

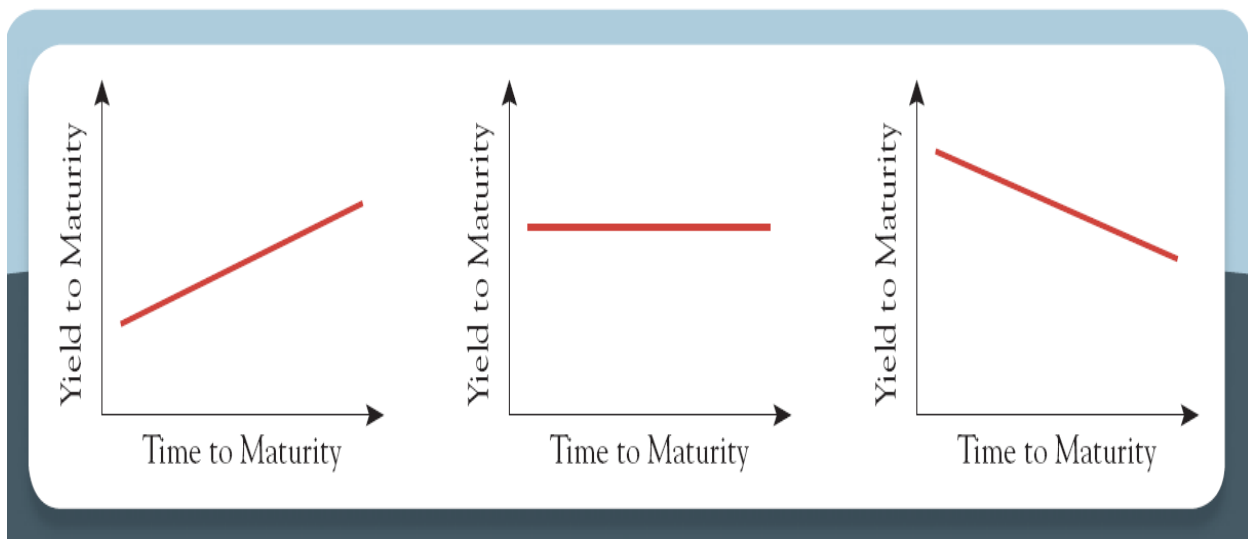
Chapter 6 (continued) - The Risk and Term Structure of Interest Rates

Term Structure of Interest Rates

The relationship among bonds with the same risk, liquidity and tax characteristics but different maturities is called the term structure of interest rates.

Yield Curve:

A plot of the term structure, with the yield to maturity on the vertical axis and the time to maturity on the horizontal axis.

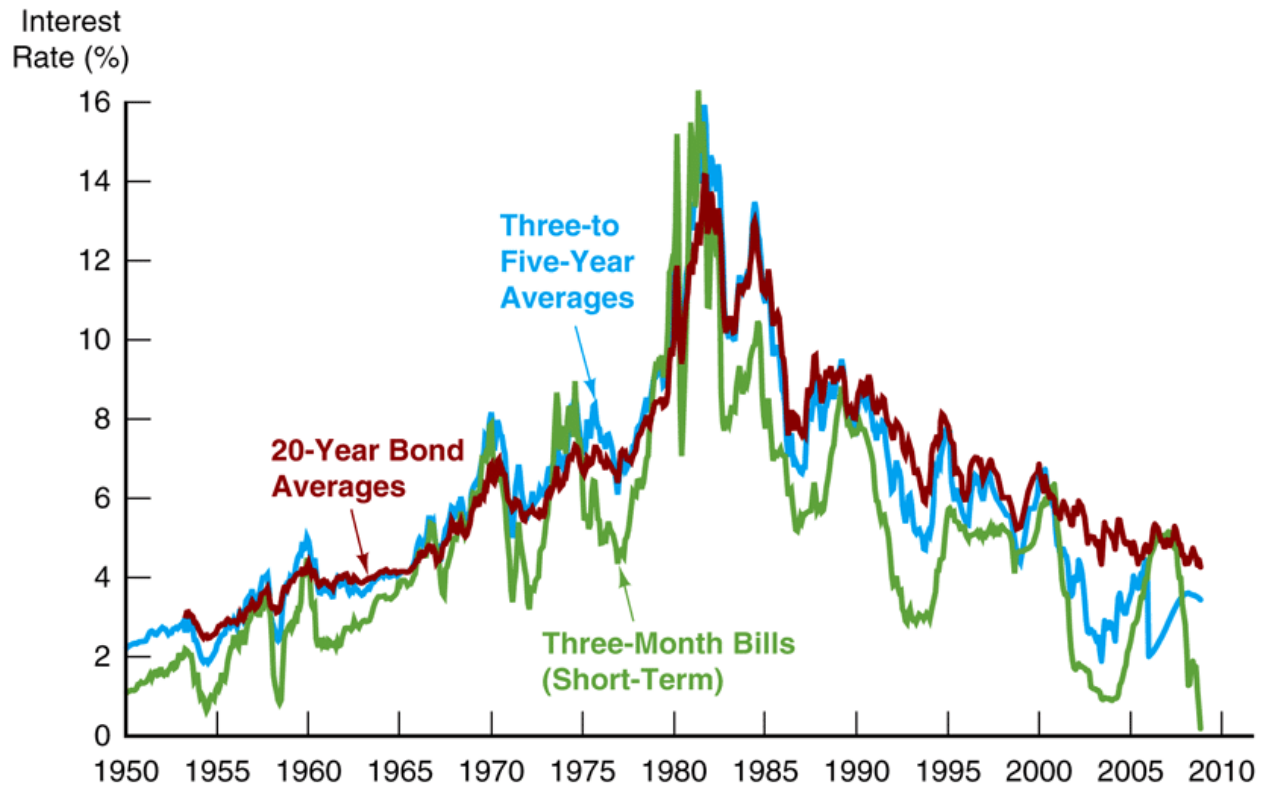


Interest rates are expected to **rise**.

Interest rates are expected to **remain unchanged**.

Interest rates are expected to **fall**.

Movements over Time of Interest Rates on U.S. Government Bonds with Different Maturities



Facts:

1. Interest rates (Yields) on different maturities tend to move together
2. When short term yields are low yield curves are more likely to slope upwards, when short term yields are high, yield curves are more likely to slope downward and be inverted.
3. Long-term yields tend to be higher than short-term yields.

Three theories to explain the three facts:

1. Pure Expectations Theory explains the first two facts but not the third
2. Segmented Markets Theory explains fact three but not the first two
3. Liquidity Premium Theory combines the two theories to explain all three facts

Pure Expectations Theory

- The interest rate on a long-term bond will equal an average of the short-term interest rates that people expect to occur over the life of the long-term bond
- Key Assumption: Buyers of bonds do not prefer bonds of one maturity over another.
 - Bonds of different maturities are considered to be perfect substitutes

Notation and formulas:

i_{jt} = interest rate on j-year bond today (t).

i_{1t+j} = interest rate on 1-year bond, j-years from today (t+j).

i^e_{1t+j} = Expected interest rate on 1-year bond, j-years from today (t+j).

Expectations Theory:

Consider two strategies:

- 1) Buy a one-year bond, and when it matures in a year, purchase another one year bond.
- 2) Purchase a two year bond and hold it until maturity

If one and two year bonds are perfect substitutes:

Generalizing..

Numerical example:

Recall the Fisher Equation: $i = r + \pi^e$

Holding r constant:

- If inflation is expected to rise in the future, expected one-year interest rates will rise and the yield curve will slope
- If inflation is expected to fall in the future, expected one-year interest rates will fall and the yield curve will slope
- If inflation is expected to remain the same in the future, expected one-year interest rates will remain the same and the yield curve will be

Using the Pure Expectations Theory to Solve for Expected 1-year (forward) Interest rates

From the formula for the yield on a 2-year bond:

From the formula for the yield on a 3-year bond:

In general:

Segmented Market Theory

Assumptions:

- Investors have specific preferences about the maturity or term of a security.
- Investors do not stray from their preferred maturity.

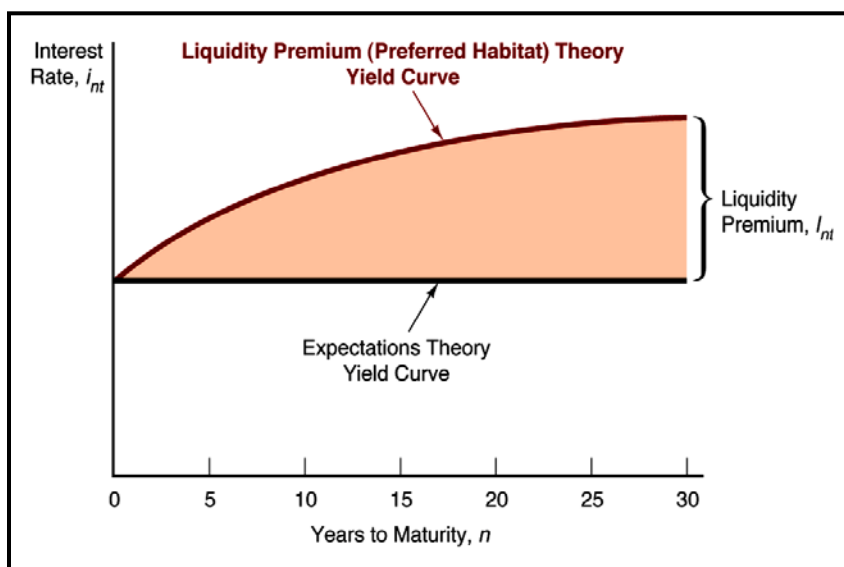
Note: Bonds of different maturities are not perfect substitutes for each other.

- The slope of the yield curve is explained by different demand and supply conditions for bonds of different maturities.
- If the yield curve slopes up, it does so because the demand for short term bonds is relatively greater than the demand for long term bonds.
 - Short term bonds have a higher price and a lower yield as a result of the relatively greater demand. So the yield curve slopes upward.

- The segmented markets hypothesis explains why....
 - Yield curves typically slope upward.
 - On average, investors prefer bonds with shorter maturities that have less interest rate risk.
 - Therefore, the demand for short term bonds is relatively greater than the demand for long-term bonds
- But, the segmented markets hypothesis does not explain why...
 - Interest rates on different maturities move together.
 - The segmented markets hypothesis assumes that short and long markets are completely segmented.

Liquidity Premium Theory of the Term Structure of Interest Rates

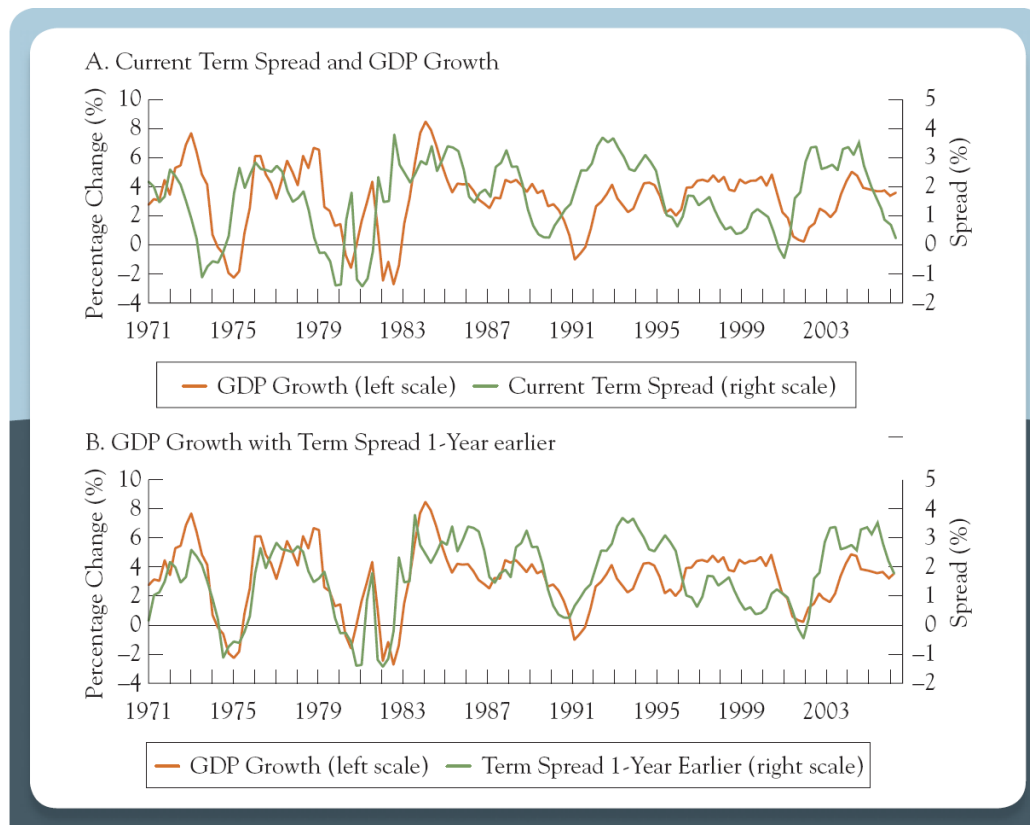
- Yield curve upward slope is explained by the fact that long-term bonds are riskier than short-term bonds.
- Bondholders face both inflation risk and interest rate risk.
- The longer the term of the bond, the greater both types of risk.
- Investors need to be compensated for the greater risk.



Information Content of Interest Rates: Term Structure

- When the yield curve slopes down, it is called *inverted*
- An inverted yield curve is a very valuable forecasting tool
- It signals an economic downturn

Information Content of Interest Rates: 10-year T-bond compared to 3-month T- bill



Market Predictions of Future Short Rates

