

Part 2 – Financial Markets (continued)

Chapter 4 (continued)

The distinction between interest rates and returns

The holding period return

- the return from holding a bond and selling it before maturity.
- the holding period return can differ from the yield to maturity.

Example:

- You purchase a 10-year coupon bond, with a 10% coupon rate, at face value (\$1000) and sell one year later.

$$RET_{(t \rightarrow t+1)} = \frac{C}{P_t} + \frac{(P_{t+1} - P_t)}{P_t} = \frac{C + P_{t+1} - P_t}{P_t}$$

Current
Yield

Capital Gain

If the interest rate one year later is the same at 10%

One year holding period return =

If the interest rate one year later is lower at 8%:

One year holding period return =

If the interest rate in one year is higher at 12%:

One year holding period return =

| TABLE 2 One-Year Returns on Different-Maturity 10%-Coupon-Rate Bonds When Interest Rates Rise from 10% to 20% | | | | | | |
|---|---|---------------------------------|---------------------------------------|--|--|--|
| (1) Years to Maturity When Bond Is Purchased | (2) Initial Current Yield (%) | (3) Initial Price (\$) | (4) Price Next Year* (\$) | (5) Rate of Capital Gain (%) | (6) Rate of Return (2 + 5) (%) | |
| 30 | 10 | 1,000 | 503 | -49.7 | -39.7 | |
| 20 | 10 | 1,000 | 516 | -48.4 | -38.4 | |
| 10 | 10 | 1,000 | 597 | -40.3 | -30.3 | |
| 5 | 10 | 1,000 | 741 | -25.9 | -15.9 | |
| 2 | 10 | 1,000 | 917 | -8.3 | +1.7 | |
| 1 | 10 | 1,000 | 1,000 | 0.0 | +10.0 | |

*Calculated using Equation 3.

Conclusions from Table 2

- The return equals the yield to maturity (YTM) only if

- A rise in interest rates is associated with ain bond prices, resulting in a capital loss if the holding period is less than the time to maturity
- The more distant a bond's maturity, thethe size of the percentage price change associated with an interest-rate change
- The more distant a bond's maturity, the the rate of return that occurs as a result of an increase in the interest rate
- Even if a bond has a substantial initial interest rate, its return can be negative if interest rates

Interest rate risk

- Change in bond price due to changes in the interest rate
- Prices and returns for long-term bonds are more volatile than those for shorter-term bonds
- There is no interest-rate risk for a bond whose time to maturity matches the holding period

Reinvestment (interest rate) Risk

- If investor's holding period exceeds the term to maturity
 - ➔ proceeds from sale of bond are reinvested at the new interest rate
 - ➔ the investor is exposed to **reinvestment risk**
- The investor from rising interest rates, and from falling interest rates

Real and Nominal Interest Rates

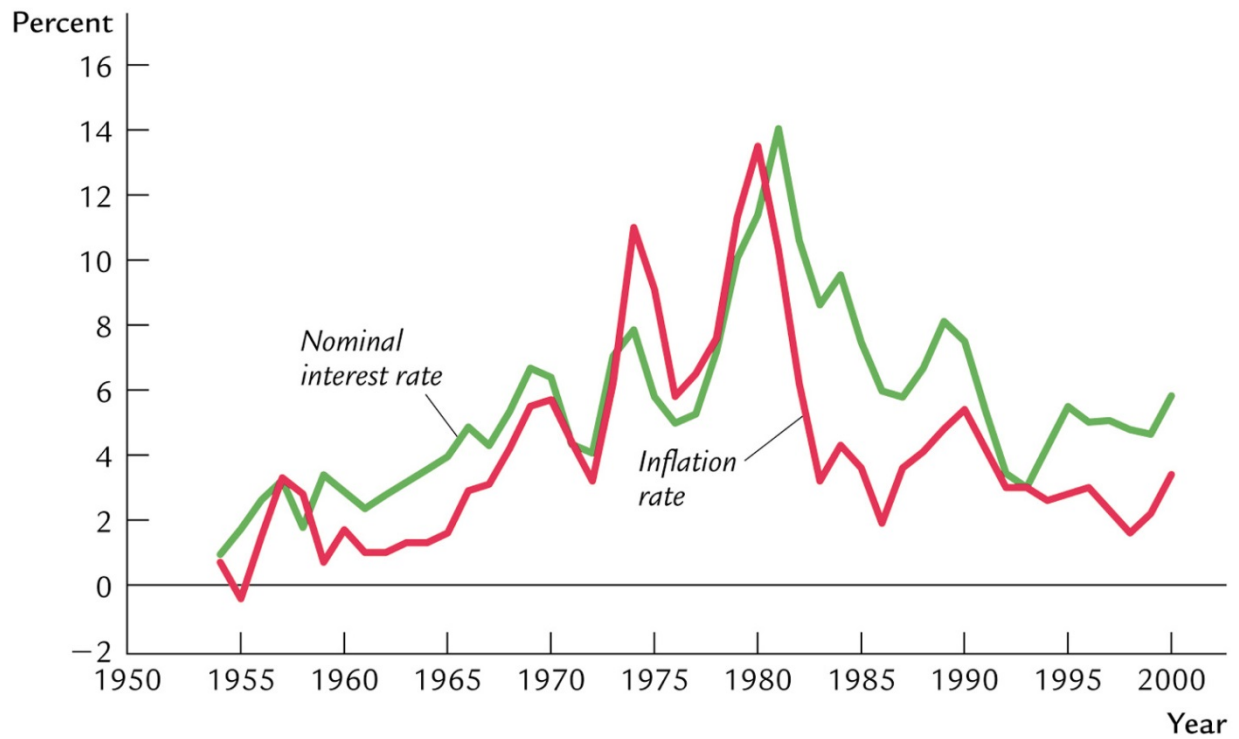
- Nominal interest rate (i) makes no allowance for inflation
- Real interest rate (r) is adjusted for changes in price level so it more accurately reflects the cost of borrowing

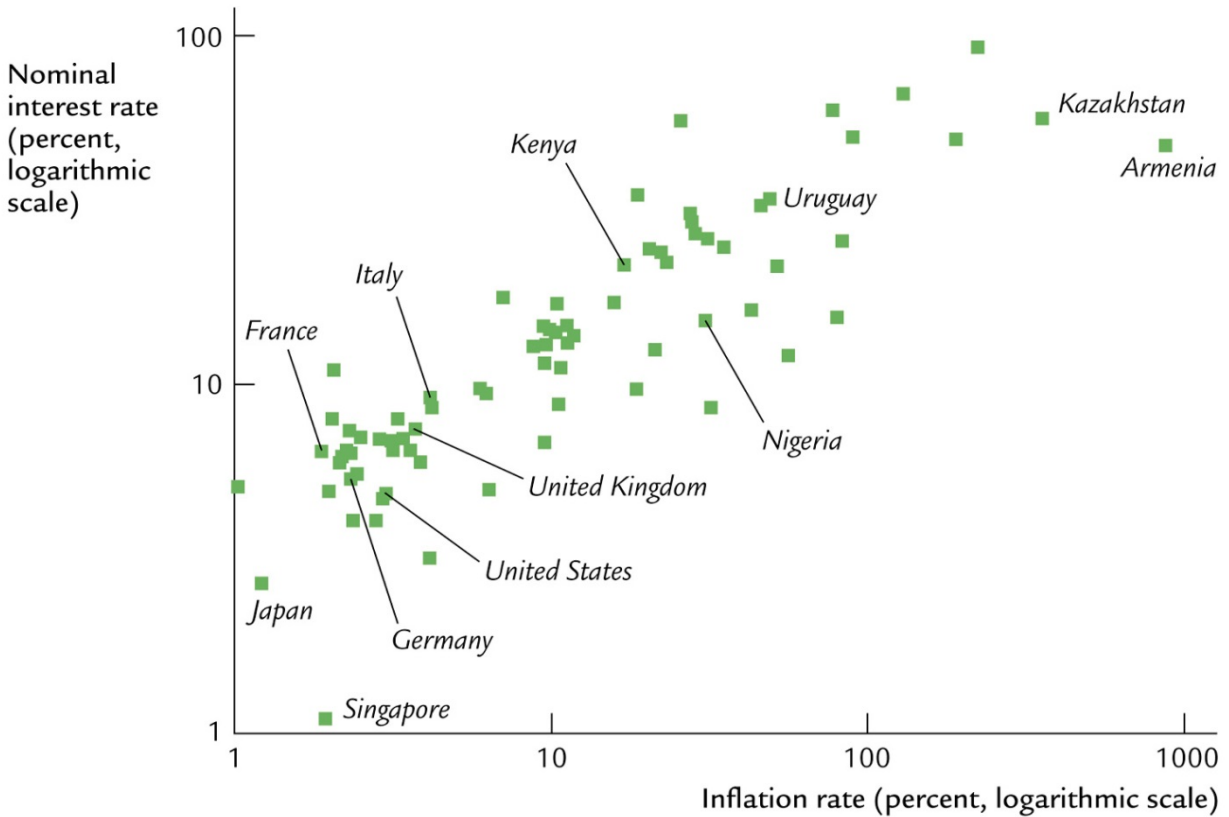
- Ex ante real interest rate is adjusted for expected changes in the price level (π^e)
- Ex post real interest rate is adjusted for actual changes in the price level (π)

Fisher Equation:

From this we get:

Inflation and Nominal interest rates





Real Interest Rate:

Interest rate that is adjusted for expected changes in the price level

$$r = i - \pi^e$$

1. Real interest rates more accurately reflects true cost of borrowing
2. When the real rate is low, there are greater incentives to borrow and less to lend.

if $i = 5\%$ and $\pi^e = 3\%$ then:

if $i = 8\%$ and $\pi^e = 10\%$ then

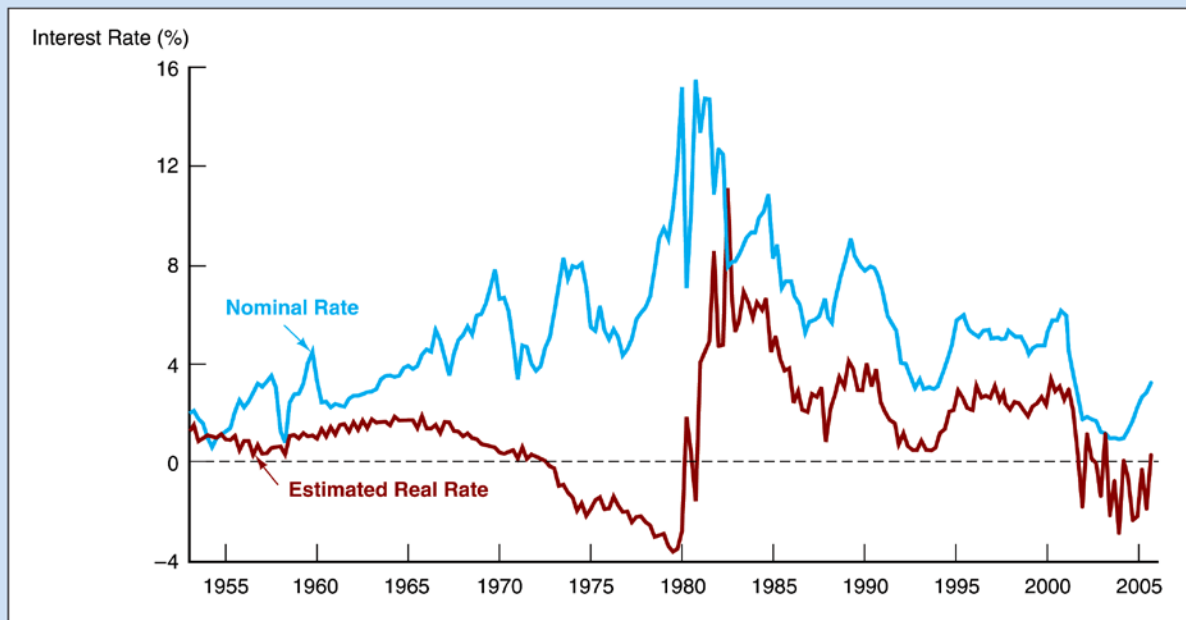


FIGURE 1 Real and Nominal Interest Rates (Three-Month Treasury Bill), 1953–2005

Sources: Nominal rates from www.federalreserve.gov/releases/H15. The real rate is constructed using the procedure outlined in Frederic S. Mishkin, "The Real Interest Rate: An Empirical Investigation," *Carnegie-Rochester Conference Series on Public Policy* 15 (1981): 151–200. This procedure involves estimating expected inflation as a function of past interest rates, inflation, and time trends and then subtracting the expected inflation measure from the nominal interest rate.

How can we measure inflationary expectations?

1. Ex-post real rates
2. Indexed bonds
3. Survey measures

Chapter 5 - The Behavior of Interest Rates

- Monetary Policy works primarily by manipulating interest rates
- Interest rates are determined by the demand and supply for bonds

First, we examine the bond market by treating bonds as a financial asset:

Determinants of asset demand:

- 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 portfolio choice:

Holding all other factors constant, the demand for an asset is:

-related to wealth
- related to its expected return relative to alternative assets
-related to the risk of its returns relative to alternative assets
- related to its liquidity relative to alternative assets

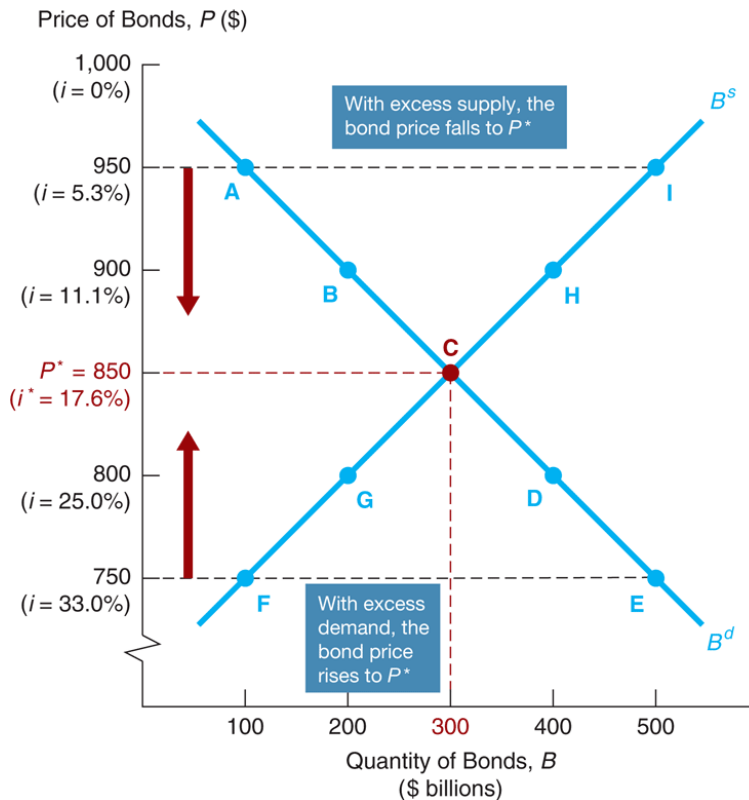
Demand and Supply for Bonds

Demand curve

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

Supply curve

At lower prices (higher interest rates), ceteris paribus, the quantity supplied of bonds is lower - a positive relationship



Market Equilibrium

- Occurs when the quantity (amount) that people are willing to buy (demand) equals the quantity (amount) that people are willing to sell (supply) at a given price
- $B^d = B^s$: the equilibrium (or market clearing) price and interest rate
- When $B^d > B^s$: excess demand
- When $B^d < B^s$: excess supply