Chapter 5

The Behavior of Interest Rates
Determining the Quantity Demanded of an Asset

- **Wealth**—the total resources owned by the individual, including all assets.
- **Expected Return**—the return expected over the next period on one asset relative to alternative assets.
- **Risk**—the degree of uncertainty associated with the return on one asset relative to alternative assets.
- **Liquidity**—the ease and speed with which an asset can be turned into cash relative to alternative assets.
Theory of Asset Demand

Holding all other factors constant:

1. The quantity demanded of an asset is positively related to wealth
2. The quantity demanded of an asset is positively related to its expected return relative to alternative assets
3. The quantity demanded of an asset is negatively related to the risk of its returns relative to alternative assets
4. The quantity demanded of an asset is positively related to its liquidity relative to alternative assets
<table>
<thead>
<tr>
<th>Variable</th>
<th>Change in Variable</th>
<th>Change in Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wealth</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Expected return relative to other assets</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Risk relative to other assets</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Liquidity relative to other assets</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

*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.*
Supply and Demand for Bonds

• At lower prices (higher interest rates), ceteris paribus, the quantity demanded of bonds is higher—an inverse relationship

• At lower prices (higher interest rates), ceteris paribus, the quantity supplied of bonds is lower—a positive relationship
Figure 1: Supply and Demand for Bonds

The diagram illustrates the supply and demand for bonds. The supply curve ($B^s$) upward-slopes, indicating that as the price of bonds increases, the quantity supplied also increases. Conversely, the demand curve ($B^d$) downward-slopes, indicating that as the price of bonds increases, the quantity demanded decreases.

At point C, the supply and demand curves intersect, indicating the equilibrium price ($P^*$) of $850$ and the equilibrium interest rate ($i^*$) of $17.6\%$. This equilibrium occurs at a quantity of $300$ billion bonds.
Market Equilibrium

- Occurs when the amount that people are willing to buy (demand) equals the amount that people are willing to sell (supply) at a given price
- When $B_d = B_s \Rightarrow$ the equilibrium (or market clearing) price and interest rate
- When $B_d > B_s \Rightarrow$ excess demand $\Rightarrow$ price will rise and interest rate will fall
- When $B_d < B_s \Rightarrow$ excess supply $\Rightarrow$ price will fall and interest rate will rise
Shifts in the Demand for Bonds

- Wealth—in an expansion with growing wealth, the demand curve for bonds shifts to the right
- Expected Returns—higher expected interest rates in the future lower the expected return for long-term bonds, shifting the demand curve to the left
- Expected Inflation—an increase in the expected rate of inflations lowers the expected return for bonds, causing the demand curve to shift to the left
- Risk—an increase in the riskiness of bonds causes the demand curve to shift to the left
- Liquidity—increased liquidity of bonds results in the demand curve shifting right
### Table 2: Factors That Shift the Demand Curve for Bonds

<table>
<thead>
<tr>
<th>Variable</th>
<th>Change in Variable</th>
<th>Change in Quantity Demanded at Each Bond Price</th>
<th>Shift in Demand Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wealth</td>
<td>↑</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>Expected interest rate</td>
<td>↑</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>Expected inflation</td>
<td>↑</td>
<td>↓</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
## SUMMARY

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

<table>
<thead>
<tr>
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<th>Change in Variable</th>
<th>Change in Quantity Demanded at Each Bond Price</th>
<th>Shift in Demand Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riskiness of bonds relative to other assets</td>
<td>↑</td>
<td>↓</td>
<td>$B^d_2$ ← $B^d_1$</td>
</tr>
<tr>
<td>Liquidity of bonds relative to other assets</td>
<td>↑</td>
<td>↑</td>
<td>$B^d_2$ → $B^d_1$</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>Wealth</td>
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<td>↑</td>
<td><img src="image1" alt="Graph" /></td>
</tr>
<tr>
<td>Expected interest rate</td>
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<td>↓</td>
<td><img src="image2" alt="Graph" /></td>
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<tr>
<td>Expected inflation</td>
<td>↑</td>
<td>↓</td>
<td><img src="image3" alt="Graph" /></td>
</tr>
<tr>
<td>Riskiness of bonds relative to other assets</td>
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<td>↓</td>
<td><img src="image4" alt="Graph" /></td>
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<tr>
<td>Liquidity of bonds relative to other assets</td>
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<td>↑</td>
<td><img src="image5" alt="Graph" /></td>
</tr>
</tbody>
</table>

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FIGURE 2  Shift in the Demand Curve for Bonds
Shifts in the Supply of Bonds

• Expected profitability of investment opportunities—in an expansion, the supply curve shifts to the right

• Expected inflation—an increase in expected inflation shifts the supply curve for bonds to the right

• Government budget—increased budget deficits shift the supply curve to the right
<table>
<thead>
<tr>
<th>Variable</th>
<th>Change in Variable</th>
<th>Change in Quantity Supplied at Each Bond Price</th>
<th>Shift in Supply Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability of investments</td>
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<td>↑</td>
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<tr>
<td>Expected inflation</td>
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<td>↑</td>
<td><img src="image" alt="Graph" /></td>
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<tr>
<td>Government deficit</td>
<td>↑</td>
<td>↑</td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

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**Figure 3** Shift in the Supply Curve for Bonds
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.
FIGURE 5  **Expected Inflation and Interest Rates (Three-Month Treasury Bills), 1953–2005**

**Figure 6**  
**Response to a Business Cycle Expansion**

In a business cycle expansion, when income and wealth are rising, the demand curve shifts rightward from $B_1^d$ to $B_2^d$, and the supply curve shifts rightward from $B_1^s$ to $B_2^s$. If the supply curve shifts to the right more than the demand curve, as in this figure, the equilibrium bond price moves down from $P_1$ to $P_2$, and the equilibrium interest rate rises.
**FIGURE 7** Business Cycle and Interest Rates (Three-Month Treasury Bills), 1951–2005

The Liquidity Preference Framework

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

Total wealth in the economy = $B^s + M^s = B^d + M^d$

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

If the market for money is in equilibrium ($M^s = M^d$), then the bond market is also in equilibrium ($B^s = B^d$).
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.
Shifts in the Supply of Money

• Assume that the supply of money is controlled by the central bank

• An increase in the money supply engineered by the Federal Reserve will shift the supply curve for money to the right
Figure 9  Response to a Change in Income or the Price Level
**Figure 10** Response to a Change in the Money Supply

- Interest Rate, $i$
- Quantity of Money, $M$
- $M^s_1$, $M^s_2$
- $M^d$
- $i_1$, $i_2$
<table>
<thead>
<tr>
<th>Variable</th>
<th>Change in Variable</th>
<th>Change in Money Demand ($M^d$) or Supply ($M^s$) at Each Interest Rate</th>
<th>Change in Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>↑</td>
<td>$M^d$ ↑</td>
<td>↑</td>
</tr>
<tr>
<td>Price level</td>
<td>↑</td>
<td>$M^d$ ↑</td>
<td>↑</td>
</tr>
<tr>
<td>Money supply</td>
<td>↑</td>
<td>$M^s$</td>
<td>↓</td>
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Everything Else Remaining Equal?

- Liquidity preference framework leads to the conclusion that an increase in the money supply will lower interest rates—the liquidity effect.
- Income effect finds interest rates rising because increasing the money supply is an expansionary influence on the economy.
- Price-Level effect predicts an increase in the money supply leads to a rise in interest rates in response to the rise in the price level.
- Expected-Inflation effect shows an increase in interest rates because an increase in the money supply may lead people to expect a higher price level in the future.
Price-Level Effect and Expected-Inflation Effect

- 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.
Figure 11  
Response Over Time to an Increase in Money Supply Growth
Figure 12  Money Growth (M2, Annual Rate) and Interest Rates (Three-Month Treasury Bills), 1950–2005