T})]}_{\text{First component}} \times \frac{1}{1 - mpc} - \underbrace{\frac{c + d + x}{1 - mpc} r}_{\text{Second component}}$$

- The equation shows how to determine aggregate output when goods market is in equilibrium.
- It shows the relationship between aggregate output and the real interest rate when the goods market is in equilibrium.
- First component of the equation explains shifts in IS curve (given interest rate)
- Second component of the equation explains movements on IS curve (changes in real interest rate)

# Monetary Policy

- Central Banks use a very short-term interest rate as their primary policy tool.
- The interest rate is overnight interest rate at which banks lend to each other.
- We need real interest rate :  $r = i - \pi^e$ 
  - changes in nominal interest rate  $\rightarrow$  changes in real interest rate (only if actual and expected inflation remain unchanged in the short-run)
  - We know prices are sticky in the short-run.
- Central bank can determine the real interest rate in the short-run.  
not long run, because prices are flexible in the long-run.
- In the long-run, real interest rate is determined by the interaction of saving and investment.

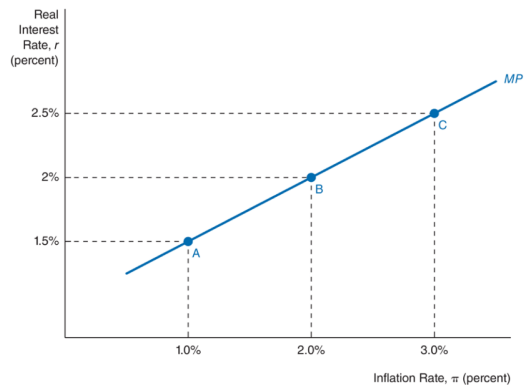
# MP Curve I

- MP curve indicates the relationship between the real interest rate which central bank sets and the inflation rate.

$$r = \bar{r} + \lambda\pi$$

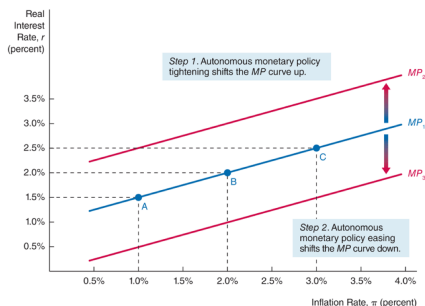
- MP has an upward slope :
  - Policy makers follow Taylor principle to stabilise inflation.
  - Interest rate is raised more than any rise in expected inflation.
  - Real interest rate rise if there is a rise in inflation.

# MP Curve II



## MP Curve III

- Shifts in MP curve shows changes in stance of monetary policy :
  - tightening of monetary policy :  $MP \uparrow$
  - easing of monetary policy :  $MP \downarrow$



# AD Curve

## MP curve

shows how central bank respond to changes in inflation with setting interest rate

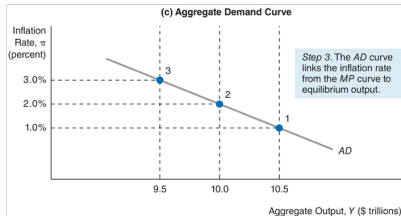
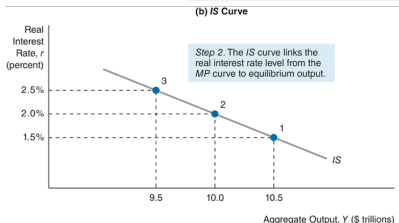
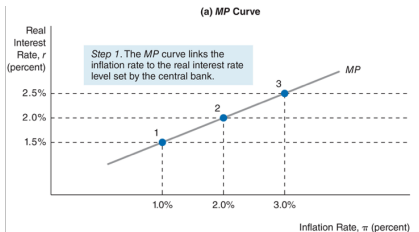
## IS curve

shows how changes in interest rate affects equilibrium output.

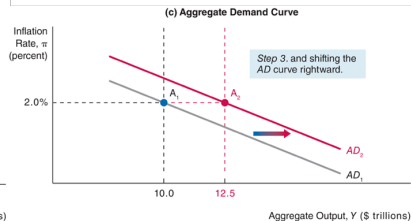
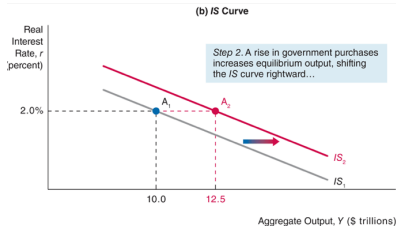
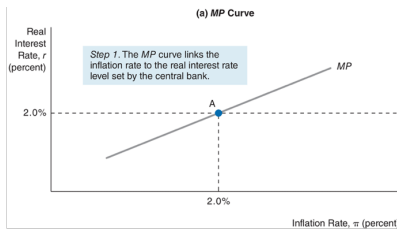
## AD curve

shows the relationship between the quantity of aggregate output and inflation rate(given inflation expectations and stance of monetary policy)

# Derivation of AD Curve

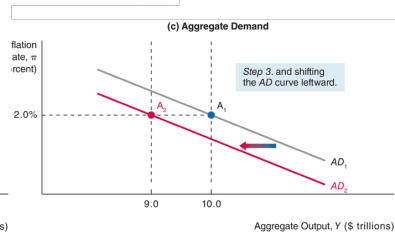
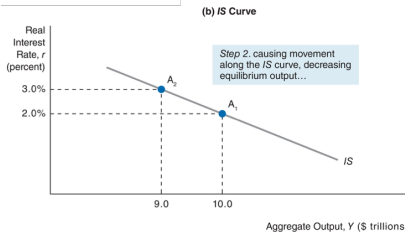
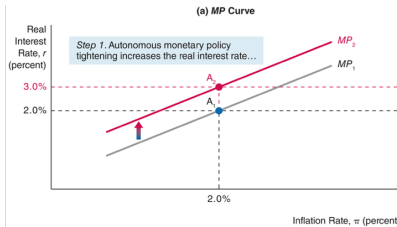


# Shifts in AD Curve





# Effects of Monetary Policy on Aggregate Demand



# References

- Mankiw, Macroeconomics: Chapter 10 and 11
- Mishkin, Macroeconomics: Chapter 9