



Universidad del Desarrollo
Universidad de Excelencia

Finance I

Fall 2012

Session 21:

Bond Valuation



- ▶ To calculate the present value of future cash flows, we “discount” the future value according to the cost of opportunity it implies.
- ▶ Higher the cost of opportunity, higher the discount, thus, lower the present value.
- ▶ The cost of opportunity depends on the risk-free return, the market risk and the portion of non-diversifiable risk held by the assets.
- ▶ Several formulas can be used as short-cuts to calculate present values of perpetuities and annuities.

2. Bond Valuation

▶ Applies to Fixed Income securities

▶ We'll define a bond as a fixed income security

- Contract that pays a predetermined amount at predefined dates in the future
- “Coupon” is the amount paid in each period
- “Face value” is the amount paid in addition to the coupon at the end of the contract
- “Maturity” is the length of time before the end of the contract
- “Frequency” of payments determines how frequent will be the coupon payments

Examples:

- 3 year maturity, annual coupon at 5%, face value of \$100
- 5 year, quarterly coupon of 1.25, face value of \$100
- 5 year zero coupon, face value of \$100

2. Bond Valuation

- ▶ **The attributes of the bond are fixed (set on the contract).**

- ▶ **But the discount rate (cost of opportunity) changes as the interest rate changes.**

- ▶ **We can calculate the price of the bond by discounting the future cash flows at the appropriate discount rate.**

- ▶ **Price is the present value of the future cash flows generated by the coupon**
 - If the price is below the face value, we say the coupon is “*at a discount*”
 - If the price is the same as the face value, we say the coupon is “*at par*”
 - If the price is above the face value, we say the coupon is “*at premium*”

2. Bond Valuation

- ▶ **If the interest rate increases, the value of the bond...**

- ▶ **If the interest rate decreases, the value of the bond....**

- ▶ **The yield (return) of the bond depends on the price and the future cash flows.**

- ▶ **The impact is different according to whether you own the bond or not**
 - If you own it, your bond is worth less, so if you sell it, your initial investment will yield a lower return

 - If you don't own it, you can buy the cash flow of the bond at a cheaper price, therefore your investment yields a higher return

2. Bond Valuation

- ▶ **If you own a financial calculator, calculating the price of a bond given a certain yield (or the yield given a price) is extremely simple.**

- ▶ **If you don't own a financial calculator, it's just simple... discount the future cash flows at the appropriate discount rate.**

- ▶ **Calculate:**
 - Price of a bond with annual payments of \$5, and face value of \$100 with a maturity of 5 years, using a discount rate of 6%.
 - Price of the same bond, but with only 4 coupons remaining.
 - Is it at a discount or at a premium?

2. Bond Valuation

- ▶ **The sensitivity of the price to changes in the interest rate can be measured by the bond's "duration"**
- ▶ **There are several definitions of duration. We will use the definition presented by BMA**
 - Average time to each payment.
 - 3 year bond, annual payment of 10%, face value of 1000, yield 5%.
 - It measures the sensitivity of the price to changes in the interest rate. Higher duration means a higher sensitivity.
 - Volatility (percentage change in price) = $\text{duration}/(1+\text{yield})$
 - For small changes in the interest rate, you can use the duration to calculate the effect in price, without having to discount the cash flows
 - For a bond with a duration of 2.753 and a yield of 5%, calculate the percentage increase in price due to a 0.5 % decrease in the yield

- ▶ An increase in the interest rate results in a _____ bond price
- ▶ A decrease in the interest rate results in an _____ bond price
- ▶ If the duration of a bond increases, the sensitivity to small interest rate changes _____

▶ **In a few minutes you will receive:**

- Link to this week's assignment (individual response)
- Questions to include in the video

▶ **Quiz 6 on Wednesday. BRING YOUR CALCULATOR**