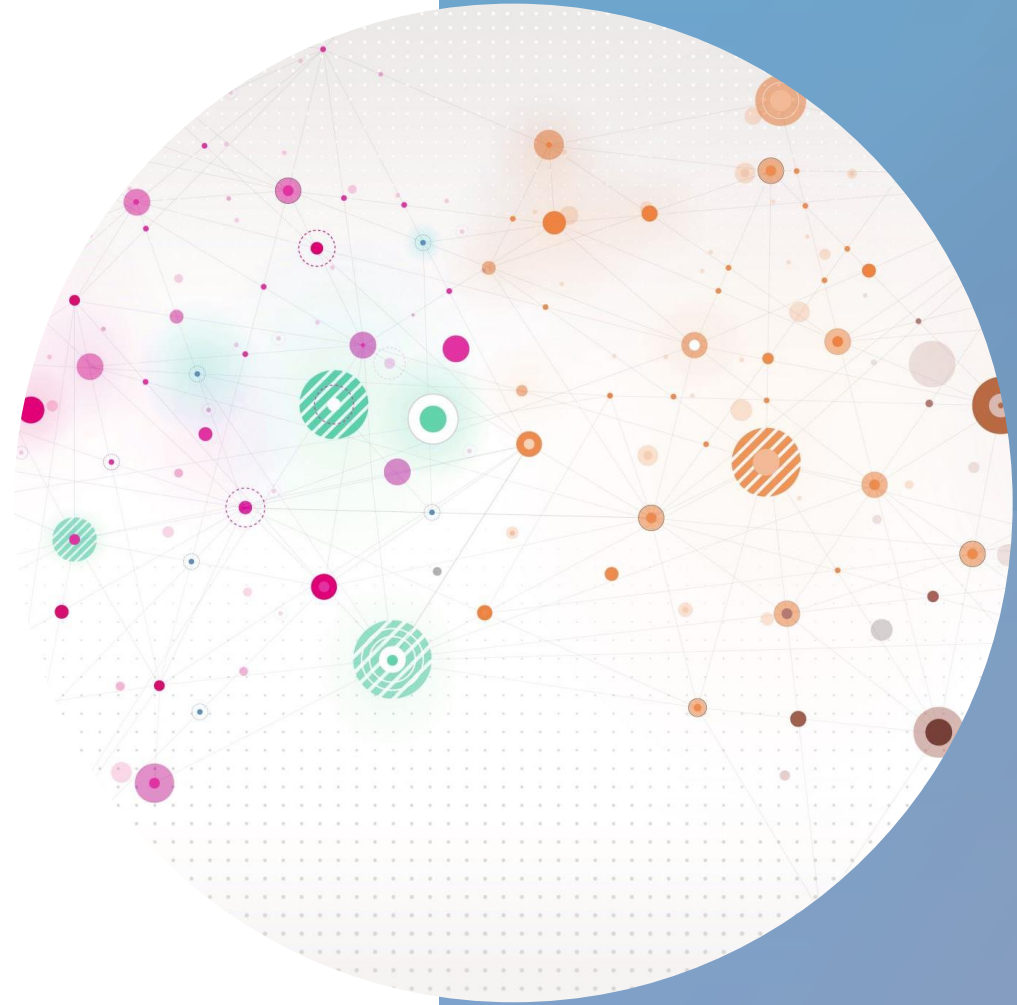


FINANCIAL MANAGEMENT II

WEEK 5: BONDS AND THEIR
VALUATION



BOND- DEFINITION

A bond is a long-term financial contract in which the issuer commits to making interest and principal payments to the bondholders on specified dates.

Note: Issuer means borrower

Bond is a debt instrument.

Corporations and government agencies (treasury, municipalities, etc...) issue bonds.



BOND CONCEPTS AND TERMINOLOGY

Par Value:

- Face value
- Generally it is \$1,000

Coupon Rate:

- Annual interest rate on a bond

Coupon Payments:

- The interest payments made to bondholders

Maturity Date:

- Payments are made until a final repayment date, called the maturity date of the bond. On this date, the par value must be repaid.

Term:

- The time remaining until the repayment date.

Yield to Maturity (YTM):

- The rate of return earned on a bond if it is held to maturity.

TYPES OF BONDS

By Issuer

- Treasury Bonds
- Municipal Bonds
- Corporate Bonds
- Foreign bonds

By Coupon Payment

- Coupon Bonds
- Zero-Coupon Bonds

TYPES OF BONDS BY ISSUER

Treasury bonds:

- commonly known as government bonds,
- Issued by the federal government.
- No default risk.
- Not entirely risk-free due to interest rate changes

Corporate bonds

- Issued by business firms.
- Unlike Treasuries, corporates are exposed to default risk
- Corporate bonds have different levels of default risk depending on the company's and bond's features.

Municipality Bonds:

- Called as munis
- Exposed to default risk
- Risk is lower than corporate bonds
- Having some tax advantages

Foreign Bonds

- Issued by other governments
- Exposed to default risk
- Currency risk

TYPES OF BONDS BY COUPON PAYMENT

Coupon bonds

- Pay investors their face value at maturity.
- Make periodically coupon interest payments (e.g. annual, semiannual)

Zero-coupon bonds

- The investor receives the face value of the bond on the maturity date
- No coupon payment
- Sold at a price below the amount that the investor receives at maturity date. (discounted)
- Prior to its maturity date, the price of a zero-coupon bond is less than its face value.

BOND VALUATION

- The value of a bond is the present value of cash flows from the current time until it matures.
- There are two types of Cash flow in a bond:
- Coupon payments and principal
- The value of bond equals to the sum of present value of coupon payments and principal:
- $P_B = PV (\text{Coupon payments}) + PV (\text{Principal Payment})$
- Thus the value of bond equation is:
- $$= \frac{C_1}{(1+i)^1} + \frac{C_2}{(1+i)^2} + \frac{C_3}{(1+i)^3} + \dots + \frac{C_n}{(1+i)^n} + \frac{F_n}{(1+i)^n}$$
- $$= \frac{C_1}{(1+i)^1} + \frac{C_2}{(1+i)^2} + \dots + \frac{C_n + F_n}{(1+i)^n}$$
- Where $C_{1,2,\dots,n}$ is coupon payments, F_n is principal, i is the market interest rate n is the number of periods until maturity date

EXAMPLE - 1

- A three-year corporate bond (a bond with three years to maturity) with an 10 percent coupon rate and a \$1,000 face value. If the market rate of interest 8% and interest payments are made annually, what is the market price of the bond?

SEMIANNUAL COUPON PAYMENTS

- In Europe, bonds typically pay coupon interest on an annual basis, whereas in the United States, most bonds pay coupon interest semiannually, meaning twice a year.
- To calculate the coupon payment, we multiply the face value of the bond by half of the coupon rate.
- To determine the present value of the coupon payments and the principal, the cash flows are discounted using semiannual market interest rates.
- Accordingly, the equation is:
- $$P_B = \frac{C_1/m}{(1+i/m)^1} + \frac{C_2/m}{(1+i/m)^2} + \dots + \frac{C_n/m + F_{mn}}{(1+i/m)^{mn}}$$
- m is equal to 2 since coupon payments are semiannual.

EXAMPLE - 2

- A three-year corporate bond (a bond with three years to maturity) with a 10 percent coupon rate and a \$1,000 face value. If the market rate of interest 8% and interest payments are made *semiannually*, what is the market price of the bond?

PAR, PREMIUM, AND DISCOUNT BONDS

Par-value bonds:

- bonds that sell at par value, or face value
- It occurs when a bond's coupon rate is *equal* to the market rate of interest on similar bonds

Premium Bonds:

- Bonds sold at prices above par (face) value
- It occurs when a bond's coupon rate is *higher* than the market rate of interest on similar bonds

Discount Bonds

- Bonds sold at prices below par (face) value
- It occurs when a bond's coupon rate is *lower* than the market rate of interest on similar bonds

EXAMPLE - 3

A three-year corporate bond (a bond with three years to maturity) with a 10 percent coupon rate and a \$1,000 face value. If interest payments are made semiannually, what is the market price of the bond, assuming market interest rates are:

- 10%
- 8%
- 12%

VALUING ZERO- COUPON BOND

- As defined earlier, zero coupon bonds have no coupon payments but promise a single payment at maturity which is principal payment. Thus, the price (or yield) of a zero coupon bond is simply a special case of bond valuation equation:
- $$P_B = \frac{F_{mn}}{(1+i/m)^{mn}}$$

EXAMPLE - 4

- A three-year zero-coupon bond (a bond with three years to maturity) has a \$1,000 face value. What is the price of this bond with semiannual compounding when the market interest rate is 8 percent?

YIELD TO MATURITY

- To define mathematically, it is the discount rate that makes the present value of the coupon and principal payments equal to the price of the bond.
- $$P_B = \frac{C_1}{(1+YTM)^1} + \frac{C_2}{(1+YTM)^2} + \frac{C_3}{(1+YTM)^3} + \dots + \frac{C_n}{(1+YTM)^n} + \frac{F_n}{(1+YTM)^n}$$

EXAMPLE

- Suppose you decide to buy a three-year bond with a 6 percent coupon rate for \$960.99. Assume that the coupon payments are made annually. What is yield-to-maturity?