**Lecture 7 Review**

**Bonds**

Debt

* Debt: a contractual agreement between a borrower and a lender
  + The lender provides capital to the borrower in the form of debt (principal)
  + The borrower uses the capital to fund firm projects or activities and agrees to repay principal plus interest to the lender
* Debt has 4 Basic Characteristics:

1. No ownership or voting rights
2. Maturity date
3. Fixed payments at set dates
4. First claimant

* Bond holders have first claim on the firms assets in the event of bankruptcy
* Long-term debt is usually referred to as bonds
  + Bonds: a fixed income security (constant payment)
    - A fixed income security is less risky for the investor
* Bonds are issued by 4 different sources:

1. US Government

* The US gov’t issues bonds to cover gov’t spending
* Low risk, except time

1. Corporate

* Corporate bonds are issued by firms to finance PPE
* Risk varies depending on the company, but there’s almost always a risk of time and default

1. Municipal

* Municipal bonds are issued by local and state gov’ts to finance projects
* Interest is paid using tax revenue but the tax revenue can be cyclical, leading to default risk

1. International

* International bonds are issued by foreign gov’ts and corporations
* Ex: BMW
* Risk varies but there’s always an exchange rate risk
* Long term debt is generally classified according to whether it is secured by specific physical assets of the issuing company
  + Secured debt issues are usually called mortgage bonds
  + Issues that aren’t secured by specific assets are called debentures or debenture bonds
* A bond creates an agreement or indenture between the bond holder and the bond issuer
  + An indenture details the nature in which the principal must be repaid
* There are 6 key characteristics described in indentures:

1. Name of Firm (issuer)
2. Maturity Date
3. Face Value: value paid at maturity
   1. Typically a $1000 default assumption
4. Coupon Rate: interest rate paid by the bond
   1. Determines the dollar amount paid by the bond every period
5. Payment Dates
6. Call Option: the right for the issuing company to retire the bond before the maturity date
   1. Must pay interest owed plus face value
   2. Companies do this to refinance their debt

Valuing Bonds

Bond Price = PV of cash flows it pays the investor

Bond Price = PV of coupon payments + PV of FV

Annuity Lump Sum

Bond Price = (coupon / rd) x [1-(1/rd)^N] + [Face/(1+rd)^N]

Coupon = (coupon rate) x (FV)

N = time until maturity (forward looking)

r = rd = required return to buy the bond today

The Coupon Rate vs. rd

* rd is dynamic while the coupon rate is fixed

rd = rf + rint + rdr + rliq

* rd is market driven while the coupon rate is historical
* rd sets the price investors will pay while the coupon rate sets the dollars paid by the bond

Bonds and Risk

* Even though bonds are a fixed income security, they have 3 main types of risk:

1. Interest rate risk
2. Default risk
3. Liquidity risk

* The higher the risk facing the bond, the higher the return

Interest Rate Risk (INT / maturity risk / time risk)

* A bond is first issued by a company on the primary market. This is the market where corps transact with investors regarding brand new bonds. Typically, the bonds coupon rates are set equal to the current market interest rates that apply to bonds with similar risk. The coupon payment remains fixed over the bonds life
  + What happens when market interest rates change?
    - The greater the time until maturity, the greater the exposure to changes in the economy. Therefore, the greater the time until maturity, the greater the INT risk and the greater the rint
* Long term events that may cause a change in interest rates:
  + GDP changes
  + War/terrorism
  + Taxes
  + Technology
  + Unemployment
  + Competition
* If interest rates increase, bond prices fall
  + If you have a longer time until maturity, there are more coupons impacted by the higher interest rate which further pushes down the price
* If interest rates fall, bond prices increase by a greater amount as we move further away from maturity
  + With lower rates, investors face more opportunity cost to switch to investments that reflect the new lower rate, so there’s more demand for the bond and the price increases

Default (DR) Risk

* Default Risk: the chance you don’t get paid the interest that’s owed to you
  + The possibility that the borrower wont repay the entire obligation
* There are 2 ways an investor can lose money:

1. Bankruptcy
2. Reorganization (refinancing debt)

* The greater the DR, the greater the rdr
* To estimate default risk before buying a bond, look at the firms credit ratings
  + Moody’s and S&P review companies using a variety of factors and assign a credit rating to their debt (the rating measures the likelihood of default)
  + The rating have 2 basic divisions:
    - Investment-Grade: bonds in the highest four rating categories; these bonds have a low chance of default and carry less risk for the investor
      * Provide a lower yield to maturity
    - Junk-Grade (speculative): the lower rating categories; have a greater chance of failing to make required debt payments and have a corresponding higher yield to maturity
  + As the quality of the grade decline, the chance of default increases so investors require a larger yield to maturity
  + The rating for bonds are based on the state of the company’s financial position (based on balance sheet and income statements)
  + Some criteria for ratings include:
    - Current financials
      * Rating agency reviews current coverage and debt ratios to evaluate current ability to pay interest on debt
    - Project financials
      * Rating agency projects future financing needs and financial ratios for the firm based on growth, the state of the economy, and competition
    - Pending litigation
      * Rating agency looks at pending lawsuits against the firm and evaluates potential to damage ability to repay debt
    - Pending antitrust or environmental issues
      * Rating agency looks at any potential regulation that may hamper the firms commerce
    - Competition
    - Technology factors

Liquidity (LIQ) Risk

* Liquidity: how often the bond trades
  + Bonds don’t trade all the time like stocks
  + Some corporate bonds don’t trade frequently
* The lower the trading frequency, the greater the LIQ risk and the greater the rliq

Bond Pricing

* A bonds price is the PV of the cash flow stream that the bond is expected to generate
  + On a calc:
    - N = number of years until maturity
    - I/Y = discount rate
    - PMT = (coupon rate) x (Face Value)
    - If payments aren’t on a yearly basis, divide I/Y and PMT by m and multiply N by m
  + By hand:
    - Use the PV of a bond formula
* The reality of bond pricing is that we can’t set the price, we pay the market price

Bond Yields

* Yield or Yield-to-Maturity is another name for interest rate or discount rate
  + Y or YTM: annual return if I buy today and hold the bond until maturity
  + By YTM, we refer to the one discount rate that someone can use to capitalize all cash flows and get a PV that’s equal to the bonds price as traded in financial markets
    - Long term investors like to know about YTM
* We find a bonds YTM by solving for I/Y on the calc

Current Yield

* Many investors in bonds are only interested in holding the bond for a short period of time (usually 1 year)
  + These bond holders will only receive the coupon payment generated by the bond for that year, so we need another measure to reflect their return
* Current Yield: the one year return for holding a bond
* Current Yield matters to short-term investors
  + Ex: brokerages, insurance companies, corporations
    - Liquidity investors
* In the calculation of the current yield, we assume the price of the bond doesn’t change over the year

Bond Price Terminology in Relation to Par Value

* We classify bond trading prices based on their relationship to par or face value
  + If the bond price is less than par value, we say the bond is trading at a discount
    - The yield required by investors is greater than the coupon rate on the bond
    - By paying a discounted price, you get a larger yield than you required
  + If the bond price is greater than par value, we say the bond is trading at a premium
    - The yield required by investors is less than the coupon rate on the bond
    - Investor demand increases to own the bond, which pushes up the price
  + If the bond is trading at $1000, we say the bond is trading at par
    - The yield to maturity required by the investor is equal to the coupon rate
    - The cash flows paid by the bond match the risk that investors see in the firm
* Bond yields and bond prices are inversely related
  + When the bond yield goes up, investors pay less due to increased risk

Zero Coupon Bond

* Zero Coupon Bond: a security that pays no interest payments during its life
  + Investor is only promised FV at maturity
* All zero coupon bonds trade at a discount as you pay less than the FV when you purchase the bond
* Largest issuer of zero coupon bonds is US Dep’t of Treasury
  + US Savings Bond
* Motive for issuing a zero coupon bond is that you can defer interest payment until maturity
  + This is appealing for firms with cash constraints but investors may expect a premium for taking the risk
* To solve for a zero coupon bond, we adjust the basic bond pricing formula to remove the coupon payments

P = (Face Value) / (1+rd)^N