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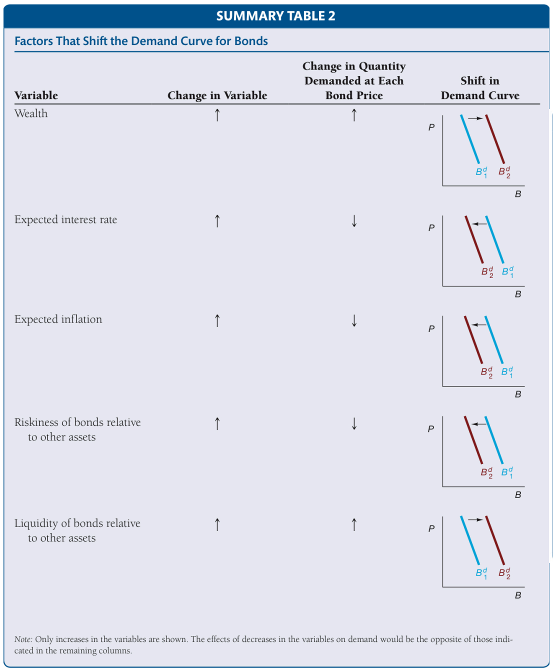
1 Review, Chapters, 5–7

1.1 Ch. 5: Behavior of interest rates

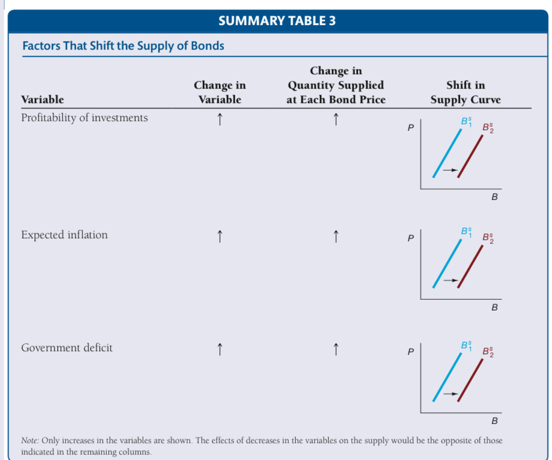


SUMMARY TABLE 2

Factors That Shift the Demand Curve for Bonds

Variable	Change in Variable	Change in Quantity Demanded at Each Bond Price	Shift in Demand Curve
Wealth	↑	↑	B^d_1, B^d_2 (→)
Expected interest rate	↑	↓	B^d_2, B^d_1 (←)
Expected inflation	↑	↓	B^d_2, B^d_1 (←)
Riskiness of bonds relative to other assets	↑	↓	B^d_2, B^d_1 (←)
Liquidity of bonds relative to other assets	↑	↑	B^d_1, B^d_2 (→)

Note: Only increases in the variables are shown. The effects of decreases in the variables on demand would be the opposite of those indicated in the remaining columns.



SUMMARY TABLE 3

Factors That Shift the Supply of Bonds

Variable	Change in Variable	Change in Quantity Supplied at Each Bond Price	Shift in Supply Curve
Profitability of investments	↑	↑	B^s_1, B^s_2 (→)
Expected inflation	↑	↑	B^s_1, B^s_2 (→)
Government deficit	↑	↑	B^s_1, B^s_2 (→)

Note: Only increases in the variables are shown. The effects of decreases in the variables on the supply would be the opposite of those indicated in the remaining columns.

- Money supply growth rate and interest rates
- **Liquidity preference framework** predicts that increase in money supply leads to **lower** interest rates.

  Milton Friedman's criticism:

  - Liquidity effect: higher money supply leads to lower interest rates immediately (Fast)
  - Expected-inflation effect: Higher money leads to higher **expected** inflation, pushing interest rates **up** (Fast)
  - Income effect: Higher money supply leads to higher income and wealth, push interest rates **up** (Slower)
  - Price-level effects: Higher money supply leads to inflation (higher price levels) pushing interest rates **up** (Fisher effect) (Slower)

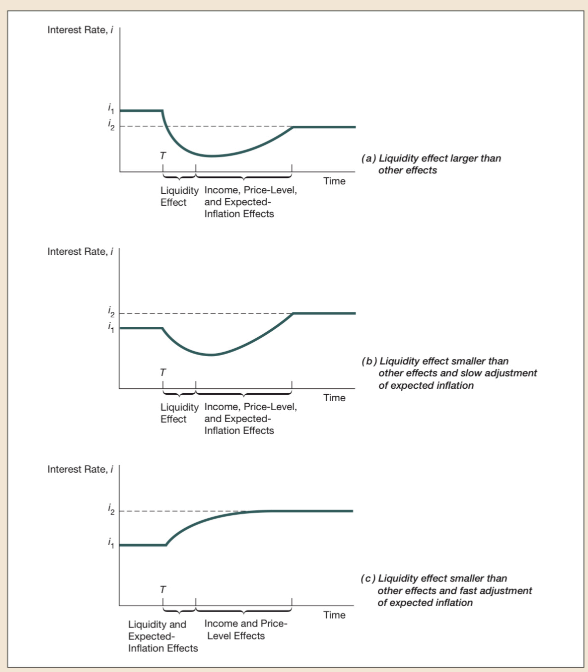


FIGURE 11 Response over Time to an Increase in Money Supply Growth
Each panel shows how interest rates respond over time to an increased rate of money supply growth, starting at time *T*.

1.2 Ch. 6: Risk and term structure of interest rates

- Risk structure of interest rates
  - Bonds with the same maturity may have different interest rates due to
    * Default risk
      · U.S. Treasury bonds generally considered to have near zero default risk
      · **Risk premium:** Spread between interest rates on bonds with default risk and rate on risk-free asset of same maturity (Treasury bonds)
    * Liquidity: ease at which asset can be bought/sold (converted to cash)
      · Cost of buying/selling a bond (transaction costs)
      · number of buyers and sellers in a bond market
    * Tax considerations
      · Interest payments on municipal bonds are exempt from federal income taxes
  - Bond ratings by ratings agencies (e.g. Moody's, S&P, Fitch)
    * Rating agencies rate default risk. (Different agencies use different scales—e.g. Baa1 from Moody's is roughly equivalent to BBB+ from S&P or Fitch.)
    * Bonds with BBB-/Baa3 or higher are considered **Investment Grade (IG)**. Lower rated bonds are considered **Non-investment Grade/Junk bonds**
  - Bonds with identical risk, liquidity, and tax characteristics may have different interest rates because time remaining to maturity is different
- Yield curve
  - Yield curve: plots interest rate on bonds with differing maturity, but same risk, liquidity, and tax considerations (usually Treasury bonds)
    * Upward-sloping (normal): long-term rates higher than short-term rates
    * Flat: short- and long-term rates the same
    * Inverted: long-term rates lower than short-term (often portends a recession)
- Term structure of interest rates
  - Interests rates of bonds of different maturities tend to move together
  - When short-term interest rates are low, yield curves are more likely to slope up; when short-term rates are high, yield curves are more likely to be inverted.
  - Yield curves almost always slope up. (Inversion is rare and usually followed a recession)
- 3 main theories to explain these facts:
  - Expectations theory
    * Interest rate on a long-term bond will equal an average of the expected short-term interest rates over the life of the long-term bond
    * Considers long-term bonds are **perfect substitutes**
    * $i_{nt} = \frac{i_t + i^e_{t+1} + i^e_{t+2} + \ldots + i^e_{t+(n-1)}}{n}$
  - Segmented markets theory
    * Bonds of different maturities are **not all substitutable**
    * Interest rates for each maturity length are determined by supply supply and demand for that individual bond
    * Investors have different preferences over different maturity lengths
  - Liquidity premium theory
    * Bonds of different maturities are **partially substitutable**
    * $i_{nt} = \frac{i_t + i^e_{t+1} + i^e_{t+2} + \ldots + i^e_{t+(n-1)}}{n} + l_{nt}$ where l_{nt} is the liquidity premium for the n-period bond at time t
    * l_{nt} positive and rising with maturity length

1.3 Ch. 7: The stock market

- How to price a stock? Use cash-flow discounting!
  - One-period valuation model (compare to our previous formulation of rate of return)
    - Assumes you collect the dividend for 1 period then sell
    - Want to find: Price you're willing to pay today: P_0
    - Need to know: Desired rate of return k_e on equity, dividends over the period, D_1, and expected price next period P_1
    - $P_0 = \frac{D_1}{1+k_e} + \frac{P_1}{1+k_e}$
  - Generalized dividend valuation model
    - Same as one-period valuation, but hold for n periods instead of just 1
    - $P_0 = \frac{D_1}{1+k_e} + \frac{D_2}{(1+k_e)^2} + \ldots + \frac{D_n}{(1+k_e)^n} + \frac{P_n}{(1+k_e)^n}$
  - Gordon growth model
    - Assumes you hold forever (very long term), and dividends grow at a stable rate g
    - $P_0 = \frac{D_0(1+g)}{1+k_e} + \frac{D_0(1+g)^2}{(1+k_e)^2} + \ldots = \frac{D_0(1+g)}{k_e-g} = \frac{D_1}{k_e-g}$ (D_0 is most recently paid dividend)
    - Requires $g < k_e$ (Why? What happens as g gets close to k_e?)

2 Exercises

1. U.S. government bonds have no default risk because
   (a) they are backed by the full faith and credit of the federal government
   (b) the federal government can increase taxes to pay its obligations
   (c) they are backed with gold reserves
   (d) they can be exchanged for silver at any time
2. If the probability of a bond default increases because corporations begin to suffer large losses, then the default risk on a corporate bond will ______, and the expected return on these bonds will ______, everything else held constant.
   (a) decrease; increase
   (b) decrease; decrease
   (c) increase; increase
   (d) increase; decrease
3. Which of the following securities has the lowest interest rate?
   (a) Junk bonds
   (b) U.S. Treasury bonds
   (c) Investment-grade bonds
   (d) Corporate A-rated bonds
4. Risk premia on corporate bonds tend to ______ during business cycle expansions and ______ during recessions, everything else held constant.
   (a) increase; increase
   (b) increase; decrease
   (c) decrease; increase
   (d) decrease; decrease

5. Everything else held constant, if the tax-exempt status of municipal bonds were eliminated, then
    (a) the interest rate on municipal bonds would still be less than the interest rate on Treasury bonds.
    (b) the interest rate on municipal bonds would equal the rate on Treasury bonds.
    (c) the interest rate on municipal bonds would exceed the rate on Treasury bonds.
    (d) the interest rate on municipal, Treasury, and corporate bonds would all increase.
6. If the expected path of one-year interest rates over the next five years is 1%, 2%, 3%, 4%, and 5%, the expectations theory predicts that the bond with the highest interest rate today is the one with a maturity of
    (a) two years.
    (b) three years.
    (c) four years.
    (d) five years.
7. If the one-year interest rates for the next three years are expected to be 4%, 2%, and 3% respectively, and the three-year term premium is 1%, then the three-year bond rate will be (according to the liquidity premium theory)
    (a) 1%
    (b) 2%
    (c) 3%
    (d) 4%
8. If the yield curve slope is mildly upward sloping for short maturities and then steeply upward sloping for longer maturities, the liquidity premium theory (assuming a mild preference for shorter-term bonds) indicates that the market is predicting
    (a) a rise in short-term interest rates in the near future and a decline further out in the future.
    (b) constant short-term interest rates in the near future and a rise further out in the future and further out in the future.
    (c) a decline in short-term interest rates in the near future and a rise further out in the future.
    (d) constant short-term interest rates in the near future and a rise further out in the future.
9. According to the liquidity premium theory of term structure, a flat sloping yield curve indicates that short-term interest rates are expected to
    (a) rise in the future.
    (b) remain unchanged in the future.
    (c) decline moderately in the future.
    (d) decline sharply in the future.