

## LESSON 17

## BONDS

- An evidence of debt issued by a corporation or a governmental body.
- When a corporation (or government) wishes to borrow from public on a long term basis, it does so by issuing or selling debt securities generally called bonds
- A bond represents a loan made by investors to the issuer. In return for his/her money, the investor receives a legal claim on future cash flows of the borrower.
- The issuer promises to:
  - Make regular coupon payments every period until the bond matures, and
  - Pay the face/par/maturity value of the bond when it matures.
- Default - since the abovementioned promises are contractual obligations, an issuer who fails to keep them is subject to legal action on behalf of the lenders (bondholders).
- B Corporation:
  - Wants to borrow \$1,000 for 30 years at 12 % interest rate
  - Will pay  $0.12 \times \$1,000 = \$120$  in interest every year for 30 years.
  - Will repay \$1,000 at the end of 30 years
- B Corporation
  - \$120 regular interest payments are the bond's coupons
  - \$1,000 is the par value or face value of the bond
  - Annual coupon divided by the par value ( $\$120/\$1000 = 12\%$ ) is the coupon rate
  - 30 years is the maturity time

## Bond Values and Yields

- The value of bonds may fluctuate as the interest rates change by time in the market place, though the cash flows from a bond remain the same.
- When interest rates rise, the present value of the bond's remaining cash flows decline and the bond is worth less
- When the interest rates fall, the bond is worth more.
- To determine the value of bond at a particular point in time, we need to know:
  - No. of periods remaining till maturity,
  - The face value,
  - The coupon rate, and
  - The market interest rate for similar bonds
- The interest rate required in the market on bonds is called the bond's Yield to Maturity
- The X Corporation issues a bond with 10 years to maturity having annual coupon of \$80. Similar bonds have a yield to maturity of 8%.
- X bond's cash flows have two components:
  - **an annuity component (coupons) and**
  - **a lump sum (face value paid at maturity)**
- The X Corporation
- At the going interest rate of 8% the present value of \$1,000 paid in 10 years is:

$$PV = \$1,000 / 1.08^{10} = \$1,000 / 2.1589 = \$463.19$$

- Present value of the annuity of 80\$ per year for 10 years is:

$$PV = \$80 \times (1 - 1/1.08^{10}) / 0.08$$

$$PV = \$80 \times 6.7101$$

$$PV = \$536.81$$

The X Corporation

- To get the bonds value we add up both parts

$$\text{Total Bond Value} = \$463.19 + \$536.81$$

$$\text{Total Bond Value} = \$1,000$$

- This means that the bond sells for exactly its face value.

Alternatively,

Years	0	1	2	3	4	5	5	7	8	9	10
Coupon		\$80	\$80	\$80	\$80	\$80	\$80	\$80	\$80	\$80	\$ 80
Face value											\$1000
		<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$80</u>	<u>\$1080</u>

- Interest rate change
- Interest rate risen to 10% after one years (9 years to maturity)
- **Now the present value of \$1,000 paid in nine years at 10% is**

$$\$1,000 / 1.10^9 = \$1,000/2.3579 = \$424.10$$

- **And present value of \$80 annuity for 9 years at 10% is**

$$\$80 \times (1 - 1/1.10^9)/0.10 = \$80 \times 5.7590 = \$460.72$$

- Adding both parts:

$$\text{Total bond value is } \$424.10 + 460.72 = \$884.82$$

- Therefore, the bond should sell for about \$885
- Because the bond sells for less than the going rate, investors are willing to lend something less than \$1,000.
- Because the bond sells for less than face value, it is said to be a discount bond.
- The investor who purchased and kept bond would get \$80 per year and would have a \$115 gain at maturity as well. This gain compensates the lender for below-market coupon rate.

Another way to see why bond is discounted by \$115 is to note that the \$80 coupon is \$20 below the coupon on a newly issued par value bond. So the investor who buys and keeps the bond gives up \$20 every year for 9 years. At 10 % this annuity is worth:

$$\$20 \times (1 - 1/1.10^9)/0.10 = \$20 \times 5.7590 = \$115.18$$

Just as rise of interest rates reflected a decline in the price of the bond, a drop of 2% in interest rates would result in the bond being sold for more than \$1000. Such a bond is said to sell at a premium or is called a premium bond.