The Short-Run: IS/LM

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Issues

- In the growth models we studied aggregate demand was irrelevant.
- We always assumed there is enough demand to employ all factors / sell all output.
- Why is this appropriate for long-run analysis?

The Short and the Long Run

Short run: supply is elastic

- only demand matters
- IS/LM model

Long run: output is on its trend growth path

- only supply matters
- capital stock adjusts
  growth models

Medium run: supply depends on prices

- demand and supply matter
- price setting mechanisms push output towards trend
- AS/AD model
- the transition from short to long run

Why Isn't There One Model?

In state of the art research, there actually is one model.

It has the price adjustment **frictions** that give rise to unemployment, business cycles, ...

It has **capital accumulation** that matter for long-run output (growth)

It has an explicity transition path between short run and long run equilibrium

- over time, prices adjust and demand becomes less and less important

Objectives

In this section, we are concerned with the short-run IS-LM model

You will learn:

1. how to set up and interpret the IS-LM model
2. what its limitations are
3. how to solve for the equilibrium
4. how to analyze the effects of shocks and policies

IS-LM Model

Key assumptions:

- Output is determined by aggregate demand
- There is no supply side
- Prices are fixed
- Closed economy

Think: economy in recession, with lots of unemployed resources.

We relax all of these assumptions later.

IS-LM Model

Two markets

- Goods (IS). Money (LM)
- In the background there is also a bond market

Two endogenous variables

- Output (Y). Interest rate (i)

Two policy variables

- Government spending (G). Money supply (M)

The Goods Market: IS Curve

Aggregate Demand

Start from an identity

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

Z is aggregate demand / expenditure.

For now: closed economy with $X - IM = 0$.

Add behavioral assumptions to give it content.

Consumption function

$$C = C(Y_D) = c_0 + c_1 Y_D \tag{1}$$

$Y_D = Y - T$: disposable income (after taxes and transfers)

c_0: "autonomous consumption" (intercept)

c_1: marginal propensity to consume (slope)

$s = 1 - c_1$: marginal propensity to save

Consumption might also depend on wealth, interest rates, expected incomes, etc.

- these are stuffed into c_0

Investment function

$$I = I(Y, i) = \bar{I} + b_1 Y - b_2 i \tag{2}$$

Government

- Exogenous G and T.
- G is government consumption
- T is tax revenue net of transfer payments

Goods Market Clearing

Assumption: supply is perfectly elastic.

$$Y = C + I + G \tag{3}$$

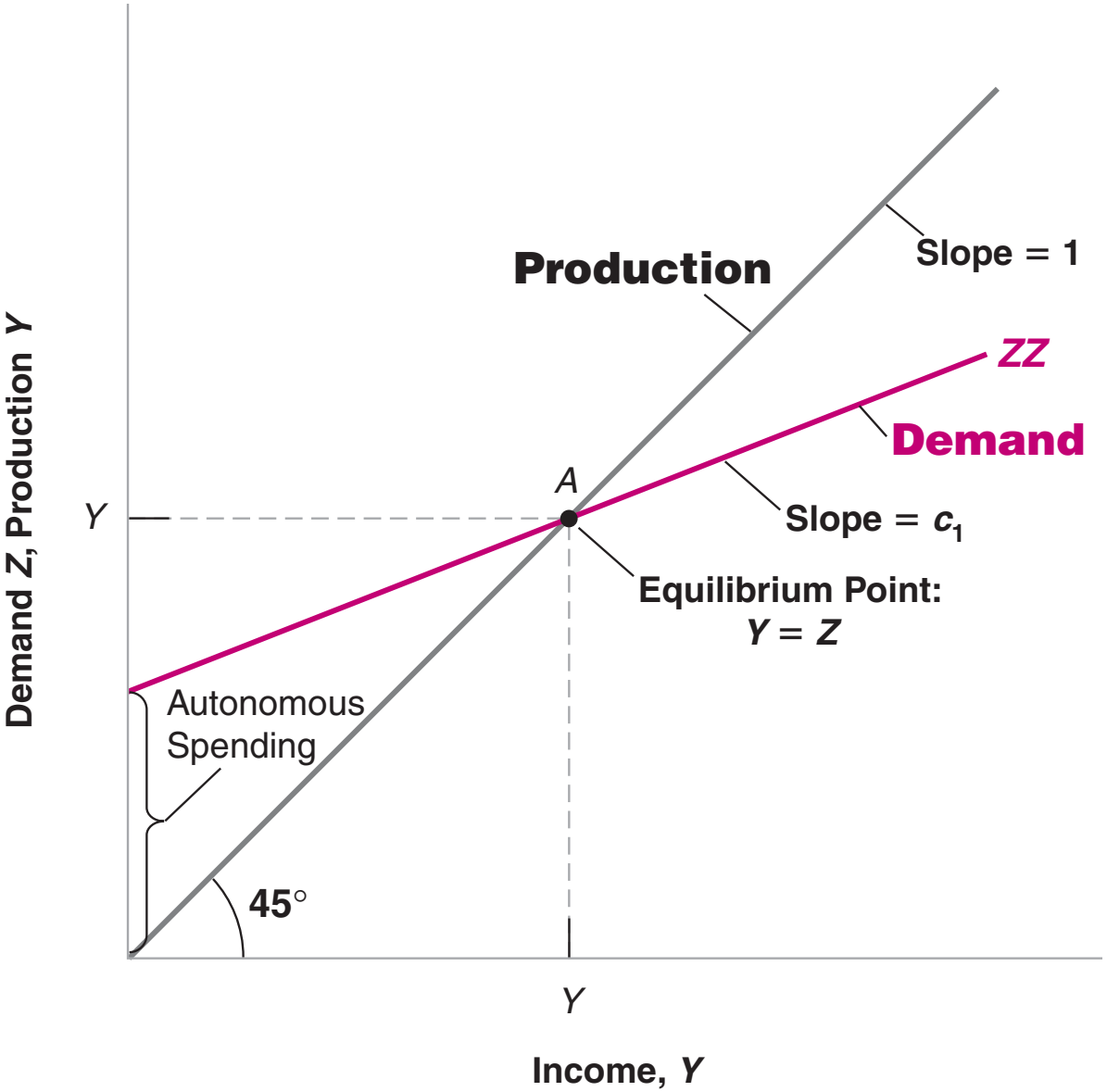
$$= \underbrace{[c_0 + \bar{I} + G - c_1 T]}_{\bar{Z}} + (c_1 + b_1)Y - b_2 i \tag{4}$$

$\bar{Z}$: autonomous spending / demand

Solve to get the IS curve:

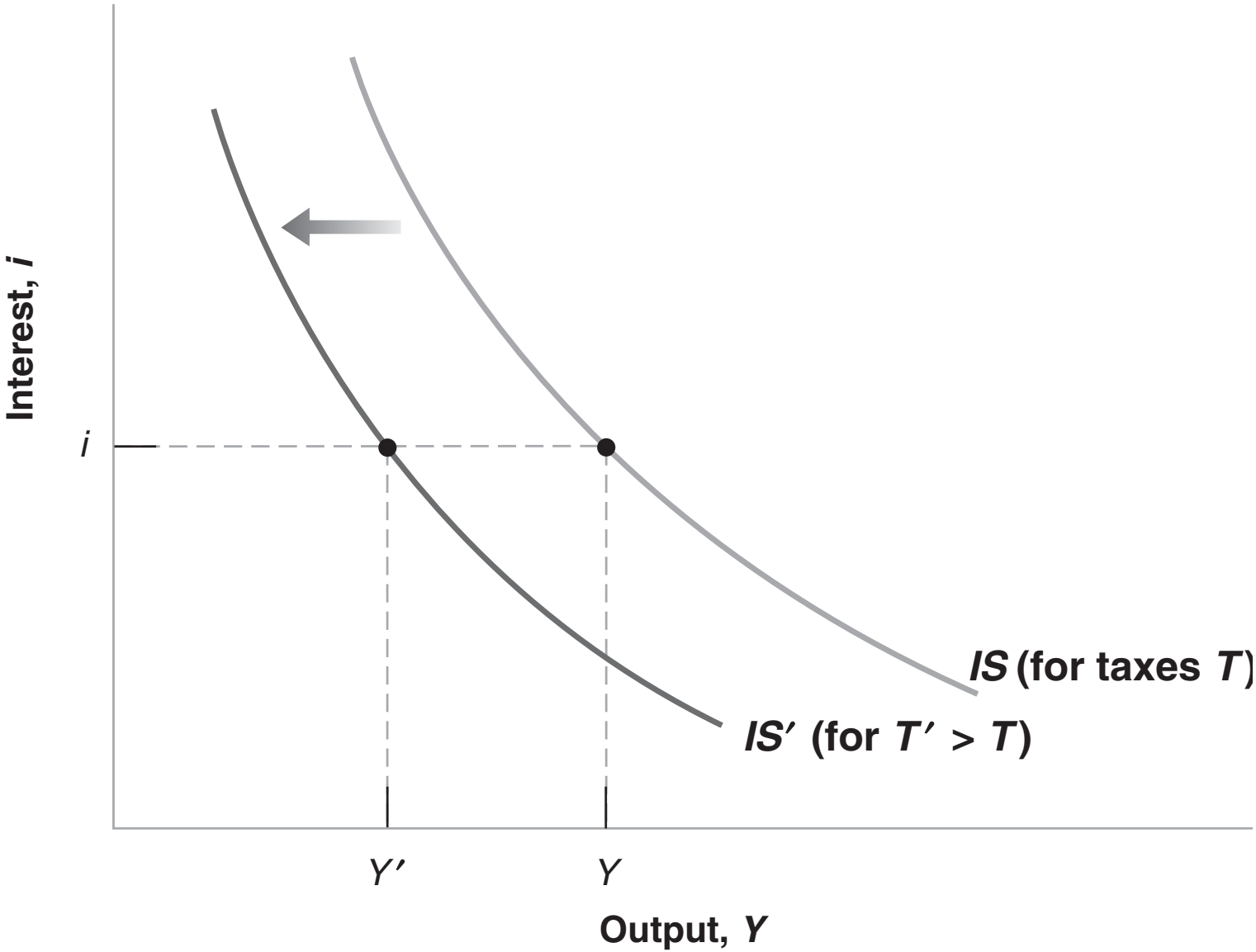
$$Y = \frac{\bar{Z} - b_2 i}{1 - c_1 - b_1} \tag{5}$$

Goods Market Clearing



What happens when the interest rate i rises?

IS Curve



Intuition: IS Curve

Why is IS downward sloping?

Shifting the IS Curve

Only autonomous demand $\bar{Z}$ shifts IS

Example: $G \uparrow$

- Excess demand $\rightarrow$ Need higher i to reduce I
- New IS curve shifted up

What else shifts IS?

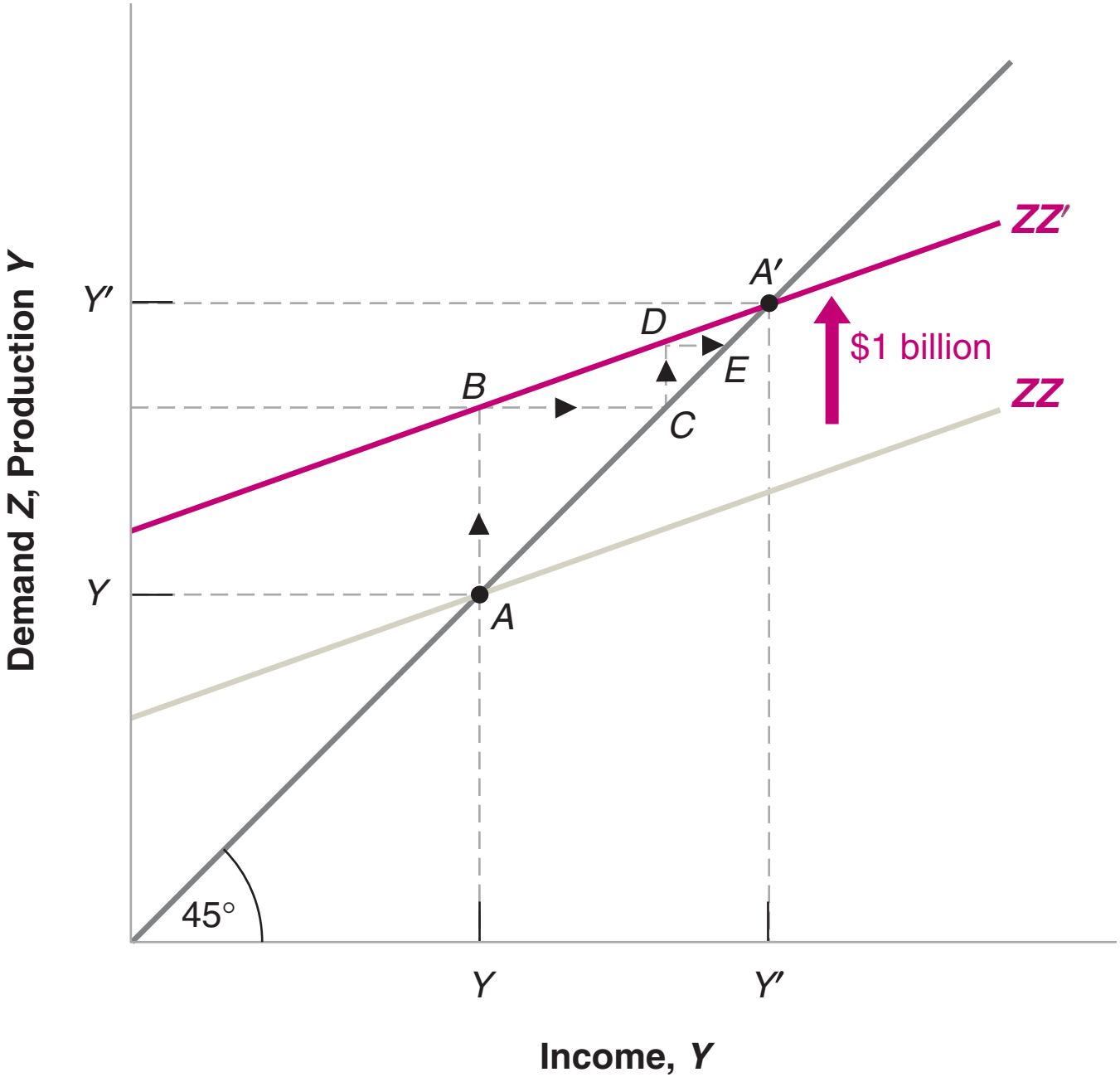
Clearly distinguish moving along the curve vs. shifting the curve!

The Fiscal Multiplier

$$Y = \frac{\bar{Z} - b_2 i}{1 - c_1 - b_1} \tag{6}$$

- Increasing government spending by \$1 $\implies$ increasing Y by $1/(1 - c_1 - b_1)$.
- This holds the interest rate constant (which will not be true in equilibrium)
- Intuition:

The Fiscal Multiplier



Saving Equals Investment

We can also think about goods market clearing as equating saving with investment.

Private saving:

$$S = Y_D - C = Y - T - C \tag{7}$$

Public saving:

$$S^P = T - G \tag{8}$$

Total saving equals investment:

$$I = Y - T - C + T - G \tag{9}$$

This yields goods market clearing

$$Y = C + I + G \tag{10}$$

The Money / Bond Market: LM Curve

LM Curve

The LM curve equates supply and demand of "money."

What is "money"?

Money Demand

How to divide wealth between "money" and bonds?

- Money: liquidity benefit
- Bonds: interest benefit

Division depends on

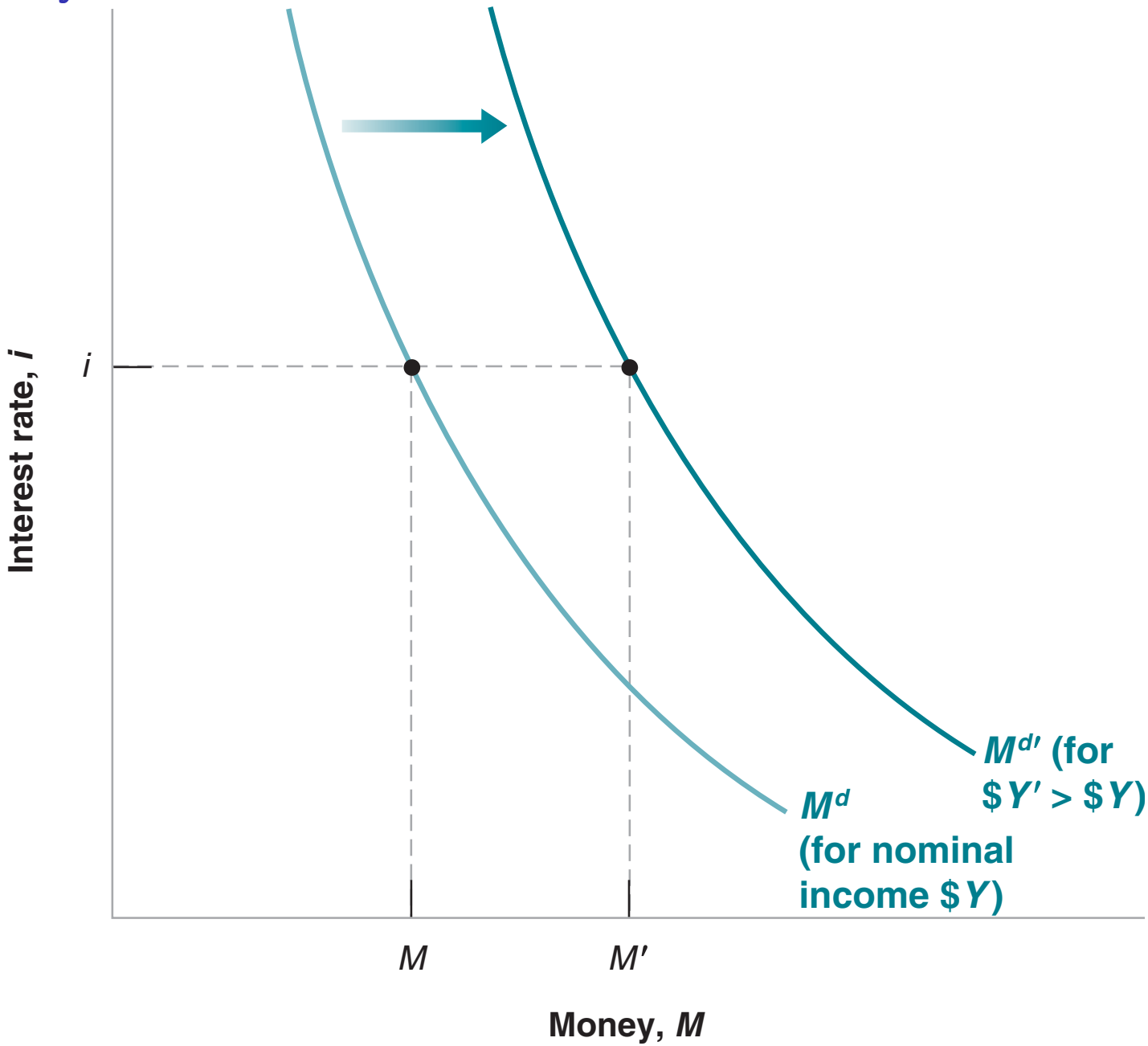
- transactions volume (nominal income)
- interest rate

Money demand can then be written as

$$M^d = \$Y \times L(i) \tag{11}$$

$\$Y$ is nominal income (in dollars)

Money Demand



Money Supply

Real world: money = [currency] + [checkable deposits]

Currency: controlled by CB

Checkable deposits: created by banks

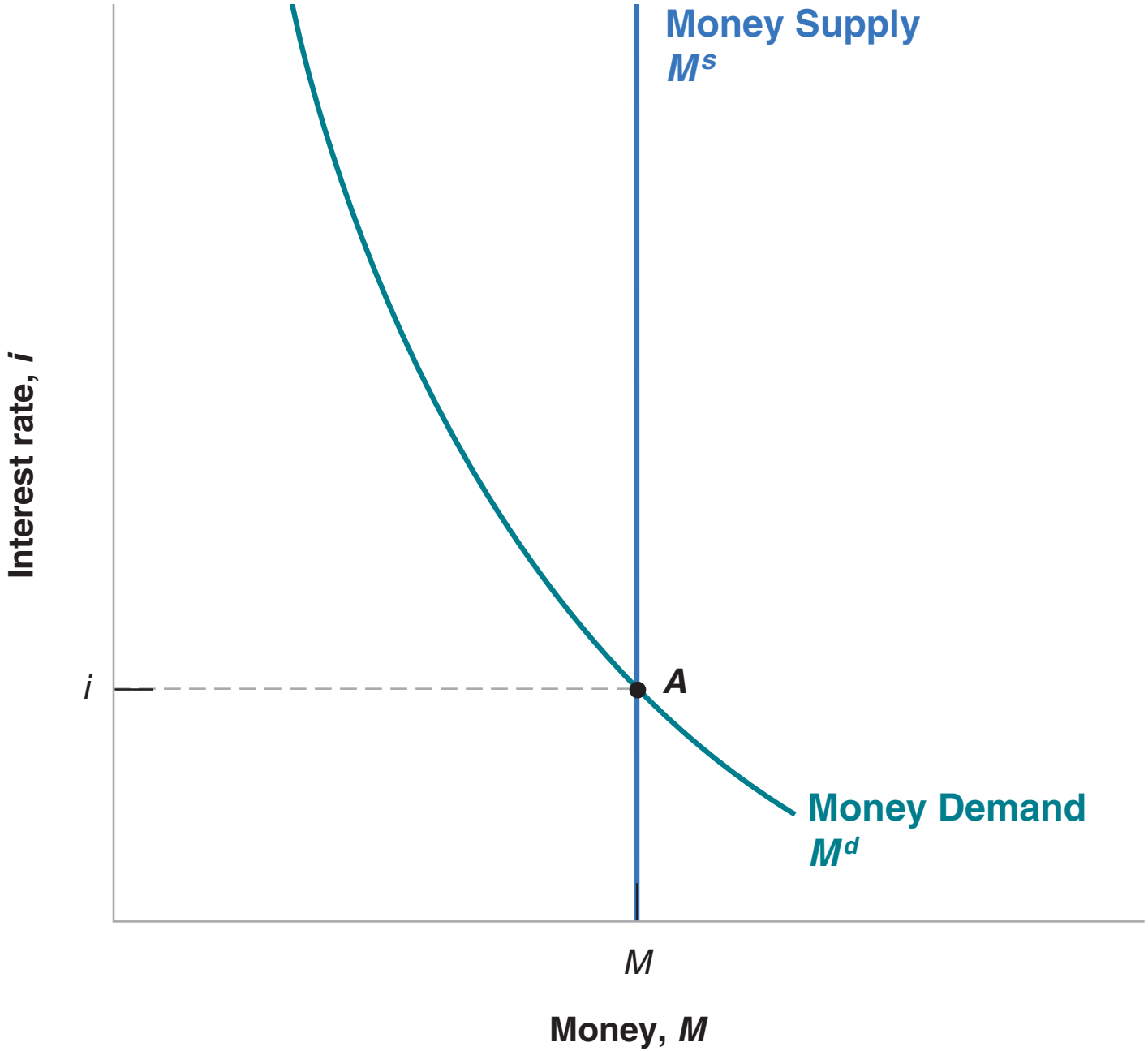
For now: assume that CB controls money supply

$$M = M^s \tag{12}$$

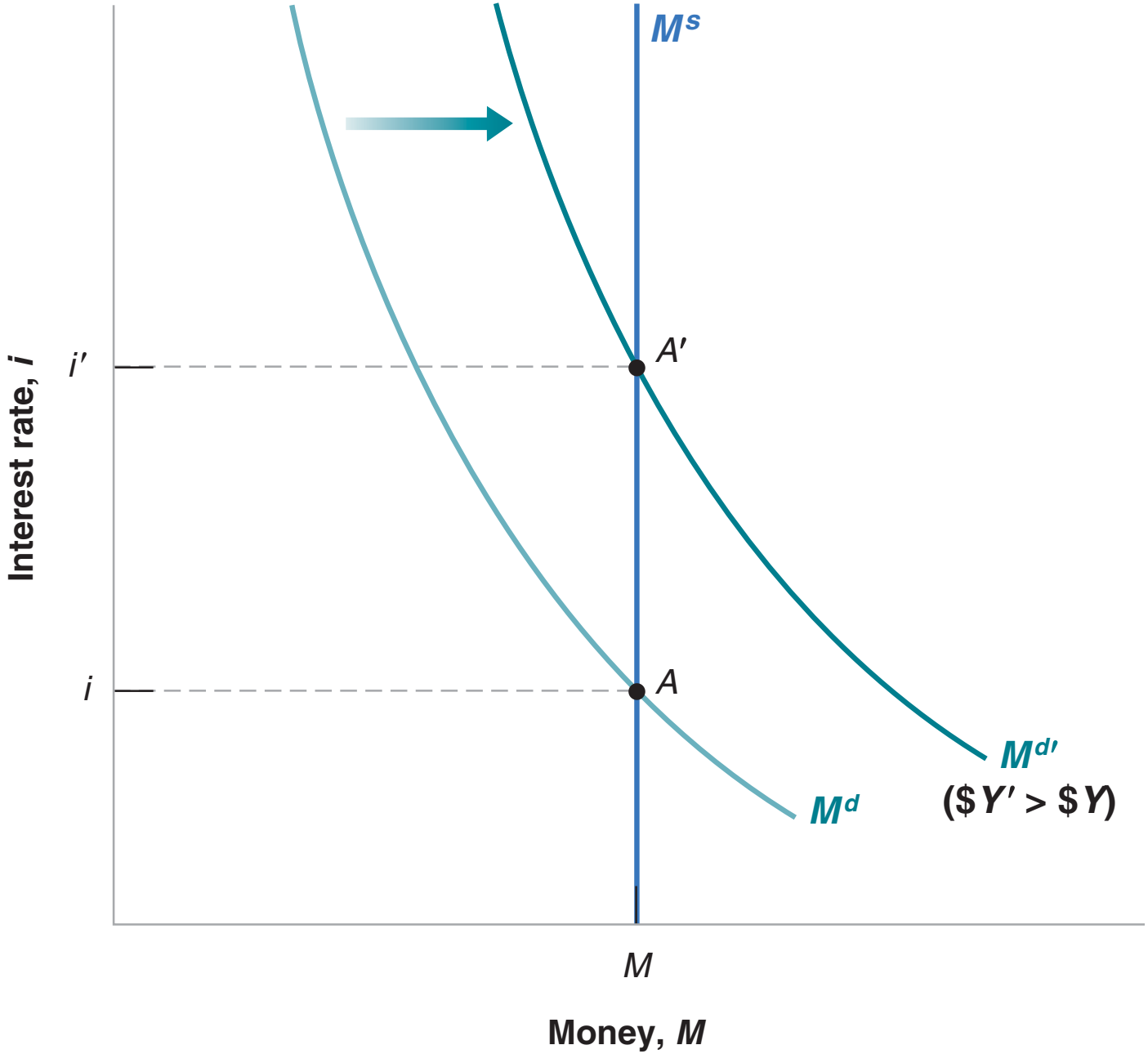
Money market clearing:

$$M^s = \$YL(i) \tag{13}$$

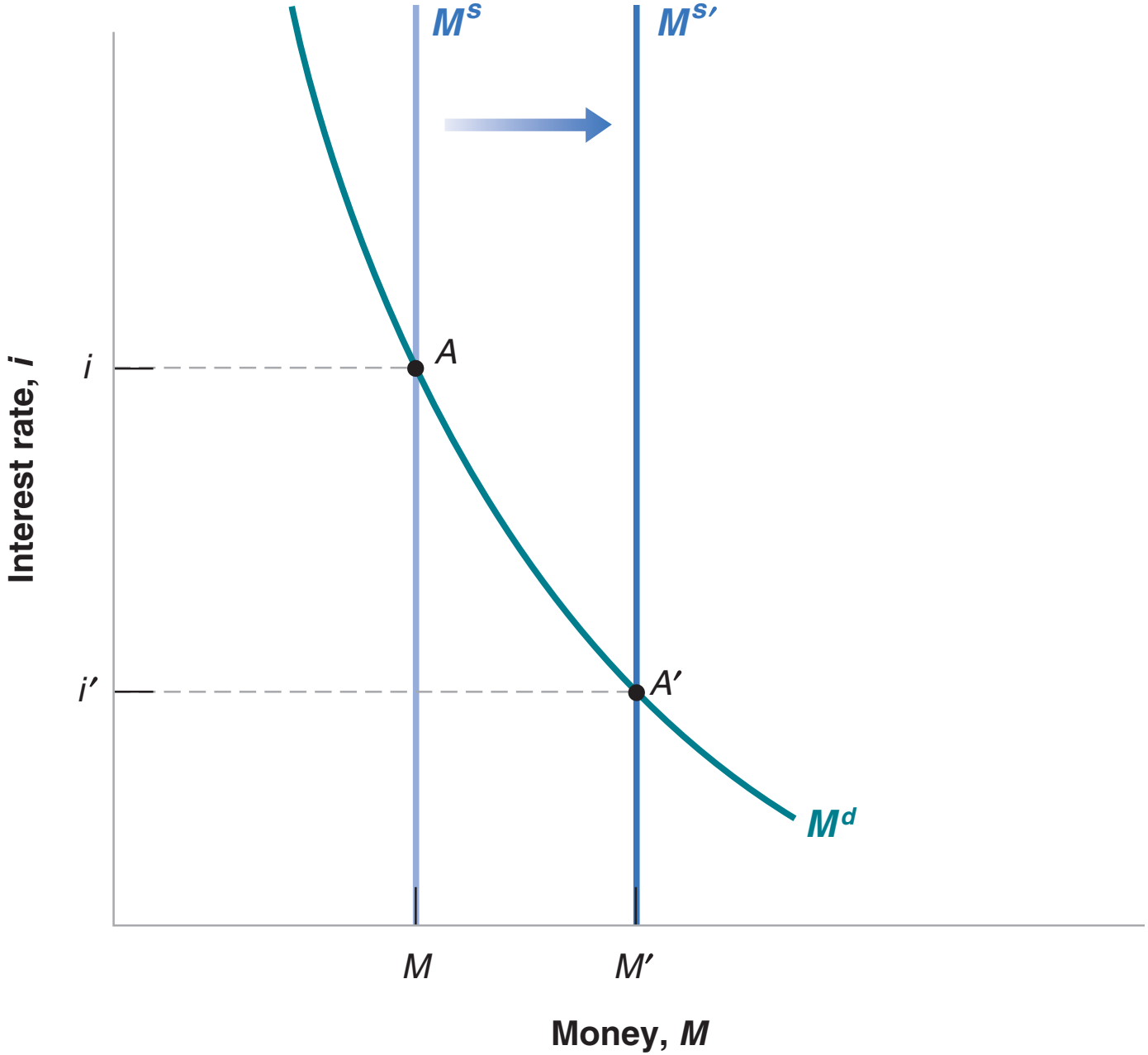
Money Market Clearing



Money Demand Increases



Money Supply Increases



Open Market Operations

- The markets for money and bonds are linked.
- To increase the money supply, the CB buy bonds and pays with currency.
- The price of bonds rises $\Longrightarrow$ the bond yield i falls.
- A complication: the CB has no direct control over the supply of bonds / the bond interest rate.
  - open market operations do not always work

Reading

- Blanchard / Johnson, Macroeconomics, ch. 3-4