CHAPTER 10
Bond Prices and Yields

10.1 BOND CHARACTERISTICS

Bond Characteristics

- Face or par value
- Coupon rate
  - Zero coupon bond
- Compounding and payments
  - Accrued Interest
- Indenture

Treasury Notes and Bonds

- T Note maturities range up to 10 years
- T bond maturities range from 10 – 30 years
- Bid and ask price
  - Quoted in points and as a percent of par
- Accrued interest
  - Quoted price does not include interest accrued

Corporate Bonds

- Most bonds are traded over the counter
- Registered
- Bearer bonds
- Call provisions
- Convertible provision
- Put provision (putable bonds)
- Floating rate bonds
- Preferred Stock
Figure 10.2 Investment Grade Bonds

Innovations in the Bond Market
- Reverse floaters
- Asset-backed bonds
- Pay-in-kind bonds
- Catastrophe bonds
- Indexed bonds
  - TIPS (Treasury Inflation Protected Securities)

10.2 BOND PRICING

Bond Pricing

\[ P_B = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} + \frac{Par\ Value}{(1+r)^T} \]

- \( P_B \) = Price of the bond
- \( C_t \) = interest or coupon payments
- \( T \) = number of periods to maturity
- \( r \) = semi-annual discount rate or the semi-annual yield to maturity

Price of 8%, 10-yr. with yield at 6%

\[ P_B = 40 \times \sum_{t=1}^{20} \frac{1}{(1.03)^t} + 1000 \times \frac{1}{(1.03)^{20}} \]

\[ P_B = 1,148.77 \]

- Coupon = 4% \times 1,000 = 40 (Semiannual)
- Discount Rate = 3% (Semiannual)
- Maturity = 10 years or 20 periods
- Par Value = 1,000
10.3 BOND YIELDS

Bond Prices and Yields
- Prices and Yields (required rates of return) have an inverse relationship
- When yields get very high, the value of the bond will be very low
- When yields approach zero, the value of the bond approaches the sum of the cash flows

Yield to Maturity
- YTM is the discount rate that makes the present value of a bond’s payments equal to its price
- 8% coupon, 30-year bond selling at $1,276.76:

\[ 1,276.76 = \sum_{i=1}^{40} \frac{40}{(1+r)^i} + \frac{1,000}{(1+r)^{40}} \]

YTM is the discount rate that makes the payment of a bond equal to its price.

Alternative Measures of Yield
- Current Yield
- Yield to Call
  - Call price replaces par
  - Call date replaces maturity
- Holding Period Yield
  - Considers actual reinvestment of coupons
  - Considers any change in price if the bond is held less than its maturity

Figure 10.3 The Inverse Relationship Between Bond Prices and Yields

Figure 10.4 Bond Prices: Callable and Straight Debt
10.4 BOND PRICES OVER TIME

Premium and Discount Bonds
- **Premium Bond**
  - Coupon rate exceeds yield to maturity
  - Bond price will decline to par over its maturity
- **Discount Bond**
  - Yield to maturity exceeds coupon rate
  - Bond price will increase to par over its maturity

10.5 DEFAULT RISK AND BOND PRICING
Default Risk and Ratings

- Rating companies
  - Moody’s Investor Service
  - Standard & Poor’s
  - Fitch

- Rating Categories
  - Investment grade
  - Speculative grade

Factors Used by Rating Companies

- Coverage ratios
- Leverage ratios
- Liquidity ratios
- Profitability ratios
- Cash flow to debt

Protection Against Default

- Sinking funds
- Subordination of future debt
- Dividend restrictions
- Collateral

Figure 10.8 Definitions of Each Bond Rating

Figure 10.9 Callable Bond

Issued by Mobil

10.6 THE YIELD CURVE
Term Structure of Interest Rates

- Relationship between yields to maturity and maturity
- Yield curve - a graph of the yields on bonds relative to the number of years to maturity
  - Usually Treasury Bonds
  - Have to be similar risk or other factors would be influencing yields

Figure 10.11 Treasury Yield Curves

Figure 10.10 Yields on Long-Term Bonds

Theories of Term Structure

- Expectations
  - Long term rates are a function of expected future short term rates
  - Upward slope means that the market is expecting higher future short term rates
  - Downward slope means that the market is expecting lower future short term rates
- Liquidity Preference
  - Upward bias over expectations
  - The observed long-term rate includes a risk premium

Forward Rates Implied in the Yield Curve

\[
(1 + y_n) = (1 + y_{n-1})^{\frac{n-1}{n}}(1 + f_n) \\
(1.12)^{\frac{1}{12}} = (1.11)^{\frac{1}{1}}(1.1301)
\]

For example, using a 1 yr and 2 yr rates
Longer term rate, \( y(n) = 12\% \)
Shorter term rate, \( y(n-1) = 11\% \)
Forward rate, a one-year rate in one year = 13.01%
Figure 10.13 Illustrative Yield Curves

Figure 10.14 Term Spread