

# Behavior of Interest Rates

Notes on Mishkin Chapter 5  
(pages 91-108)

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# Mishkin Chapter 5: Selected Key In-Class Discussion Questions and Issues

- How can **standard Econ 101 supply-demand analysis** be applied to bond markets to determine equilibrium prices, interest rates, and quantities?
- What kinds of factors cause **movements along** the demand/supply curves for bonds?
- What kinds of factors cause **shifting** of the demand and supply curves for bonds?
- How is the **equilibrium bond price and/or quantity of bonds** affected by these shifts?
- In what sense is this analysis “**short run**”?

# Notational Note

Recall that, all else equal:  $P \downarrow$  if and only if  $i \uparrow$

- That is, for any particular type of bond, the **market price  $P$  moves inversely to the market interest rate (yield to maturity)  $i$**  on this type of bond.

In most of the following slides, attention will be focused on the bond price  $P$  rather than on the interest rate  $i$ .

**But all findings stated in terms of  $P$  could equivalently be stated in terms of  $i$ .**

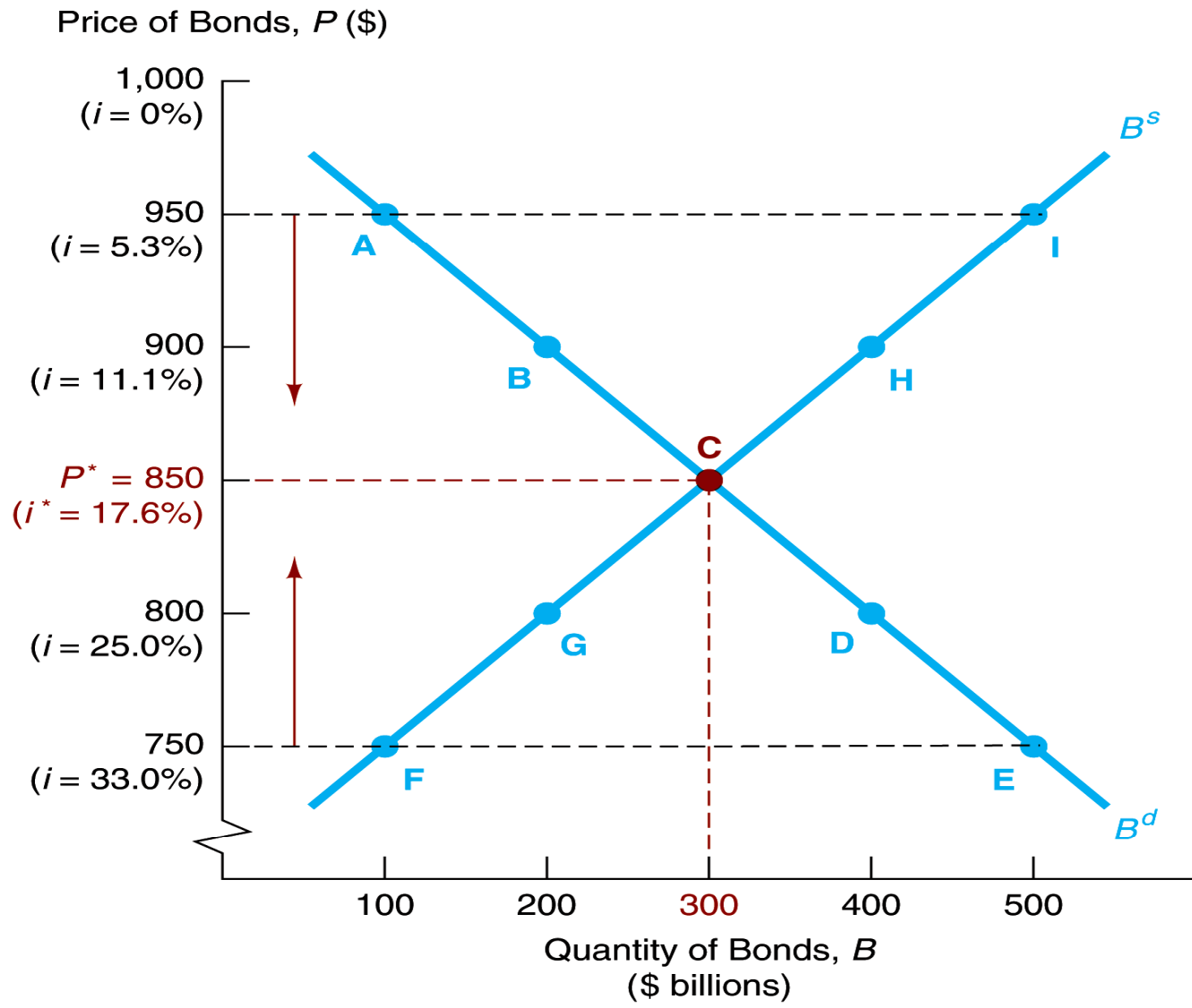
# Supply and Demand for Bonds

All else equal:

- At higher prices  $P$ , the quantity demanded of bonds is lower—buyers are discouraged
- At higher prices  $P$ , the quantity supplied of bonds is higher—sellers are encouraged

# Bond Market Equilibrium

- Occurs at a price  $P$  where the amount of bonds  $B^d$  that people are willing to buy (demand) equals the amount  $B^s$  that people are willing to sell (supply).
- If  $P$  is such that  $B^d = B^s$ , then  $P$  is called a **market equilibrium (or market clearing) bond price**.
- If  $P$  is such that  **$B^d > B^s$  (excess demand)**, then demanders (buyers) will tend to bid up  $P$  to the equilibrium price.
- If  $P$  is such that  **$B^d < B^s$  (excess supply)**, then suppliers (sellers) will tend to bid down  $P$  to the equilibrium price.



**FIGURE 1 Supply and Demand for Bonds**

# Factors Affecting the Demand for Bonds

- **Wealth** — the total value of all owned financial and real assets (including human capital)
- **Expected Real Return Rate** — the real return rate expected on bonds relative to alternative assets
- **Risk** — the degree of uncertainty associated with the real return rate on bonds relative to alternative assets
- **Liquidity** — the ease and speed with which bonds can be turned into cash relative to alternative assets

## Factors Affecting the Demand for Bonds...

Holding all other factors constant (including price), the **quantity of bonds demanded** is:

1. **positively** related to **wealth**
2. **positively** related to **expected real return rate**
3. **negatively** related to **risk relative to other assets**
4. **positively** related to **liquidity**



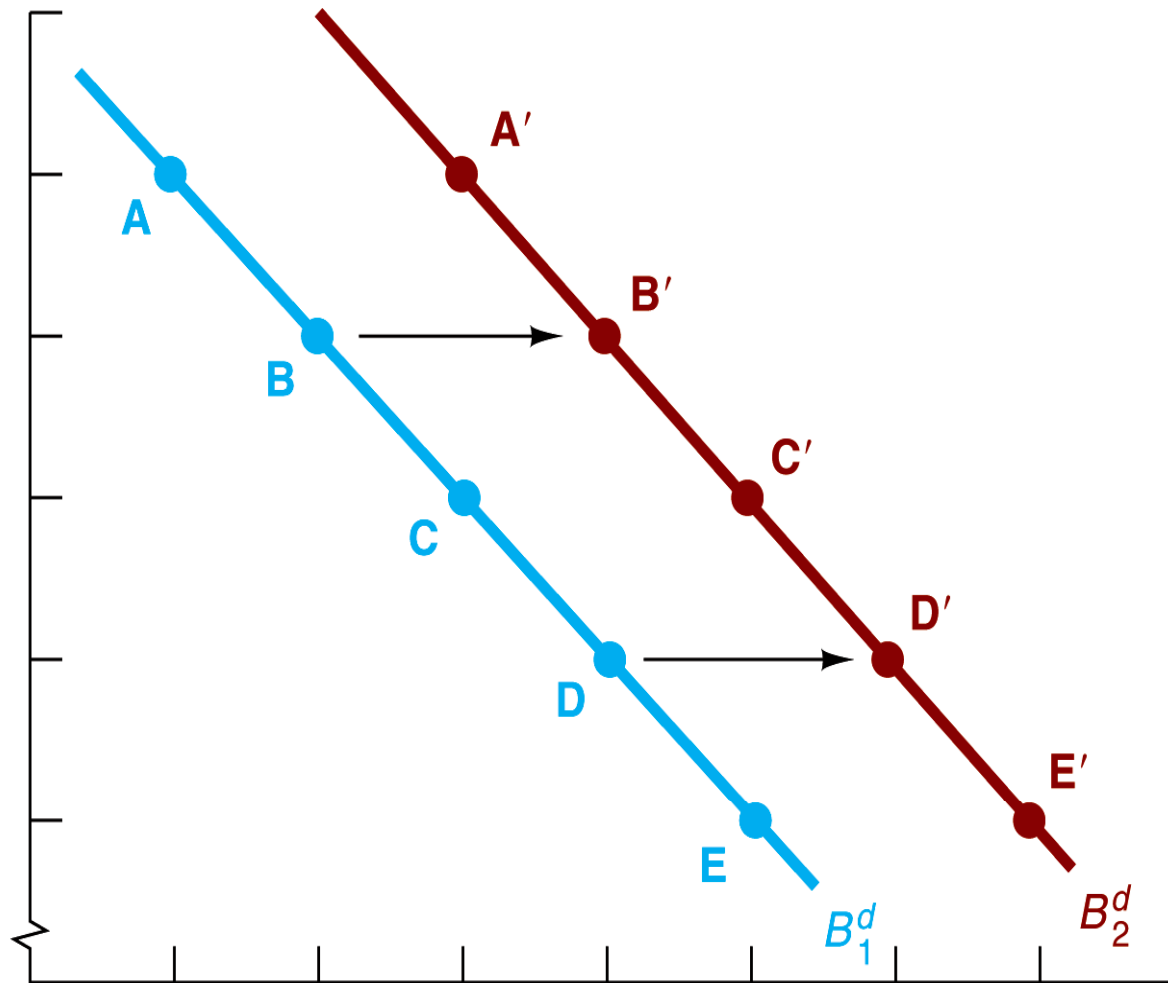
## SUMMARY

### TABLE 1 Response of the Quantity of an Asset Demanded to Changes in Wealth, Expected Returns, Risk, and Liquidity

Variable	Change in Variable	Change in Quantity Demanded
Wealth	↑	↑
Expected return relative to other assets	↑	↑
Risk relative to other assets	↑	↓
Liquidity relative to other assets	↑	↑

*Note:* Only increases in the variables are shown. The effect of decreases in the variables on the change in quantity demanded would be the opposite of those indicated in the rightmost column.

Price of Bonds,  $P$



Quantity of Bonds,  $B$

**FIGURE 2** Shift in the Demand Curve for Bonds

# Shifts in the Bond Demand Curve

(Holding Constant All Other Factors, Including Price)

- **Wealth** —An increase in wealth causes the demand curve for bonds to *shift to the right*.
- **Expected Interest Rate** —An increase in future expected interest rates  $i$  lowers the expected real return rate on bonds, causing the demand curve to *shift to the left*.
- **Expected Inflation Rate** —An increase in the expected inflation rate lowers the expected real return rate on bonds, causing the demand curve to *shift to the left*.

**SUMMARY**

**TABLE 2 Factors That Shift the Demand Curve for Bonds**

Variable	Change in Variable	Change in Quantity Demanded at Each Bond Price	Shift in Demand Curve
Wealth	↑	↑	
Expected interest rate	↑	↓	
Expected inflation	↑	↓	

(continued)

## Shifts in the Bond Demand Curve...Continued

(Holding Constant All Other Factors, Including Price)

- **Risk** —An increase in the riskiness of bonds relative to other assets causes the demand curve to *shift to the left*.
- **Liquidity** —An increase in the liquidity of bonds causes the demand curve to *shift to the right*.

# SUMMARY

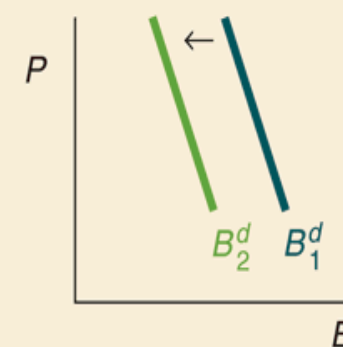
## TABLE 2 Factors That Shift the Demand Curve for Bonds (continued)

Variable	Change in Variable	Change in Quantity Demanded at Each Bond Price	Shift in Demand Curve
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Riskiness of bonds relative to other assets

↑

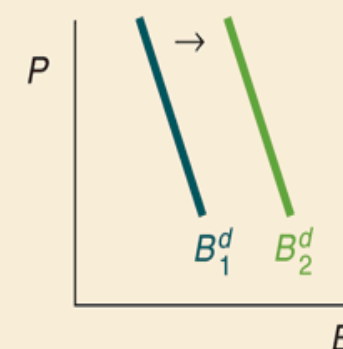
↓



Liquidity of bonds relative to other assets

↑

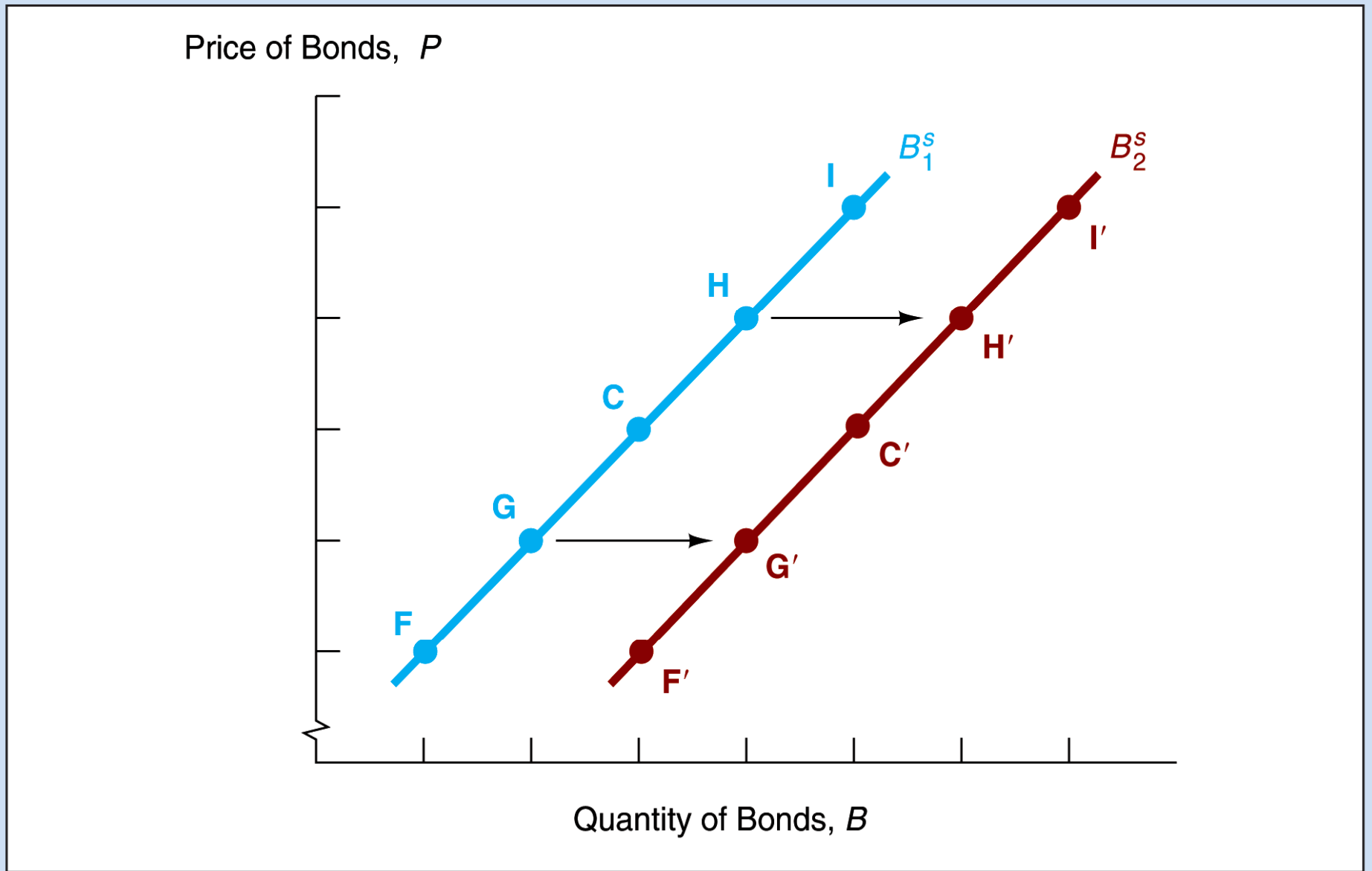
↑



Note: Only increases in the variables are shown. The effect of decreases in the variables on the change in demand would be the opposite of those indicated in the remaining columns.

# Factors that Affect the Supply of Bonds

- **Expected profitability of physical capital investment** (hence of borrowing)
- **Expected inflation rate** (which affects the real cost of borrowing)
- **Government deficits** (requiring government to sell bonds to finance expenditures)



**FIGURE 3** Shift in the Supply Curve for Bonds



# Shifts in the Bond Supply Curve

(Holding Constant All Other Factors, Including Price)

- **Expected profitability of investment opportunities** — In an expansion, the supply curve for bonds *shifts to the right*.
- **Expected inflation rate** — Given an increase in the expected inflation rate, the supply curve for bonds *shifts to the right*.
- **Government deficit** — Given an increase in the government budget deficit, the supply curve for bonds *shifts to the right*.

**SUMMARY**

**TABLE 3 Factors That Shift the Supply of Bonds**

Variable	Change in Variable	Change in Quantity Supplied at Each Bond Price	Shift in Supply Curve
Profitability of investments	↑	↑	<p>The graph shows a coordinate system with a vertical axis labeled 'P' and a horizontal axis labeled 'B'. Two upward-sloping lines represent supply curves. The first line is dark blue and labeled <math>B_1^s</math>. The second line is green and labeled <math>B_2^s</math>. An arrow points from <math>B_1^s</math> to <math>B_2^s</math>, indicating a rightward shift.</p>
Expected inflation	↑	↑	<p>The graph shows a coordinate system with a vertical axis labeled 'P' and a horizontal axis labeled 'B'. Two upward-sloping lines represent supply curves. The first line is dark blue and labeled <math>B_1^s</math>. The second line is green and labeled <math>B_2^s</math>. An arrow points from <math>B_1^s</math> to <math>B_2^s</math>, indicating a rightward shift.</p>
Government deficit	↑	↑	<p>The graph shows a coordinate system with a vertical axis labeled 'P' and a horizontal axis labeled 'B'. Two upward-sloping lines represent supply curves. The first line is dark blue and labeled <math>B_1^s</math>. The second line is green and labeled <math>B_2^s</math>. An arrow points from <math>B_1^s</math> to <math>B_2^s</math>, indicating a rightward shift.</p>

*Note:* Only increases in the variables are shown. The effect of decreases in the variables on the change in supply would be the opposite of those indicated in the remaining columns.

# The “Fisher Effect”

## ★ PREDICTION:

An **increase** in the expected inflation rate  $\pi^e$  that lowers the expected real interest rate  $i_r = i - \pi^e$  will (all else equal)

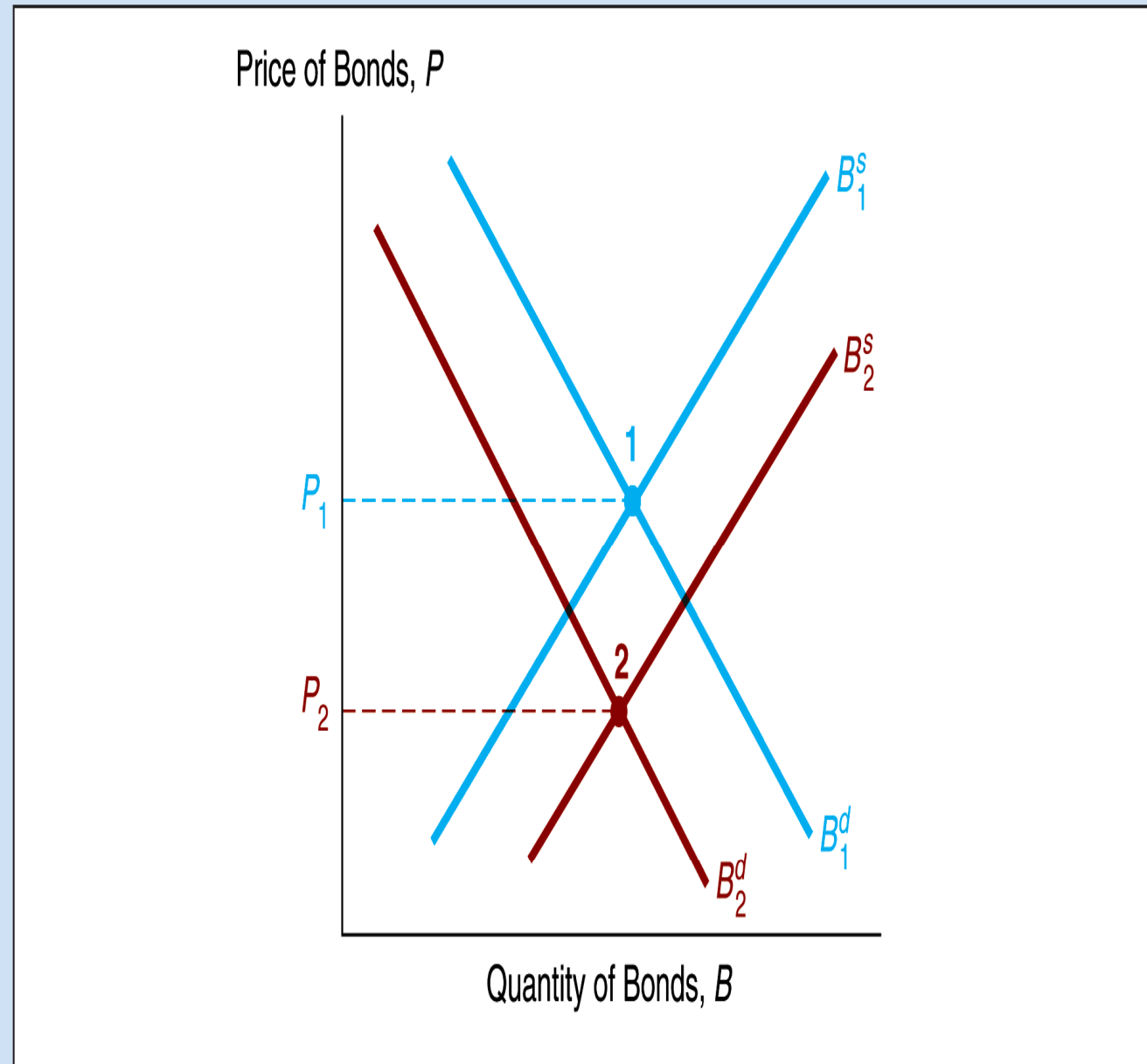
- shift **left** the demand curve for bonds;
- shift **right** the supply curve for bonds;
- hence result in an **increase in  $i$** .

This prediction, that  $\pi^e$  and  $i$  will tend to move together over time, is called the **FISHER EFFECT**.

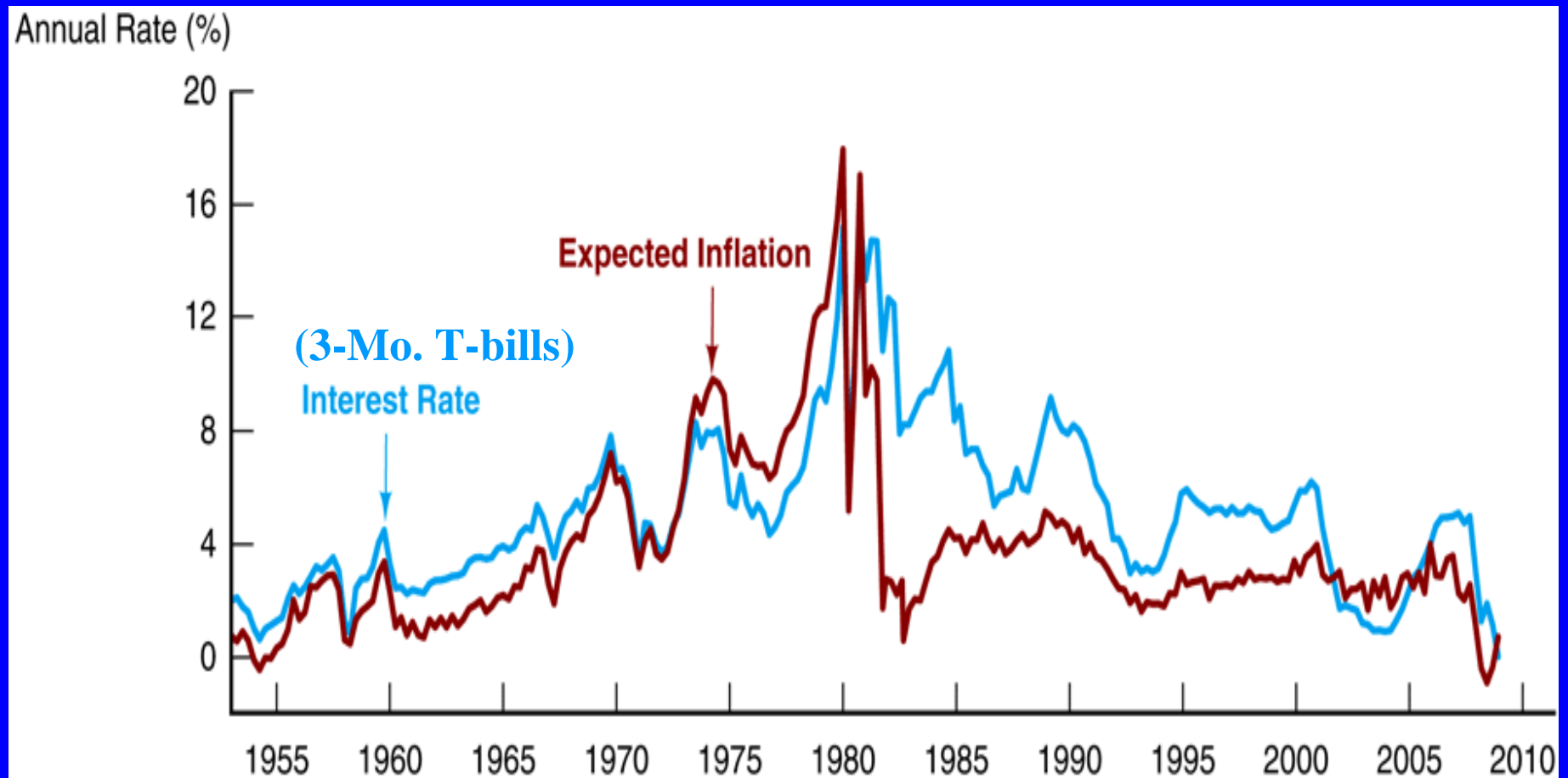
## FIGURE 4

### Response to a Change in Expected Inflation

When expected inflation rises, the supply curve shifts from  $B_1^s$  to  $B_2^s$ , and the demand curve shifts from  $B_1^d$  to  $B_2^d$ . The equilibrium moves from point 1 to point 2, with the result that the equilibrium bond price falls from  $P_1$  to  $P_2$  and the equilibrium interest rate rises.



# Evidence on the Fisher Effect in the United States



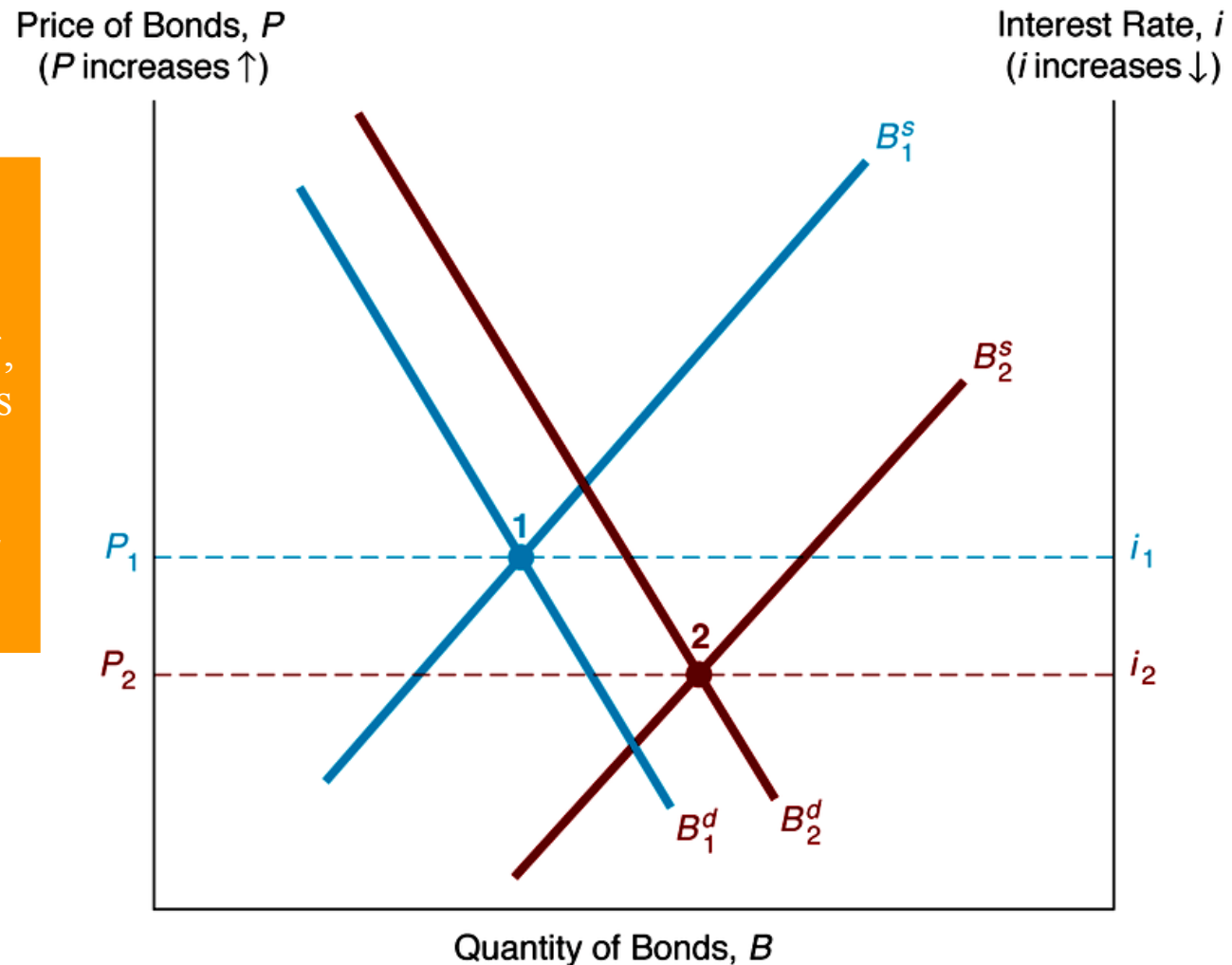
*Source:* Expected inflation calculated using procedures outlined in Frederic S. Mishkin, “The Real Interest Rate: An Empirical Investigation,” *Carnegie-Rochester Conference Series on Public Policy* 15 (1981): 151–200. These procedures involve estimating expected inflation as a function of past interest rates, inflation, and time trends.

## Business Cycle Impact on Interest Rates: Demand/Supply Analysis

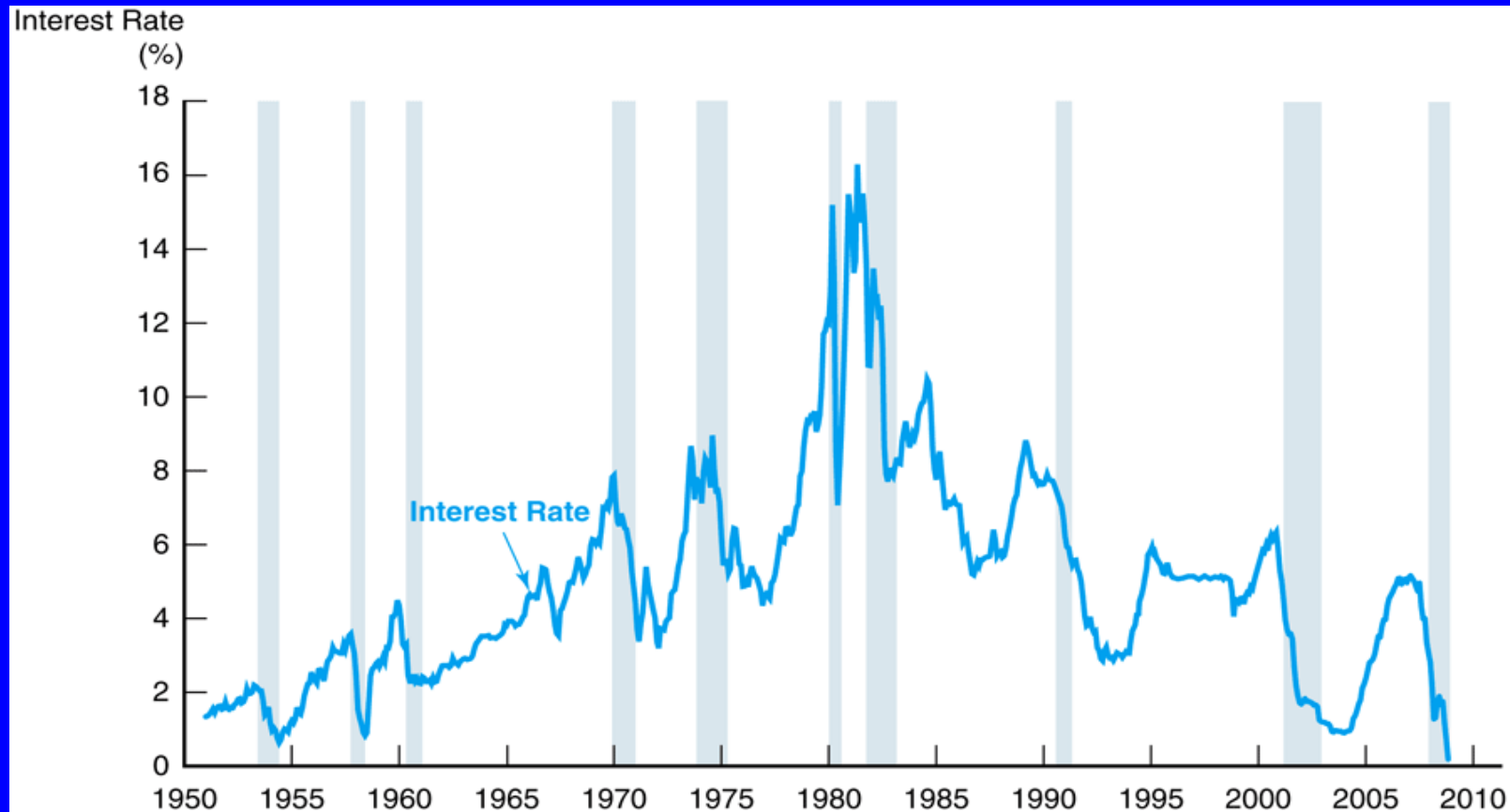
- Suppose there is an **expansion (GDP  $\uparrow$ )**
  - supply of bonds **shifts right**;
  - demand for bonds **shifts right**.
- If **supply shifts more** than demand, bond price  $P$  **decreases** ( $i$  rises).
- If **demand shifts more** than supply, bond price  $P$  **increases** ( $i$  falls).
- In either case, **quantity of bonds sold  $\uparrow$**  .

# Business Cycle Expansion (GDP↑)

1. Wealth ↑,  $B^d$  ↑,  $B^d$  shifts out to right
2. Investment ↑,  $B^s$  ↑,  $B^s$  shifts out to right
3. If  $B^s$  shifts more than  $B^d$  then  $P$  ↓,  $i$  ↑



# Evidence on Business Cycles and Interest Rates (3-mo. T-Bills)



*Source:* Federal Reserve: [www.federalreserve.gov/releases/H15/data.htm](http://www.federalreserve.gov/releases/H15/data.htm)



# Key Concepts from Mishkin Chapter 5 (pages 91-108 only)

- Demand curve for bonds;
- Supply curve for bonds;
- Bond market equilibrium price & quantity;
- Excess supply of bonds;
- Excess demand for bonds.

# Key Issues for Mishkin Chapter 5 (pages 91-108 only)

- Factors causing movements **along** the bond demand (supply) curve;
- Factors causing the bond demand (supply) curve to **shift** right or left;
- Predicted movements in the price of bonds due to **excess** demand or supply;
- Predicted movements in the **equilibrium** price and/or quantity of bonds due to shifts in the demand and/or supply curve for bonds;
- Why is this D-S analysis considered “short run”?