

## Chapter 5 (continued)

### Changes in the equilibrium interest rates

- Movements versus shifts

Changes in the price of the bond leads to changes in quantity demanded or quantity supplied.

A shift in the demand or supply curve occurs when quantity demanded or supplied changes at each given price (or interest rate) of the bond in response to a change in some other factor besides the bond's price or interest rate.

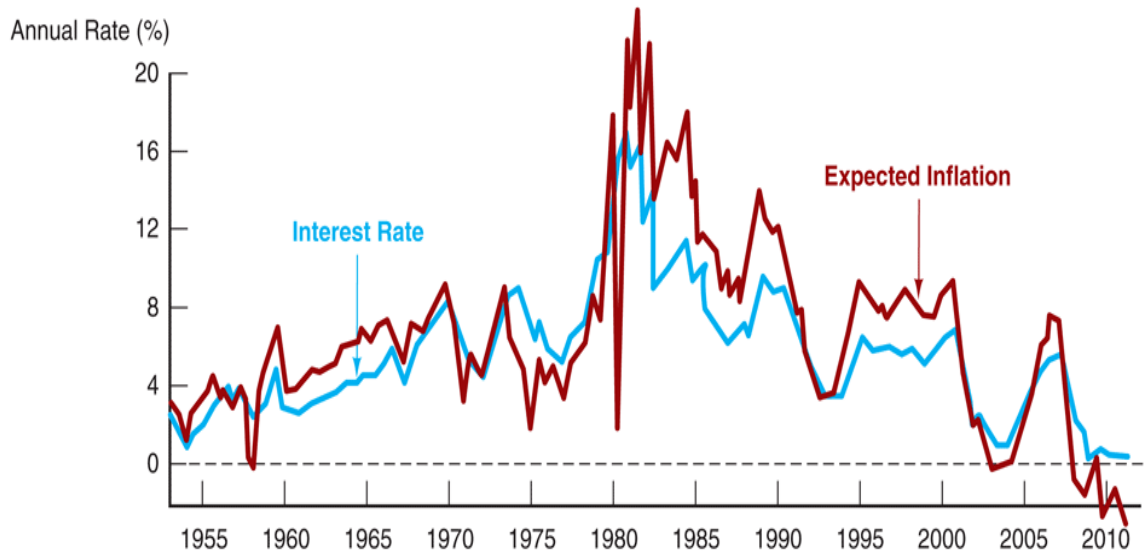
- Factors that shift the Demand Curve
  1. **Wealth/saving:** in a business cycle expansion with growing wealth, the demand for bonds rises, conversely, in a recession, when income and wealth are falling, the demand for bonds falls
  2. **Expected Returns on bonds:** higher expected interest rates in the future decrease the demand for long-term bonds, conversely, lower expected interest rates in the future increase the demand for long-term bonds.



- Factors that shift the Supply Curve
  1. **Expected Profitability of Investment Opportunities:** in a business cycle expansion, the supply of bonds increases and the supply curve shifts to the right. Conversely, in a recession, when there are far fewer expected profitable investment opportunities, the supply of bonds falls and the supply curve shifts to the left.
  2. **Expected Inflation:** an increase in expected inflation causes the supply of bonds to increase and the supply curve to shift to the right.
  3. **Government Activities:** higher government deficits increase the supply of bonds and shifts the supply curve to right. Conversely, government surpluses decrease the supply of bonds and shifts the supply curve to the left.

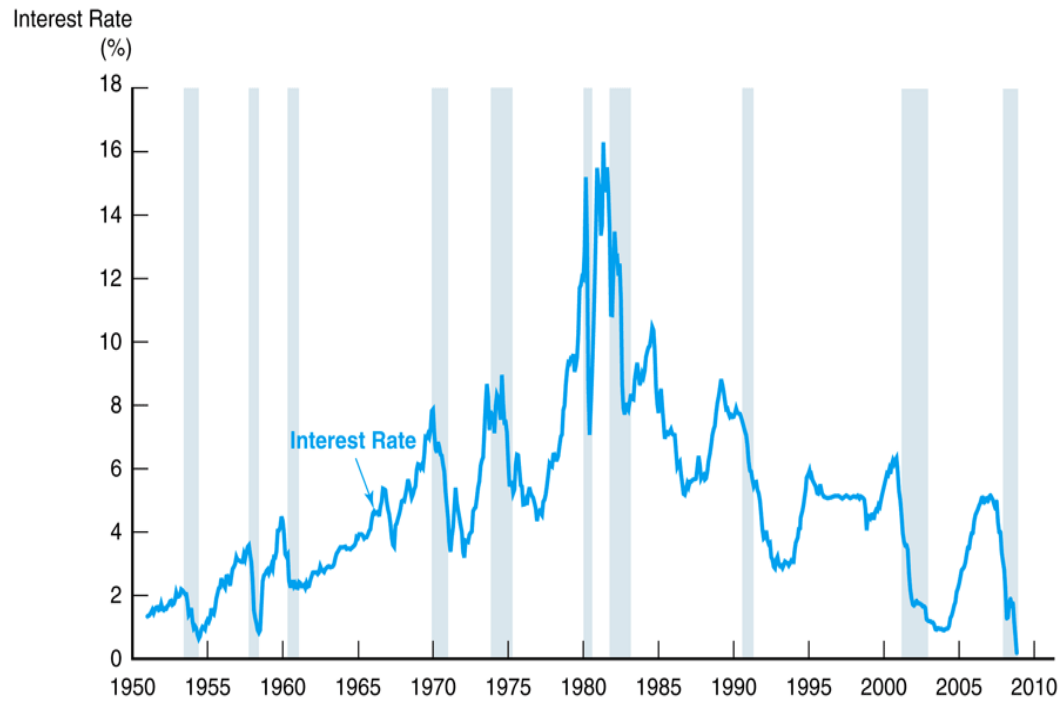
**Application 1: Changes in the interest rate due to expected inflation:  
The Fisher Effect**

**Expected Inflation and Interest Rates (Three-Month Treasury Bills),  
1953–2011**



## Application 2: Changes in the interest rate due a business cycle expansion

### Business Cycle and Interest Rates (Three-Month Treasury Bills), 1951–2008



## **The Liquidity Preference Framework: Supply and Demand in the Market for Money**

Keynesian model that determines the equilibrium interest rate in terms of the supply of and demand for money. The idea is that there are two main categories of assets that people use to store wealth: money and bonds.

### **Derivation of Demand Curve**

- As  $i$ , the opportunity cost of holding money increases and  $M^d$  decreases. The demand curve for money has the usual downward slope

### **Derivation of Supply curve**

- Assume that central bank controls  $M^s$  and it is a fixed amount.  $M^s$  curve is a vertical line

**Market Equilibrium:** Occurs when  $M^d = M^s$

### **Shifts in the Demand for Money**

- *Income Effect* - a higher level of income causes the demand for money at each interest rate to increase and the demand curve to shift to the right
- *Price-Level Effect* - a rise in the price level causes the demand for money at each interest rate to increase and the demand curve to shift to the right

### **Rise in income or the price level**

### **Shifts in the supply of money**

- The supply of money is controlled by the central bank
- An increase in the money supply by the Federal Reserve will shift the supply curve for money to the right

### Everything else remaining equal?

- Liquidity preference framework leads to the conclusion that an increase in the money supply will lower interest rates: called the liquidity effect.
- However, over time, as the economy expands and income increases, get an Income Effect. The demand curve for money shifts to the right and interest rates begin to rise.
- Also, over time, can get a **Price Level** effect. A rise in the price level causes demand curve for money to shift to the right which will cause interest rates to rise.
- There may also be an **Expected-Inflation** effect which causes an increase in interest rates because the increase in the money supply may lead people to expect a higher price level in the future (the demand curve shifts to the right).
- A one time increase in the money supply will cause prices to rise to a permanently higher level by the end of the year. The interest rate will rise via the increased prices.
- Price-level effect remains even after prices have stopped rising.
- A rising price level will raise interest rates because people will expect inflation to be higher over the course of the year. When the price level stops rising, expectations of inflation will return to zero.
- Expected-inflation effect persists only as long as the price level continues to rise which requires continued money growth.

### Money Supply Growth and the Effects on Interest Rates

**Liquidity Effect:**  $M^s \text{ growth} \uparrow \rightarrow i \downarrow$

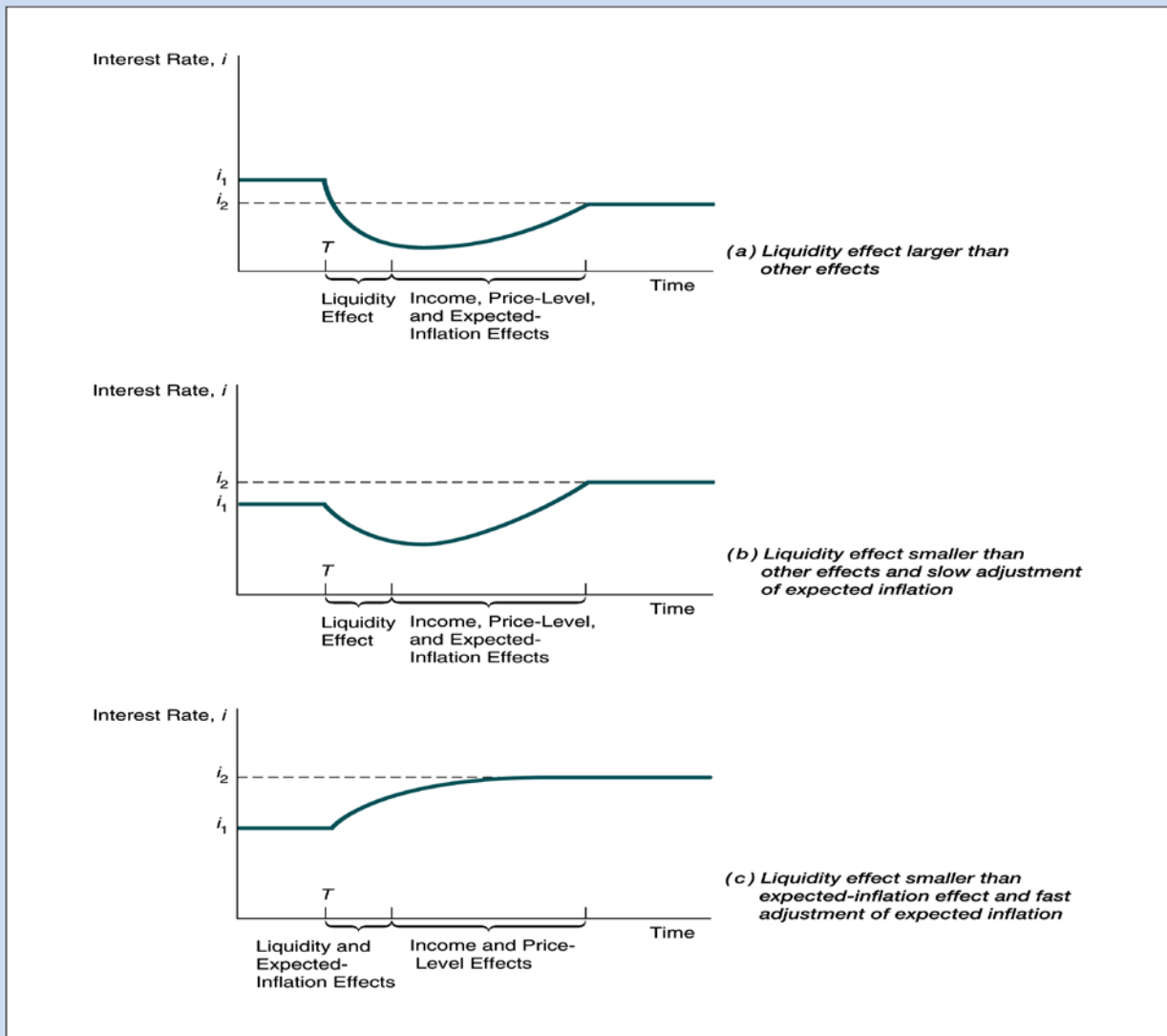
**Income Effect:**  $i \downarrow \rightarrow \text{Income} \uparrow \rightarrow M^d \uparrow \rightarrow i \uparrow$

**Price Level Effect:**  $M^s \uparrow \text{ growth} \rightarrow \text{Price level} \uparrow \rightarrow M^d \uparrow \rightarrow i \uparrow$

**Expected Inflation Effect:**  $M^s \uparrow \rightarrow$  Price level  $\uparrow \rightarrow \pi^e \uparrow \rightarrow B^d \downarrow \rightarrow$   
 $B^s \uparrow \rightarrow$  Fisher effect  $\rightarrow i \uparrow$

Effect of higher money growth on nominal interest rates is ambiguous because income, price level and expected inflation effects work in opposite direction of liquidity effect

**When Does Higher Money Growth Lower Interest Rates?**



**FIGURE 11** Response Over Time to an Increase in Money Supply Growth