CHAPTER 6: BOND AND THEIR VALUATING

- Government and corporations borrow money by selling **bonds** to investors
- When government or companies issue bonds, they promise to make a series of **interest payments** and then repay the debt.
- Not all bonds are alike. Each bond has different interest payment and maturity.

1. Bonds characteristics:

- **Bond -** Security that obligates the issuer to make specified payments to the bondholder (A long-term debt of a government or corporation).
- **Coupon -** The interest payments made to the bondholder.
- **Face Value** (Par Value or Principal Value) **-** Payment at the maturity of the bond.
- **Coupon Rate -** Annual interest payment, as a percentage of face value.

Ex: A 5% coupon bond have a face value of $1000 and maturing in 2011.

Each year until the bond matures, the bondholder receives a coupon of $50. When it matures in 2011, the bondholder receives the $1000 face value of the bond plus the final coupon payment.

2. Interest rates and Bond prices:

- A bond is like a package of 2 investments

a) A level stream of coupon payments for each year before it matures

b) The final repayment of the face value

$$\mathbf{PV} = \mathbf{PV\,(coupons)} + \mathbf{PV\,(face\ value)}$$

$$= \mathbf{(coupon\ x\ annuity\ factor)} + \mathbf{(face\ value\ x\ discount\ factor)}$$

$$= \mathbf{I} \times \left[\frac{\mathbf{1}}{\mathbf{r}} - \frac{\mathbf{1}}{\mathbf{r(1+r)^t}}\right] + \mathbf{C} \times \left[\frac{\mathbf{1}}{\mathbf{(1+r)^t}}\right]$$

- When the cash flows are discounted at a rate that is higher than the bond's coupon rate, the bond is worth less than its face value
- When **the interest rate rises**, the **present value of the payments** to be received by the bondholders and **bond prices fall**
- **People sometimes confuse coupon - payment on the bond with interest rate- the return that investors require** => coupon rate is fixed when the bond is issued but the interest rate changes from day to day. These changes affect the present value of the coupon payments but not the payments themselves.

3. Current yield and yield to maturity

Current Yield - Annual coupon payments divided by bond price.

$$\left[\text{Current Yield} = \frac{\text{Coupon payment}}{\text{Bond price}}\right]$$

- A bond that sold above it's face value, are called premium bond.
- A bond that sold below it's face value, are called discount bond.
- Because current yield focuses on current income and ignores prospective price increases or decreases, it doesn't measure the bond's total rate of return.

Yield to maturity – Interest rate for which the present value of the bond's payments equals the price.

- The yield to maturity is a measure of a bond's total return, including both coupon income and capital gain (the change in a bond's value).
- If you buy a bond today and hold it to maturity, your return will be the yield to maturity.
- The only general procedure for calculating yield to maturity is trial and error. You guess at an interest rate and calculate the present value of the bond's payments

4. **Bond rates of return:**

Rate of return – Earning per period per dollar invested.

$$\left[\text{Rate of return} = \frac{\text{coupon income} + \text{price change}}{\text{investment}}\right]$$

- When the **interest rates:**
  + **do not change**: the total return on the bond is equal to the yield to maturity.
  + **rise**: the rate of return will be less than the YTM
  + **fall**: the rate of return will be greater than the YTM

5. **The yield curve:**

Yield curve – Plot of relationship between bond yields to maturity and time to maturity.

- Long-term bonds have higher yield, but its prices fluctuate much more than the price of short-term bonds. Also, short-term investors can profit if the interest rate rise.

6. **Risk of defaults:**

Default (Credit) risk - the risk that a bond issuer may default on its bonds.

Default premium - the additional yield on a bond investor require for bearing credit risk.
Investment grade - bonds rated Baa or above by Moody's, or BBB or above by Standard & Poor's.

Junk bonds or speculative grade - bonds with a rating below Baa or BBB.

- The safety of most corporate bonds can be judged from bond ratings provided by Moody's, Standard and Poor's, or other bond-rating firms.

Sortable Table Key	Moody's	Fitch	S&P
Highest grade credit	Aaa	AAA	AAA
Very high grade credit	Aa1, Aa2, Aa3	AA+, AA, AA-	AA+, AA, AA-
High grade credit	A1, A2, A3	A+, A, A-	A+, A, A-
Good credit grade	Baa1, Baa2, Baa3, Baa4	BBB+, BBB, BBB-	BBB+, BBB, BBB-
Speculative grade credit	Ba1, Ba2, Ba3	BB+, BB, BB-	BB+, BB, BB-
Very speculative credit	B1, B2, B3	B+, B, B-	B+, B, B-
Substantial risks - In default	Caa1, Caa2, Caa3, Ca	CCC, CC, C, RD, D	CCC+, CCC, CCC-, CC, C, D

7. Corporate Bonds:

Coupon bond - bond has a coupon rate of I, after period time received par value.

With:

C: face value

i: interest

$$\mathbf{I = i \times C}$$

$$\left[\mathbf{P_0 = I \times \frac{1 - (1 + r_d)^{-t}}{r_d} + \frac{C}{(1 + r_d)^t}}\right]$$

* **Variations in Corporate Bonds**:

Floating-rate bond – coupon rate changes over time and is tied to some measures of current market interest rates.

Convertible bond – offers holders the right to exchange it for a specified number of shares of common stock.

Consol bond - is a bond that has no maturity and pays a fixed coupon.

$$\left[\mathbf{PV = \frac{C}{r}}\right]$$

Zero-coupon bond - bond has a coupon rate of 0.

$$\left[\mathbf{PV} = \frac{\mathbf{par}}{(\mathbf{1}+\mathbf{r})^{\mathbf{t}}}\right]$$

8. Summary:

- **Coupon:** a fixed interest payment investor receives each year until the bond matures.
- **Coupon rate:** annual coupon payment expressed as a fraction of the bond's face value.
- **Current yield:** annual coupon payment expressed as a fraction of the bond's price
- **Yield to maturity:** measure the average rate of return to an investor who purchases the bond and holds it until maturity, accounting for coupon income as well as the difference between purchase price and face value.