Chapter 5

The Behavior of Interest Rates

Determinants of Asset Demand

SUMMARY **Table 1** Response of the Quantity of an Asset Demanded to Changes in Wealth, Expected Returns, Risk, and Liquidity

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

e in demand would be the opposite

Note: Only increases in the variables are shown. The effect of decreases in the variables on the chang of those indicated in the rightmost column.

Derivation of Bond Demand Curve - Example

To derive the demand for bonds, suppose that we have:

- discount bond (no coupon payments)
- maturity = 1 year
- face value = $1,000
- holding period = maturity = 1 year (hence the expected return is equal to the "interest rate", i.e. the yield to maturity)

Next, we will assume different prices and corresponding quantities demanded (and calculate the interest rates)

Derivation of Bond Demand Curve – Example (cont.)

Remember that, in this case,

$$i = R = \frac{F - P}{P}$$

- Point A:
  - $P = \$950$
  - $B^d = \$100$ billion
  - $i = \dfrac{\$1{,}000 - \$950}{\$950} = 5.3\%$

Derivation of Bond Demand Curve – Example (cont.)

- Point B:
  - $P = \$900$
  - $B^d = \$200$ billion
  - $i = \dfrac{\$1{,}000 - \$900}{\$900} = 11.1\%$
- Point C: $P = \$850$, $B^d = \$300$ billion , $i = 17.6\%$
- Point D: $P = \$800$, $B^d = \$400$ billion , $i = 25.0\%$
- Point E: $P = \$750$, $B^d = \$500$ billion , $i = 33.0\%$
- Demand curve B^d connects points A, B, C, D, E and has the usual downward slope

Derivation of Bond Supply Curve – Example (cont.)

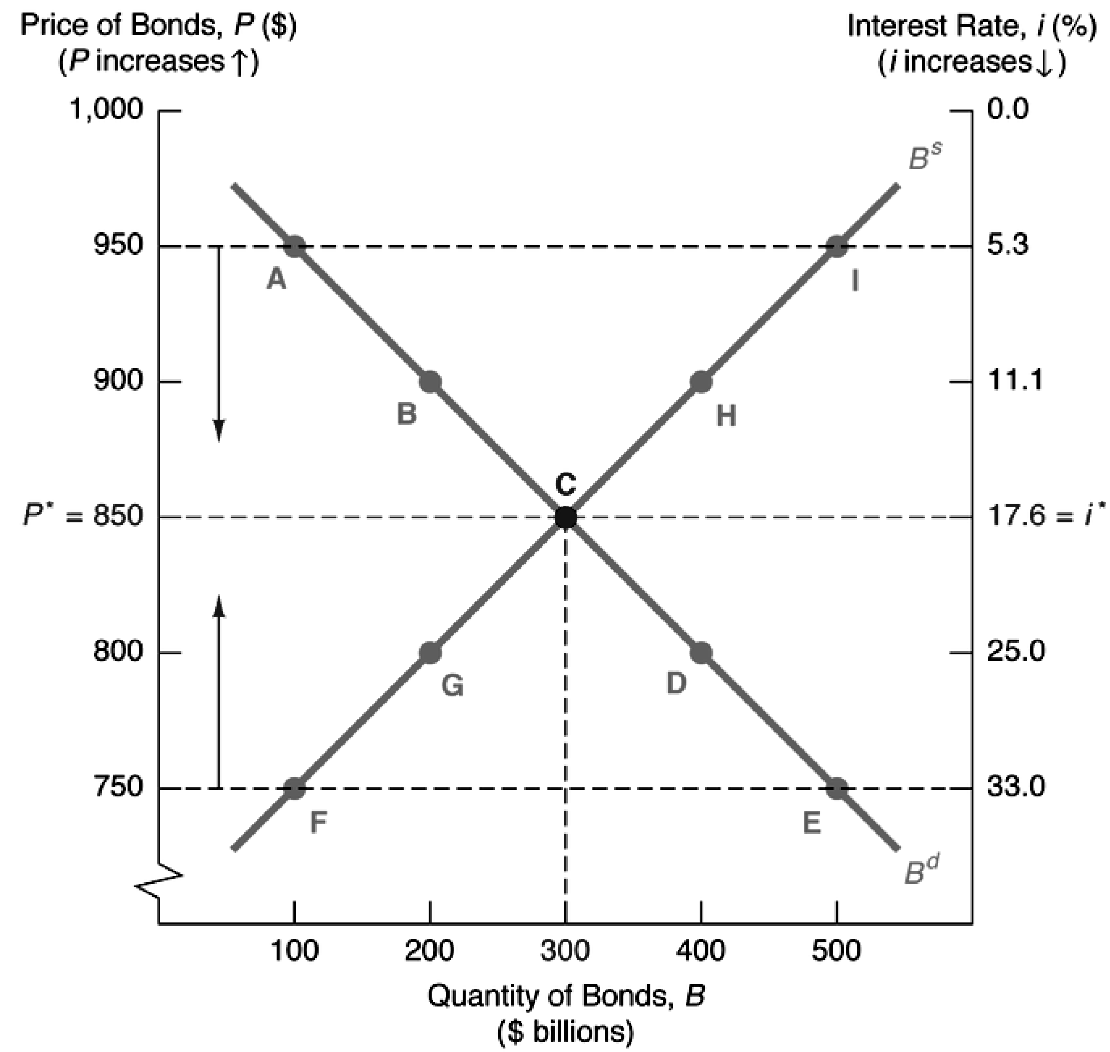
- Point F: P = \$750, i = 33.0%, B^s = \$100 billion
- Point G: P = \$800, i = 25.0%, B^s = \$200 billion
- Point C: P = \$850, i = 17.6%, B^s = \$300 billion
- Point H: P = \$900, i = 11.1%, B^s = \$400 billion
- Point I: P = \$950, i = 5.3%, B^s = \$500 billion

- Supply curve B^s connects points F, G, C, H, I, and has an upward slope

Supply and Demand Analysis of the Bond Market

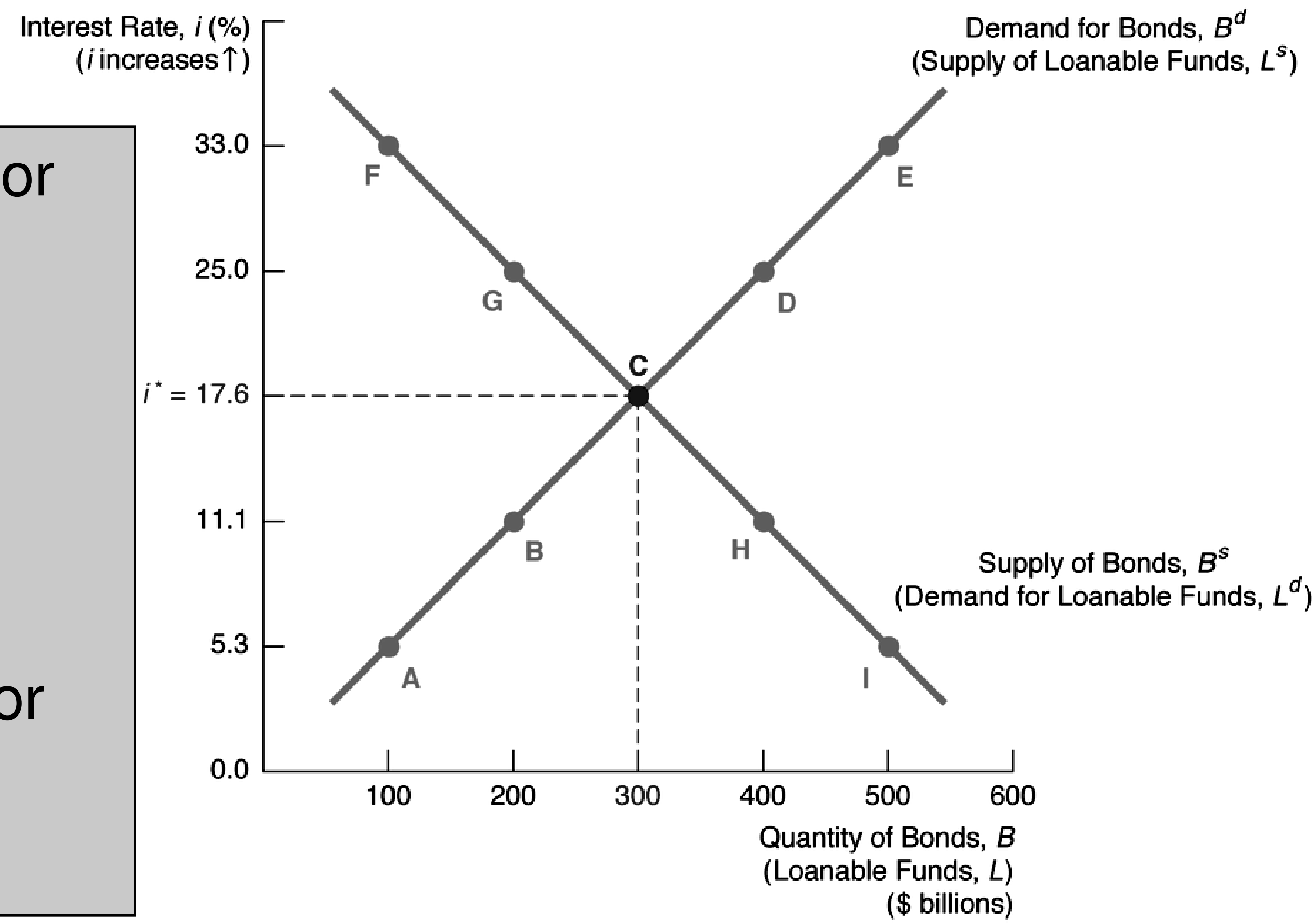
Market Equilibrium

1. Occurs when $B^d = B^s$, at $P^* = \$850$, $i^* = 17.6\%$
2. When $P = \$950$, $i = 5.3\%$, $B^s > B^d$ (excess supply): $P \downarrow$ to P^*, $i \uparrow$ to i^*
3. When $P = \$750$, $i = 33.0$, $B^d > B^s$ (excess demand): $P \uparrow$ to P^*, $i \downarrow$ to i^*

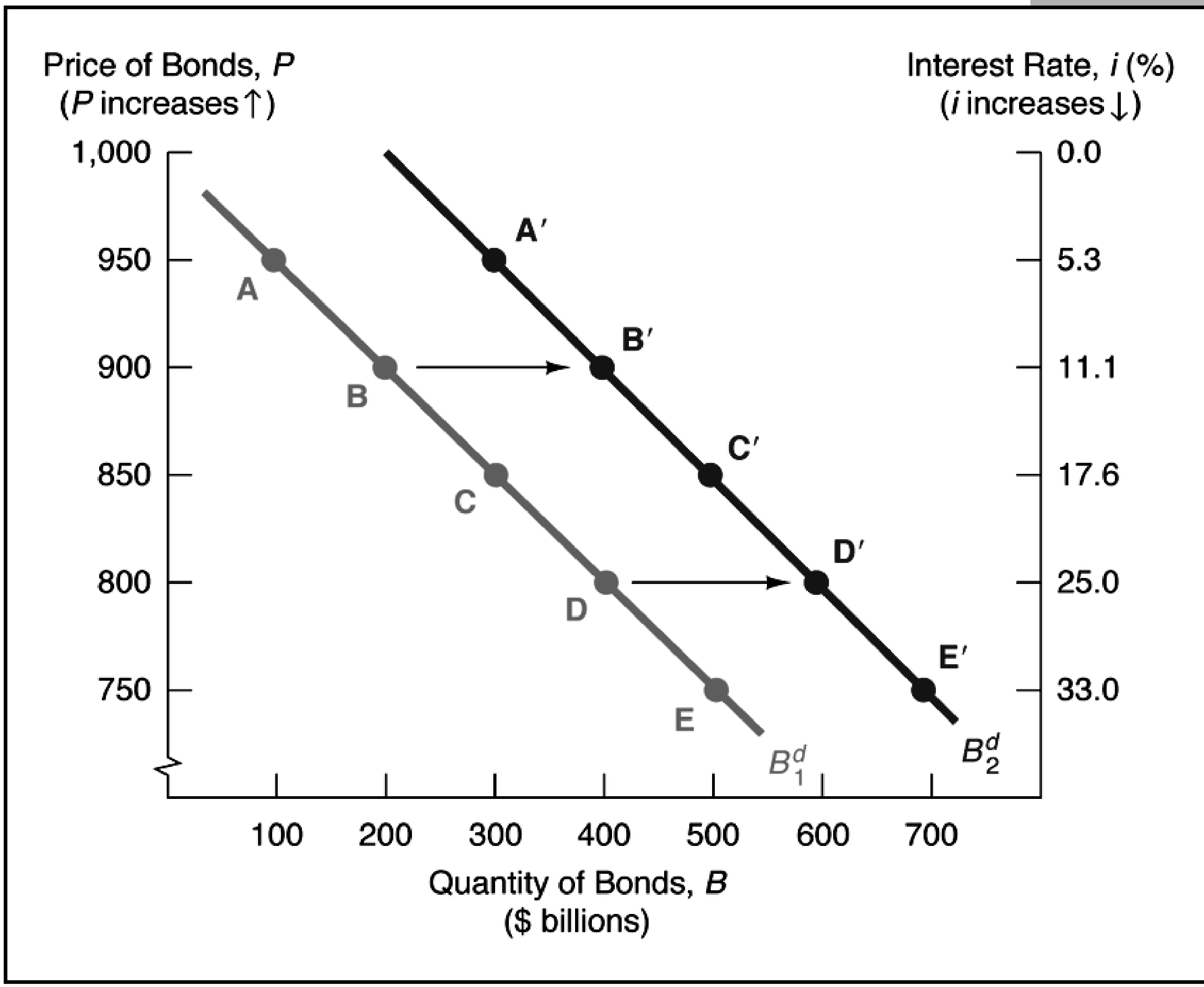


Loanable Funds Terminology

1. Demand for bonds = supply of loanable funds
2. Supply of bonds = demand for loanable funds



Shifts in the Bond Demand Curve



Shifting versus Moving along a Line

- Need to distinguish between two kinds of changes:
  - *movement along a curve*: e.g., if the price changes, the quantity demanded changes, so there is a movement along the demand curve
  - *shift in a curve:* e.g., people have a sudden interest in the bond market, which increases the demand for bonds at any given price

Factors that Shift the Bond Demand Curve

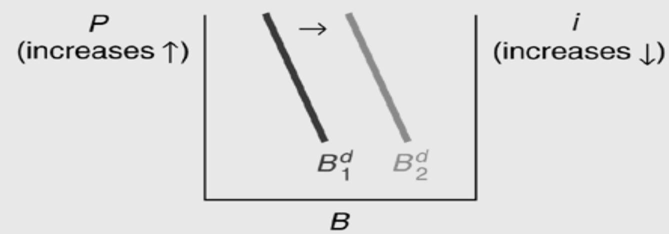
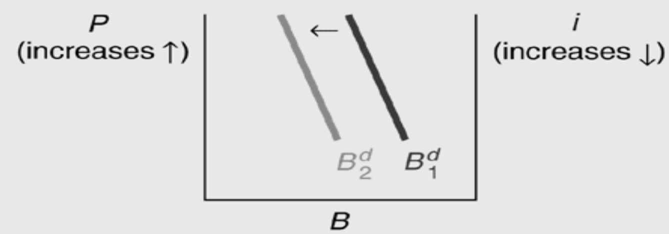
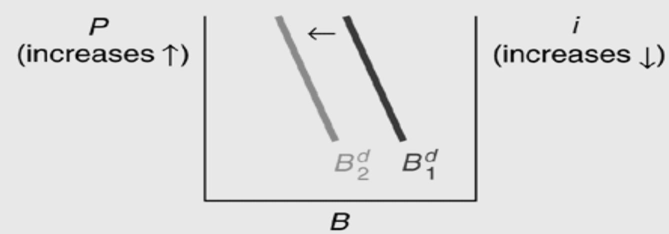
- Wealth
  - boom or more savings, wealth ↑, B^d ↑, B^d shifts out to right
- Expected return
  - i ↓ in the future, R for long-term bonds ↑, B^d shifts out to right
  - π^e↓, relative return ↑, B^d shifts out to right
  - expected return of other assets ↓, B^d ↑, B^d shifts out to right

Factors that Shift the Bond Demand Curve (cont.)

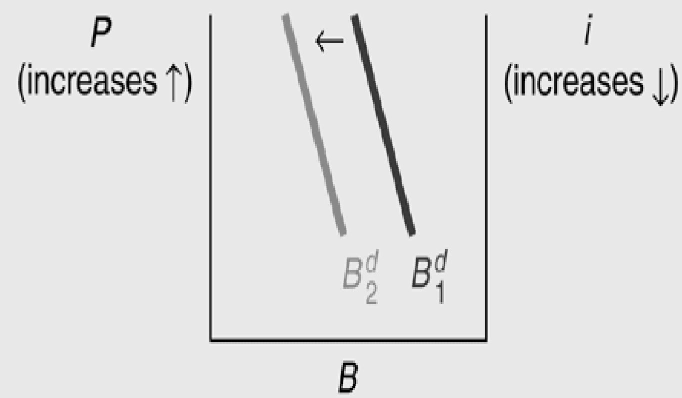
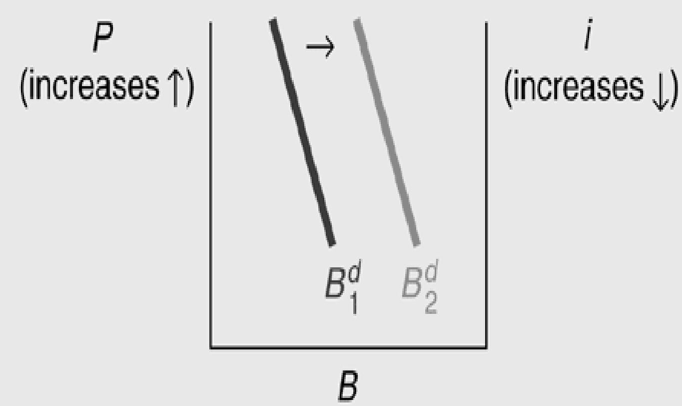
- Risk
  - risk of bonds↓, B^d ↑, B^d shifts out to right
  - risk of other assets ↑, B^d ↑, B^d shifts out to right
- Liquidity
  - liquidity of bonds ↑, B^d ↑, B^d shifts out to right
  - liquidity of other assets ↓, B^d ↑, B^d shifts out to right

Factors that Shift the Demand Curve for Bonds

SUMMARY Table 2 Factors That Shift the Demand Curve for Bonds

Variable	Change in Variable	Change in Quantity Demanded	Shift in Demand Curve
Wealth	↑	↑	
Expected interest rate	↑	↓	
Expected inflation	↑	↓	

Factors that Shift the Demand Curve for Bonds (cont.)

Riskiness of bonds relative to other assets	↑	↓	
Liquidity of bonds relative to other assets	↑	↑	

Shifts in the Bond Supply Curve

1. **Profitability of Investment Opportunities**

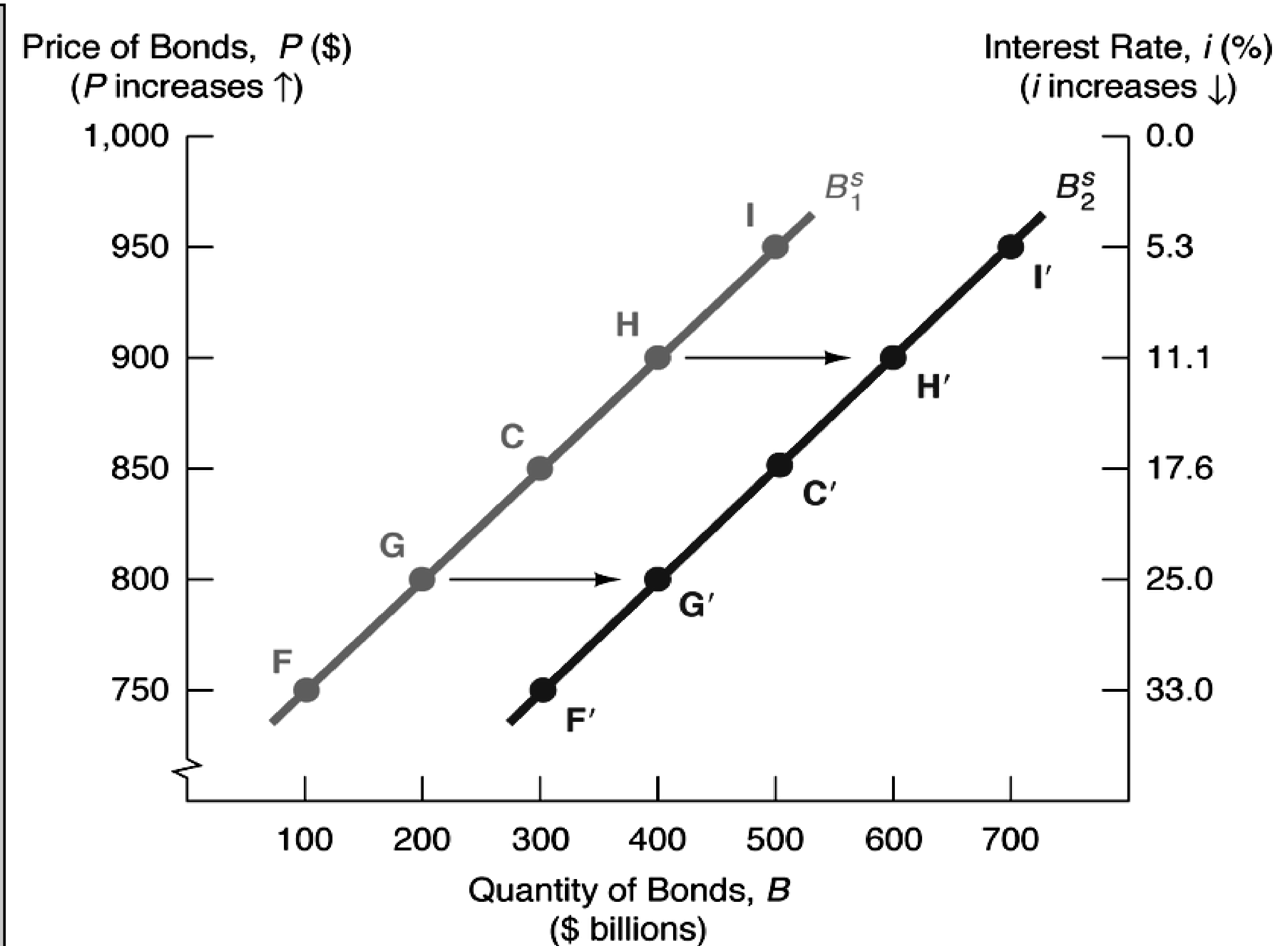
   Business cycle expansion, investment opportunities ↑, B^s ↑, B^s shifts out to right

2. **Expected Inflation**

   π^e ↑, B^s ↑, B^s shifts out to right

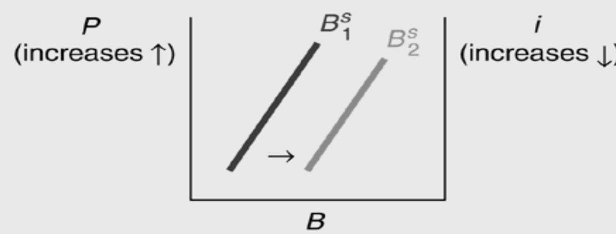
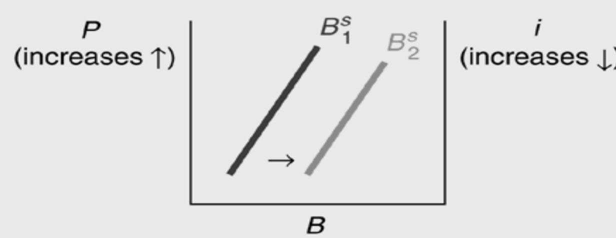
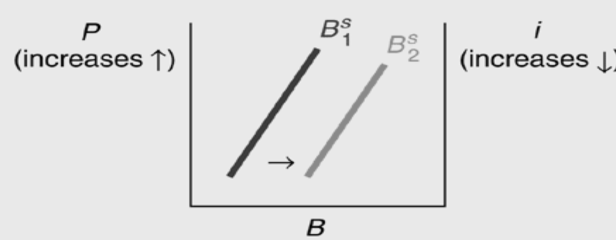
3. **Government Activities**

   Deficits ↑, B^s ↑, B^s shifts out to right

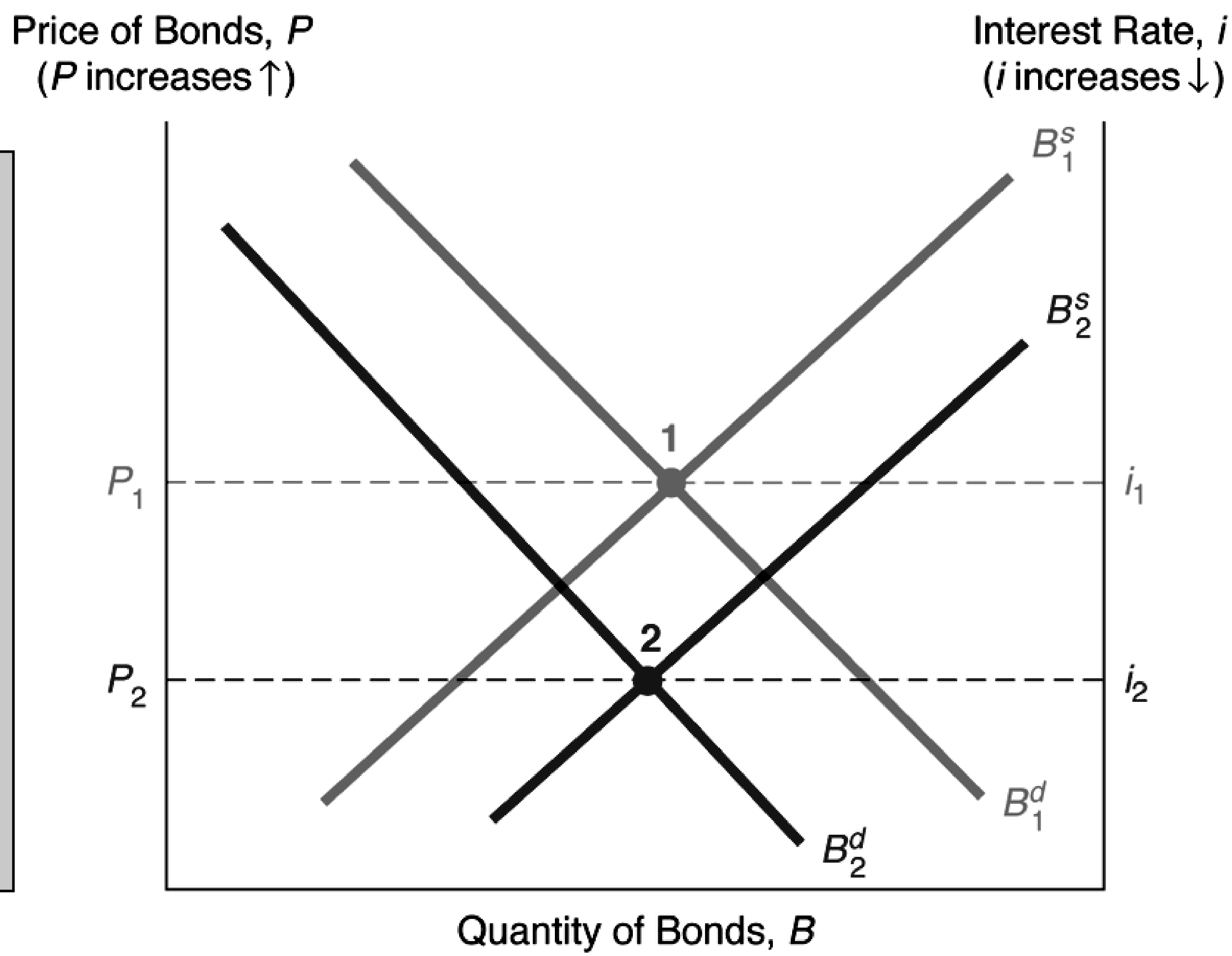


Factors that Shift Supply Curve for Bonds

SUMMARY Table 3 Factors That Shift the Supply of Bonds

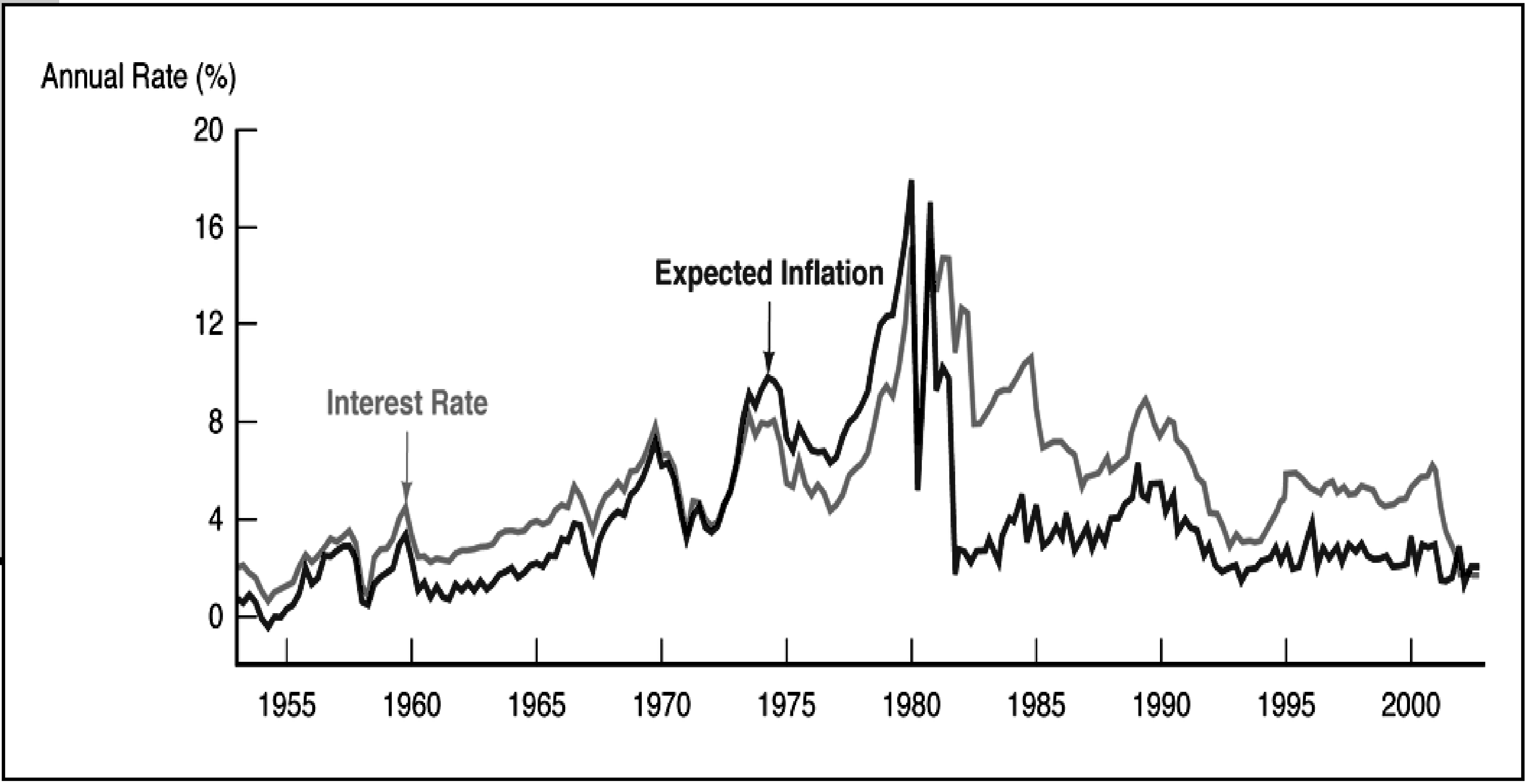
Variable	Change in Variable	Change in Quantity Supplied	Shift in Supply Curve
Profitability of investments	↑	↑	
Expected inflation	↑	↑	
Government deficit	↑	↑	

Changes in Expected Inflation: The Fisher Effect



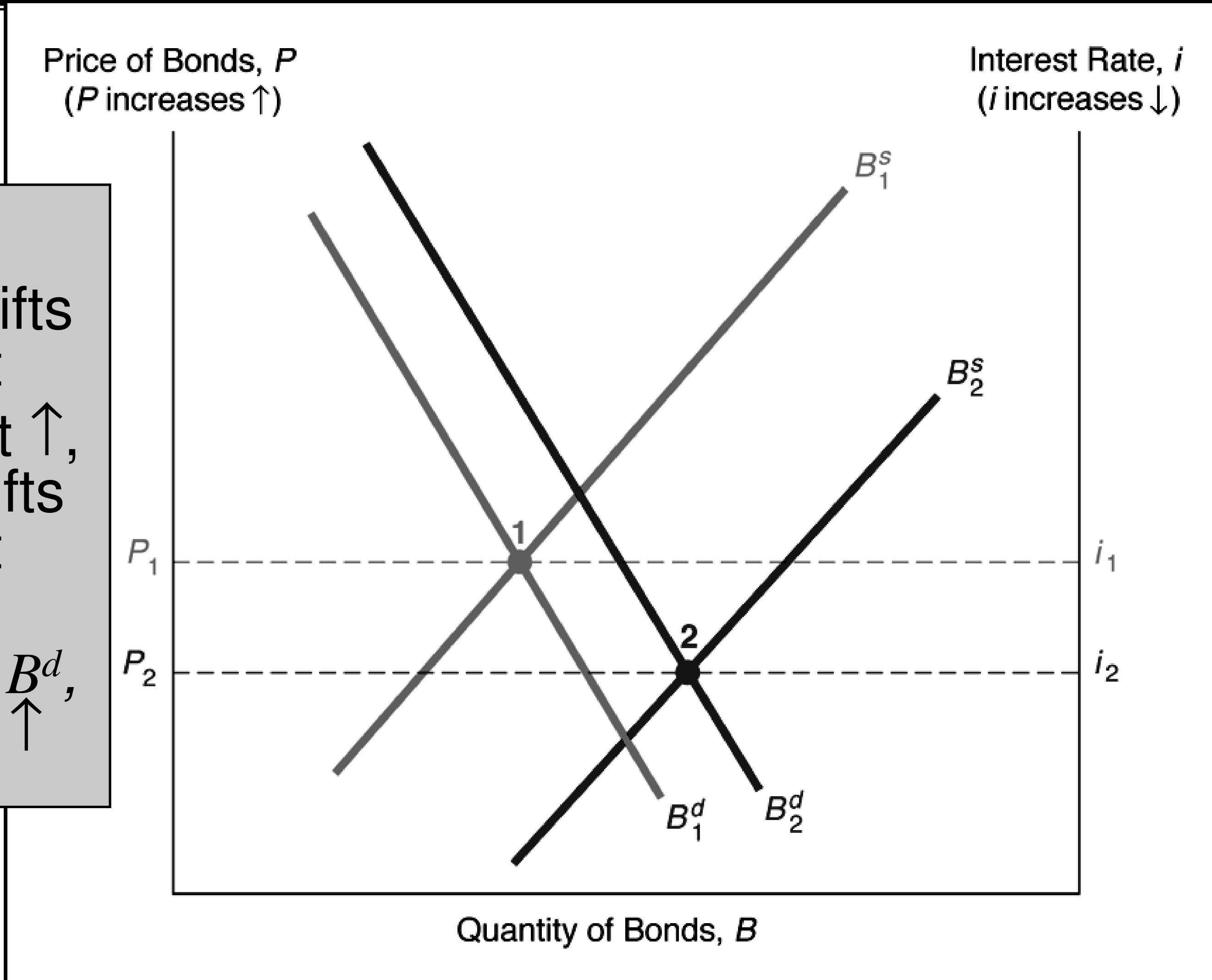
If $\pi^e \uparrow$
1. Relative Return ↓, B^d shifts in to left
2. $B^s \uparrow$, B^s shifts out to right
3. $P \downarrow$, $i \uparrow$

Evidence on the Fisher Effect in the United States

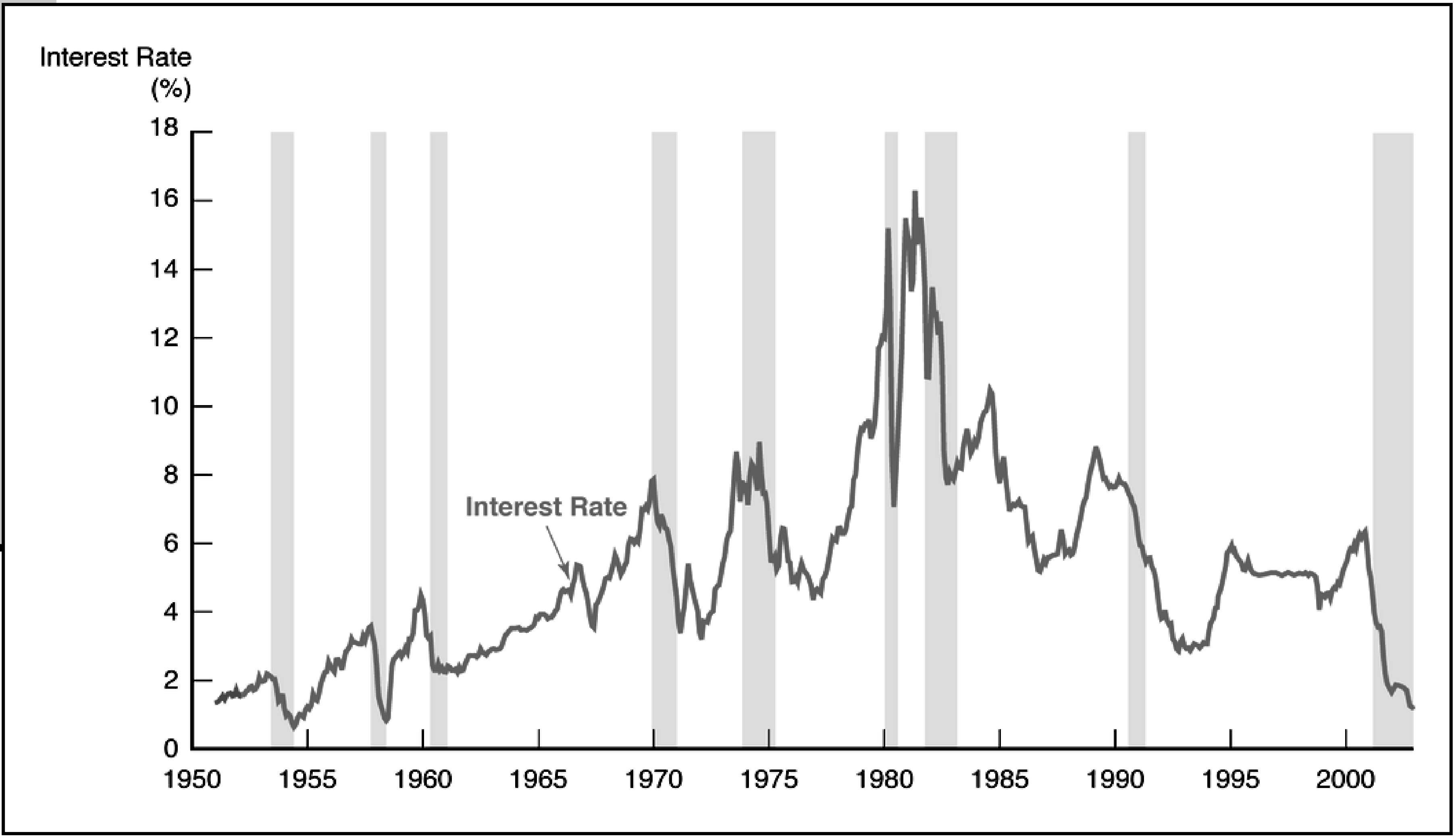


Business Cycle Expansion

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



Liquidity Preference Framework (Keynes)

- main assumption: two kinds of assets in the economy: money (i.e., currency) and bonds
- thus:

$$M^s + B^s = Wealth$$

- the budget constraint of the economy is:

$$M^d + B^d = Wealth$$

- therefore, $M^s + B^s = M^d + B^d$
- rearranging the terms, we have that:

$$M^s - M^d = B^d - B^s$$

- the money market equilibrium occurs when $M^s = M^d$, which means that $B^s = B^d$ and the bond market is in equilibrium as well

Relation to Loanable Funds Framework

- equating the supply and demand for bonds as in the loanable funds framework is equivalent to equating the supply and demand for money as in the liquidity preference framework
- the two frameworks are closely linked, but differ in practice because the liquidity preference assumes only two assets, money and bonds, and ignores the effects on interest rates from changes in expected returns on real assets

Liquidity Preference Analysis

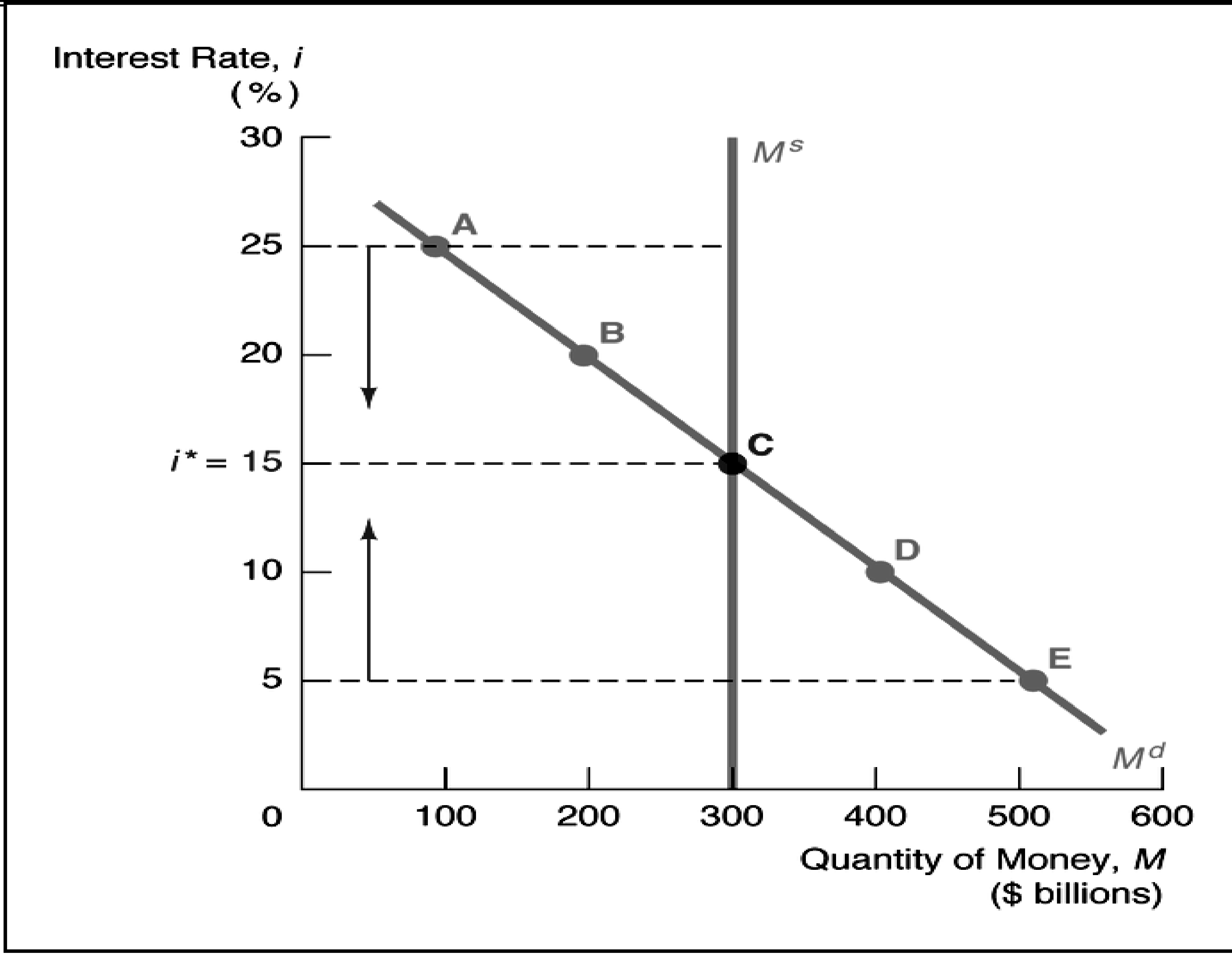
- Derivation of the money demand curve
  - Keynes assumed money bears zero interest
  - as i ↑, relative return on money ↓ (equivalently, the opportunity cost of money ↑), so demand for money ↓
  - so, the M^d curve has the usual downward slope

- Derivation of the money supply curve
  - we assume that the central bank controls the money supply M^s and it is a fixed amount
  - hence, the M^d curve is a vertical line

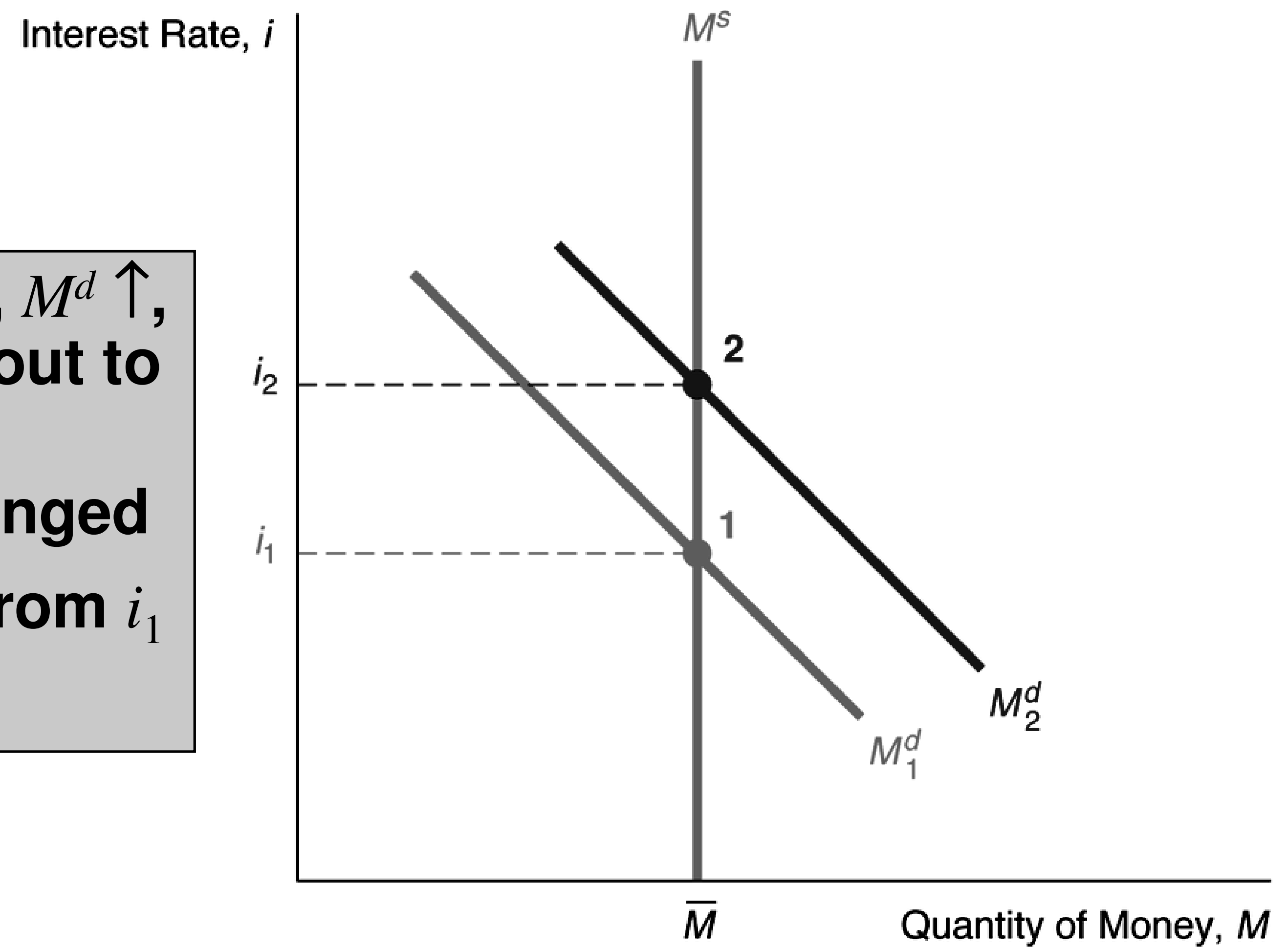
Liquidity Preference Analysis (cont.)

- Market equilibrium
  - occurs when money demand equals money supply, $M^d = M^s$
  - suppose that, at the equilibrium, $i^* = 15\%$
  - if $i = 25\%$, $M^s > M^d$ (excess supply): the price of bonds $\uparrow$, $i \downarrow$ to $i^* = 15\%$
  - if $i = 5\%$, $M^d > M^s$ (excess demand): the price of bonds $\downarrow$, $i \uparrow$ to $i^* = 15\%$

Money Market Equilibrium



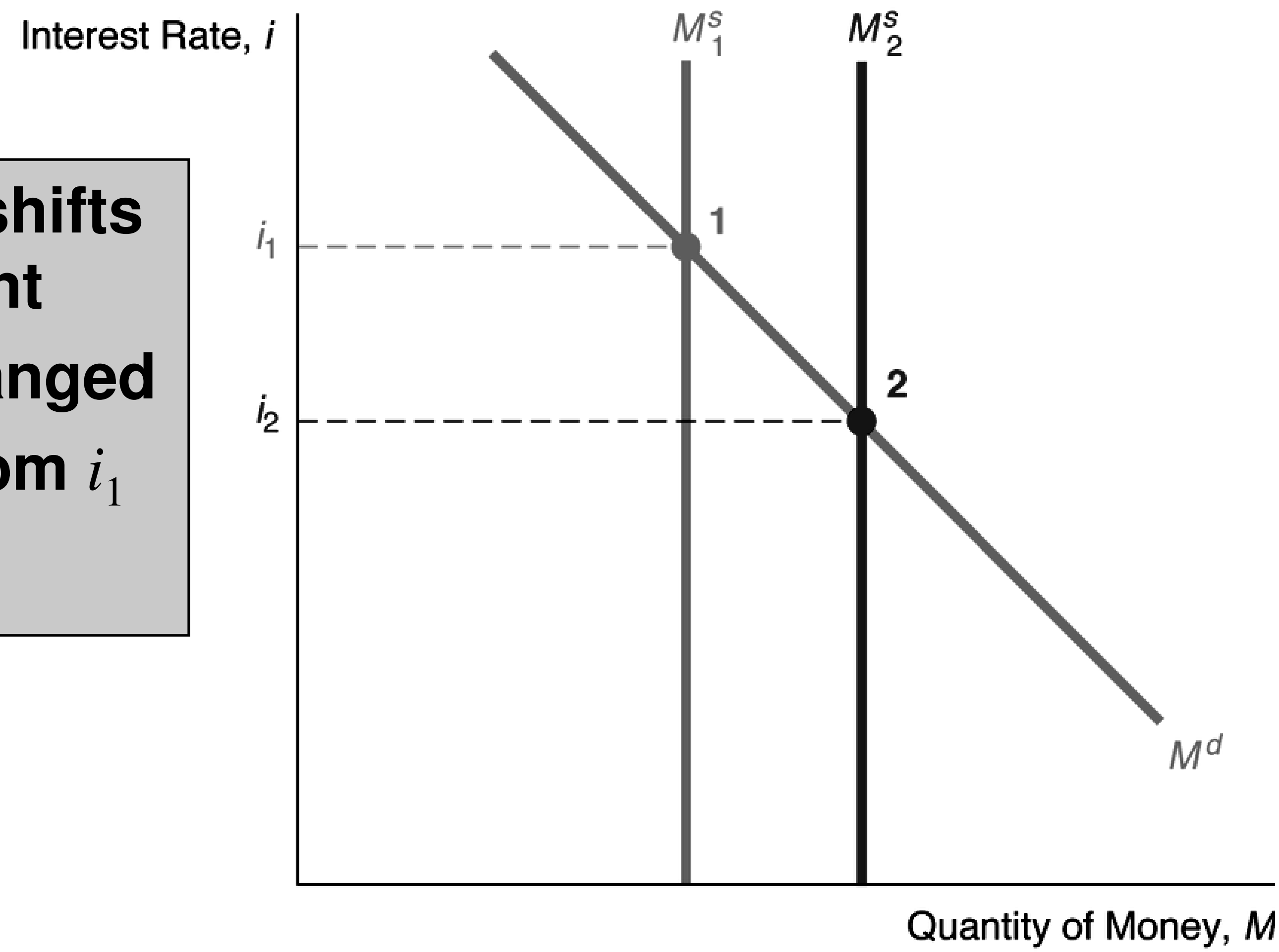
Rise in Income or the Price Level



1. **Income ↑, M^d ↑, M^d shifts out to right**
2. **M^s unchanged**
3. **i^* rises from i_1 to i_2**

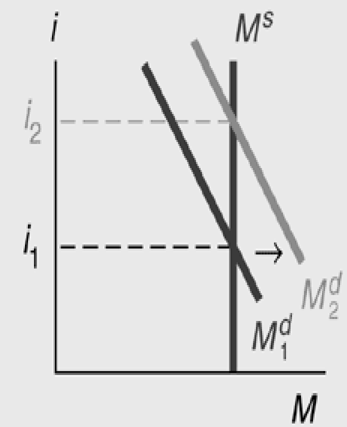
Rise in Money Supply

1. $M^s \uparrow$, M^s **shifts out to right**
2. M^d **unchanged**
3. i^* **falls from** i_1 **to** i_2

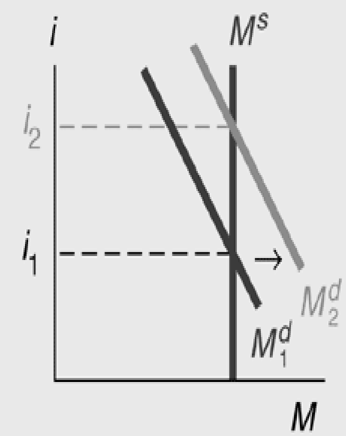
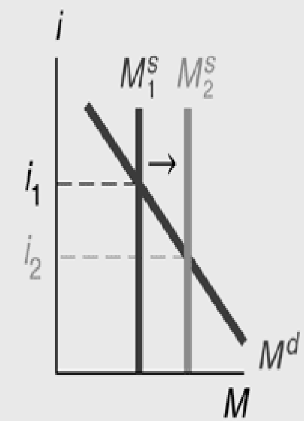


Factors that Shift the Demand for or Supply of Money

SUMMARY **Table 4 Factors That Shift the Demand for and Supply of Money**

Variable	Change in Variable	Change in Money Demand (M^d) or Supply (M^s)	Change in Interest Rate	
Income	↑	M^d ↑	↑	

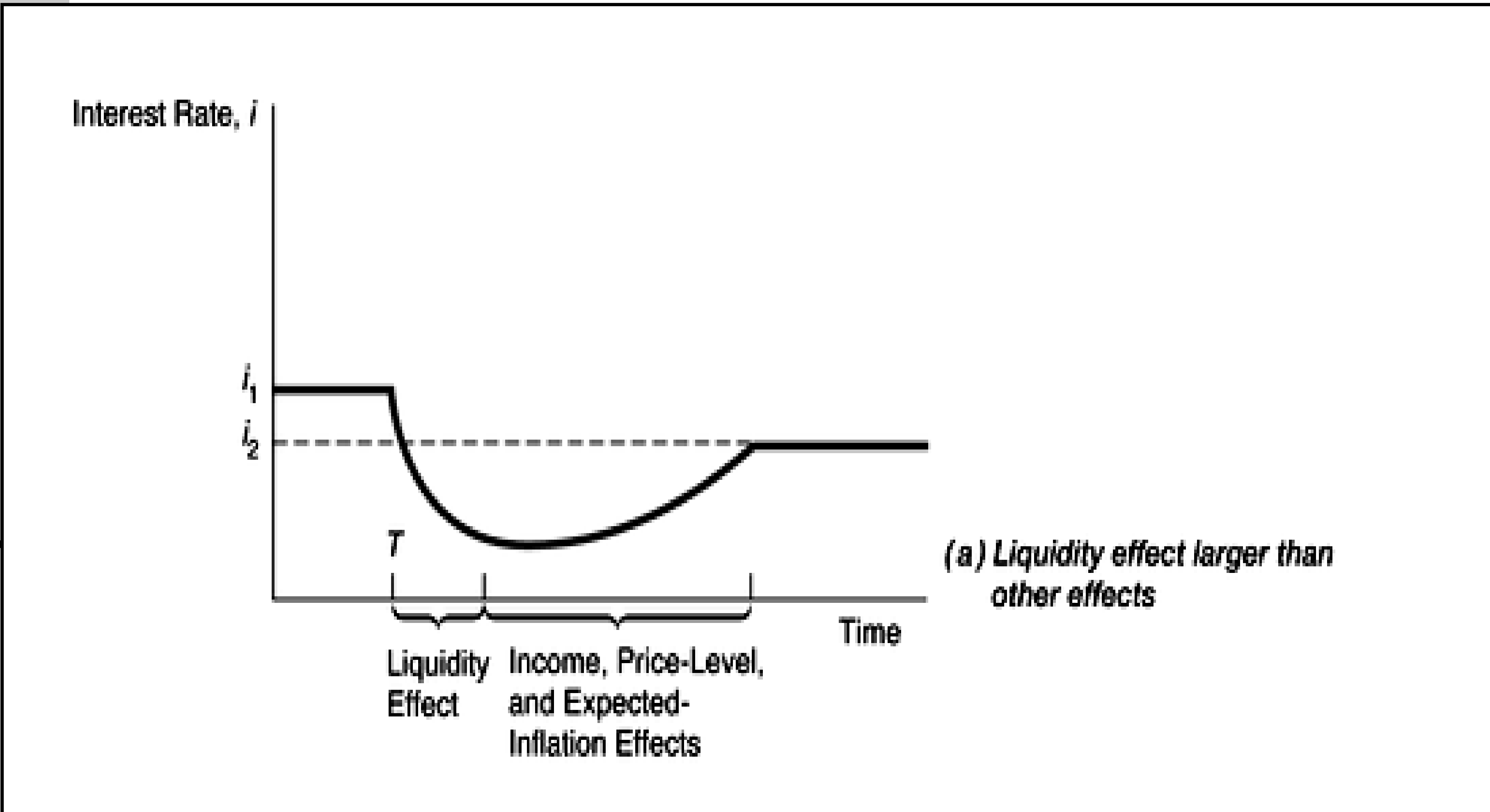
Factors that Shift the Demand for or Supply of Money (cont.)

Price level	↑	M^d↑	↑	
Money supply	↑	M^s↑	↓	

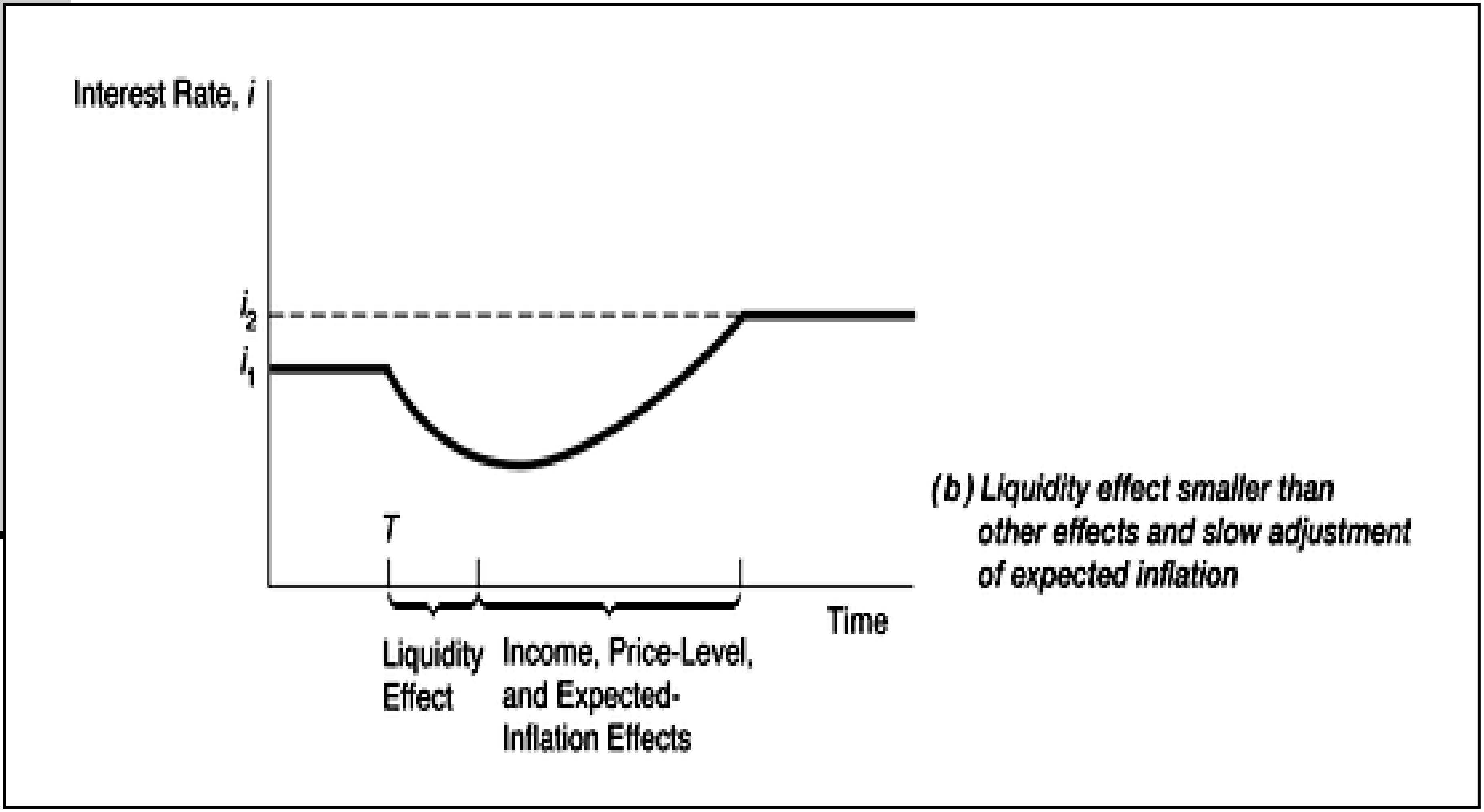
Effects of Money on Interest Rates

- *liquidity effect*: M^s ↑, M^s shifts right, i ↓
- *income effect*: M^s ↑, Income ↑, M^d ↑, M^d shifts right, i ↑
- *price level effect*: M^s ↑, Price level ↑, M^d ↑, M^d shifts right, i ↑
- *expected inflation effect*: M^s ↑, πe ↑, B^d ↓, B^s ↑, Fisher effect, i ↑
- hence, total effect of a change in money supply on interest rates is *ambiguous* because the income, price level and expected inflation effects work in the opposite direction of the liquidity effect

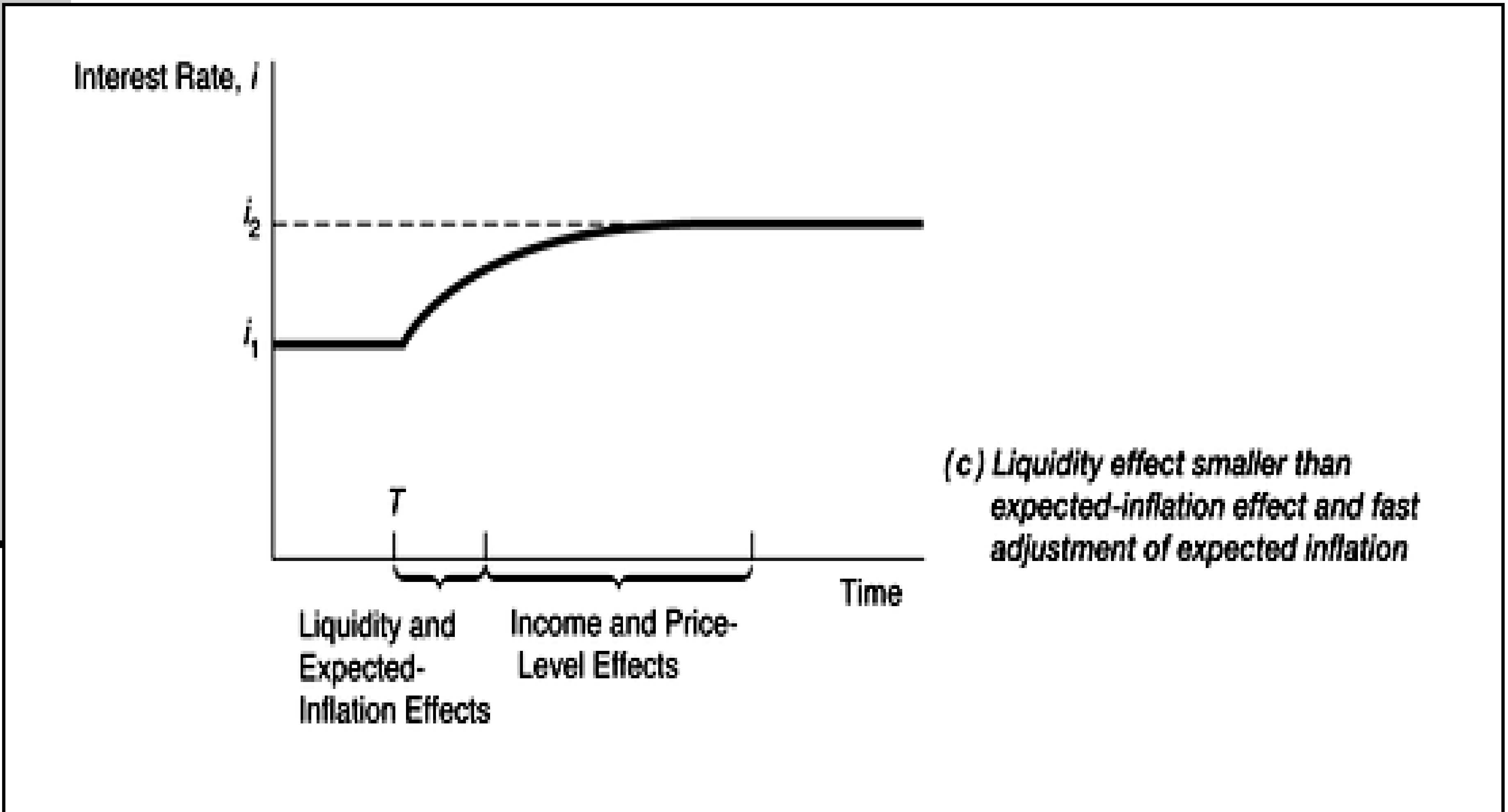
Does Higher Money Growth Lower Interest Rates? Case 1



Does Higher Money Growth Lower Interest Rates? Case 2



Does Higher Money Growth Lower Interest Rates? Case 3



Evidence on Money Growth and Interest Rates