Interest Rate and Rate of Return (RET)

The RET of a security from t to t+1

$$RET_t = \frac{c + P_{t+1} - P_t}{P_t} = \frac{c}{P_t} + \frac{P_{t+1} - P_t}{P_t}$$

Note that for a one-period discount bond, its expected return (RET^e) is equal to the interest rate (YTM),

$$RET_t^e = \frac{F - P_t}{P_t} = i_t.$$

For a mutli-period coupon pond, if an investor holds the bond from beginning to maturity, there is no capital gain or loss, and thus its expected return for holding the bond is equal to its YTM.

Behavior of Interest Rates

Fluctuations in interest rates have a tremendous impact on the health of financial institutions, because they cause big swings in the value of debt instruments held by these institutions.

What explains large fluctuations in interest rates?

In this chapter, we examine how nominal interest rates are determined, and then discuss factors that lead to changes in interest rates.

Asset Market Approach

In general, the demand for an asset depends on

1. Wealth
2. Expected return *relative to that of an alternative asset*
3. Risk *relative to that of an alternative asset*
4. Liquidity *relative to that of an alternative asset*

Consider the demand for a one-period discount bond, $i_t\,(= RET_t^e) = \frac{F-P_t}{P_t}$.

Demand for Bonds

If $P_t \uparrow$

$\Longrightarrow RET_t^e$ of this bond $(= i_t)$ *relative to that of an alternative asset* $\downarrow$

$\Longrightarrow$ the public is less willing to purchase this bond (loanable funds supply $\downarrow$)

$\Longrightarrow$ quantity demand for this bond $(B^d) \downarrow$

Thus, demand for bond is negative (positive) sloped in bond prices (interest rates).

Supply of Bonds

If $P_t \uparrow$

$\Longrightarrow i_t \downarrow$ (borrowing costs for bond issuer $\downarrow$)

$\Longrightarrow$ firms have incentives to issue more bonds (loanable funds demand $\uparrow$)

$\Longrightarrow$ quantity supply of this bond $(B^s) \uparrow$

Thus, supply of bond is positive (negative) sloped in bond prices (interest rates).

Shifts in Demand for Bonds

1. Wealth
2. Expected return *relative to that of an alternative asset*
3. Risk *relative to that of an alternative asset*
4. Liquidity *relative to that of an alternative asset*

For bonds with longer maturities, RET^e will be different from the interest rate, because capital gains or losses may be involved.

1. If the public expects that (nominal) interest rates will increase ($i^e_{t+1} \uparrow$), this means given the current bond price, they expect bond price will fall ($P^e_{t+1} \downarrow$).
Recall that $RET^e_t = \frac{c+P^e_{t+1}-P_t}{P_t}$, then
$\Longrightarrow RET^e \downarrow$ *at every given interest rate relative to that of an alternative asset*
$\Longrightarrow B^d$ shifts leftward.

2. If the public expects that equity prices will increase ($S^e_{t+1} \uparrow$)
$\Longrightarrow RET^e \downarrow$ *at every given interest rate relative to equities*
$\Longrightarrow B^d$ shifts leftward.

3. If the public expects that inflation rate will increase ($\pi^e_{t+1} \uparrow$)
$\Longrightarrow RET^e \downarrow$ *at every given interest rate relative to real assets* (because coupon payments are fixed)
$\Longrightarrow B^d$ shifts leftward.

Shifts in Supply of Bonds

1. Government deficits (Treasury bonds)

2. Expected inflation

3. Expected profitability of investments

If the expected inflation rate increase ($\pi^e_{t+1} \uparrow$), by Fisher equation,
$\Longrightarrow$ For a given nominal interest rate (bond price), the real interest rate will fall, i.e., real cost of borrowing by the bond issuer declines
$\Longrightarrow$ Quantity supply of bond increases *at every given interest rate*
$\Longrightarrow$ B^s shifts rightward.

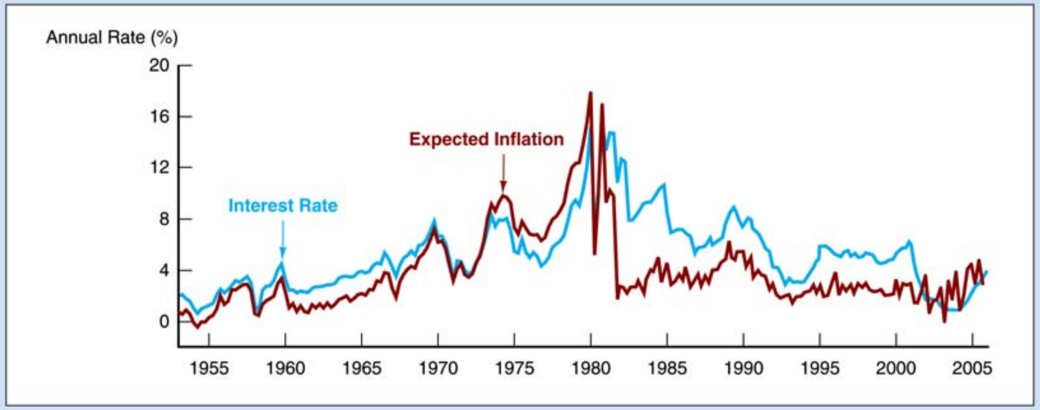

FIGURE 5 **Expected Inflation and Interest Rates (Three-Month Treasury Bills), 1953–2005**

Source: Expected inflation calculated using procedures outlined in Frederic S. Mishkin, "The Real Interest Rate: An Empirical Investigation," *Carnegie-Rochester Conference Series on Public Policy* 15 (1981): 151–200. These procedures involve estimating expected inflation as a function of past interest rates, inflation, and time trends.

Figure 1:

The Fisher Effect: $\pi^e_{t+1} \uparrow \Longrightarrow B^d$ shifts leftward and B^s shifts rightward $\Longrightarrow$ $i_t \uparrow$.

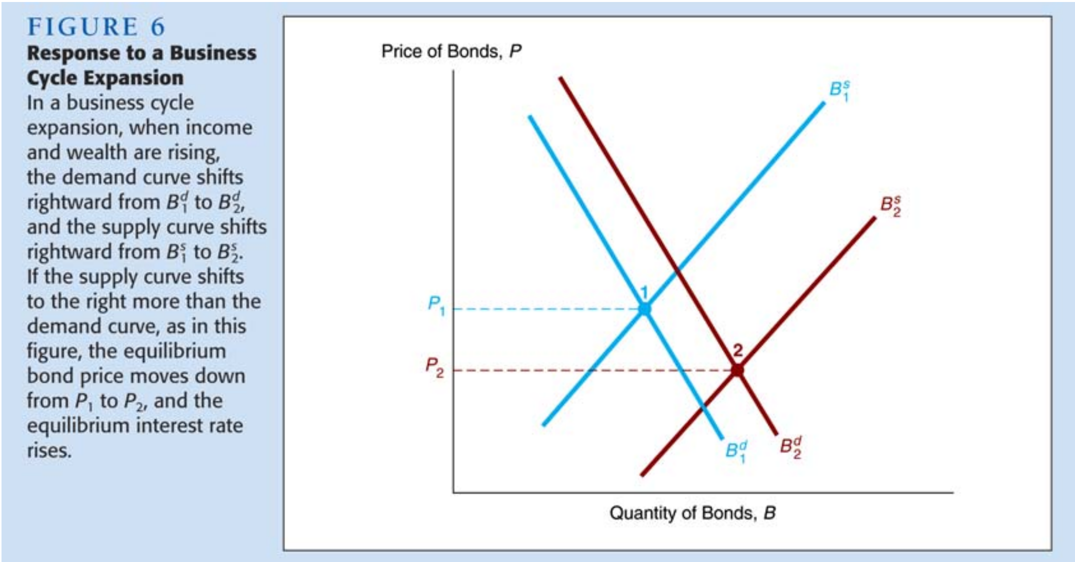

Figure 2:

The data shows that nominal interest rate is pro-cyclical
$\Longrightarrow$ This implies the shift in bond supply is more sensitive to the shift in bond demand in the business cycle.

FIGURE 7 **Business Cycle and Interest Rates (Three-Month Treasury Bills), 1951–2005**

Source: Federal Reserve: www.federalreserve.gov/releases/H15/data.htm.

Figure 3:

Keynes's Liquidity Preference Approach

Consider only two assets: money (Currency + demand deposits, zero interest rates), and bonds (interest bearing asset). $B^s + M^s = B^d + M^d$.

Liquidity Preference approach implicitly ignores any effect on interest rates that arises from changes in the expected on real assets (houses, gold, etc.).

Asset market approach (Loanable Fund Demand & Supply) is easier to use when analyzing effects from changes in expected inflation, expected returns, while Liquidity Preference is better for analyzing effects from changes in income, price level, and monetary policy.

Demand for Money: If $i \uparrow$,
$\Longrightarrow$ Opportunity cost of holding money $\uparrow$
$\Longrightarrow$ Quantity demand for money $\downarrow$

Supply of Money: Assume $M^s = \overline{M}$, which is controlled by the central bank.

Shifts in M^d

1. Income effect
2. Price level effect

If price level rises, the real money balance $(\frac{M}{P}) \downarrow$
$\Longrightarrow$ Real purchasing power *for a given amount of money* $\downarrow$
$\Longrightarrow$ Need to hold more money for purchasing the same quantity of goods
$\Longrightarrow$ $M^d \uparrow$ *for each interest rate*
$\Longrightarrow$ M^d shifts rightward

Monetary Policy and Interest Rates: Does a higher growth rate of money (expansionary monetary policy) lead to a lower interest rate?

Combining the above approaches, we have a better picture of the whole story.

If $M^s \uparrow$
$\Longrightarrow i \downarrow$ (Liquidity effect) when everything else held constant
$\Longrightarrow$ Hopefully, it will stimulate investment and consumption

But then other effects come into play

1. Income effect
$M^s \uparrow \Longrightarrow$ wealth $\uparrow \Longrightarrow M^d \uparrow \Longrightarrow i \uparrow$.

2. Price level effect
$M^s \uparrow \Longrightarrow P \uparrow \Longrightarrow \frac{M}{P} \downarrow \Longrightarrow M^d \uparrow \Longrightarrow i \uparrow$

3. Expected inflation effect (Fisher effect)
$M^s \uparrow \Longrightarrow \pi^e \uparrow \Longrightarrow i \uparrow$

Liquidity effect takes place instantly. The expected inflation effect may take place with a delay or very rapidly, depending on how the expectations adjust.

When the inflation expectations adjust very fast, the expected inflation effect may dominate and the nominal interest rate rises immediately after the expansion of money. In this case, an expansionary monetary policy leads to a higher inflation and has no real effect.