

Week 1 – Introduction to Fixed Income Securities

Part 1 – Definition of Fixed Income terminology

- **Bond:** is a debt instrument requiring the issuer/borrower to repay the lender the amount borrowed plus interest over a specified period of time
- A typical (plain vanilla) bond specifies:
 - o A fixed date when the amount borrowed (the principal) is due; and
 - o The contractual amount of interest – frequency and size of interest payment
- Assuming the issuer does not default or redeem the issue prior to maturity date, an investor holding this bond until maturity is assured of a known cash flow pattern
- **Participants in the debt markets:**
 - o **Issuer/Borrower:** The entity that promises to make the payment
 - E.g. Central governments (e.g. US, Australia), Government related agencies (e.g. Fannie Mae and Freddie Mac in US), Municipal government (e.g. NY or Rio de Janeiro in Brazil), Corporations (E.g. Coca-Cola) or supranational governments (e.g. World Bank)
 - o **Lender/Creditor:** The investor who purchases a fixed income debt security
 - o **Intermediaries:** Assist buyers and sellers by making markets e.g. Investment Banks, Commercial Banks, dealers, credit-rating agencies
- **Indenture:** The promises of the issuer and the rights of the bondholders are set forth in great detail in the bond's indenture
 - o Affirmative covenants: These set forth activities that the borrower promises to do e.g. to pay interest and principal on a timely basis
 - o Negative covenants: These set forth certain limitations and restrictions on the borrower's activities e.g. unable to raise debt unless certain tests are satisfied
- **Term to maturity:** the maturity or 'term' of a bond is simply the number of years the debt is outstanding or the number of years remaining prior to the financial principal payment
 - o Bonds can have short (1-5 years), intermediate (5-12 years) and long term (>12 years) to maturity
 - o A bond's maturity is important because 1) it indicates the time period over which interest will be received and the number of years to the principal payment, 2) its relationship to the bond's yield → yield curve, and 3) Price volatility of the bond depends on its term (duration)
- **Par value:** This is the amount that the issuer agrees to repay the bondholder at or by the maturity date. AKA Principal, Face Value, Redemption value, Maturity value
 - o Bonds may trade above the par value (**premium**) or below the par value (**discount**)
- **Coupon rate:** the interest rate the issuer agrees to pay each year. The annual amount of the interest payment made to the bondholder during the term of the bond is called the **coupon**
 - o $\text{Coupon} = \text{Coupon rate} \times \text{Par value}$
 - o Typically paid semi-annually ($\text{Coupon}/2$) but can also be paid annually.
- **Zero-Coupon bonds:** Bonds that are not contracted to make periodic coupon payments. The holder of these bonds realises interest by buying the bond at a substantial discount and then receiving the par value at maturity (the difference being the interest).
- **Step-up notes:** Securities that have coupon rates that increase over time e.g. 5 years 5% and then 6% (single step-up note), or 5% for yr 1, 6% for yr 2, 7% for yr 3 (Multiple step-up note)
- **Deferred Coupon bonds:** Bonds whose interest payments are deferred for a specified number of years. Later interest payments are usually higher to compensate for no interest initially.
- **Floating-Rate securities:** The coupon rate is not fixed but instead it resets periodically according to some reference rate:
 - o $\text{Coupon rate} = \text{Reference rate} + \text{quoted margin}$

- The floater may have restrictions on the maximum coupon rate (cap) or the minimum coupon rate (floor).
- Many inflation linked securities e.g. TIPS exist
- **Inverse floaters:** Unlike floaters, the coupon rate for inverse floaters increases when the reference rate decreases. Thus, an investor who believes interest rates will go down has the opportunity to gain higher coupon rate during inverse floaters.
 - Coupon rate = $K \times L \times (\text{reference rate})$
 - K and L are values specified in the prospectus for the issue e.g. if K is 20%, L is 2 and reference rate is 6% (3 month treasury bond) then:
 - Coupon rate = $20\% - 2 \times 6\% = 8\%$
 - If the reference rate falls to 5%, coupon rate increases to 10%.
 - Note that there is a floor here (if the 3 month T bill exceeds 10% coupon rate would be less than 0, so the floor is 0) and a cap (Coupon rate cannot exceed 20 because T bill rate would have to be less than 0)
- **Accrued interest:** Bond issuers do not disburse coupon interests every day but instead they are typically done semi-annually. If an investor sells a bond between coupon payments and the buyer holds it until the next coupon payment, the buyer will receive the interest earned for the period. The seller thus gives up the interest from the time of the last coupon payment to the time the bond is sold (accrued interest). Generally, the bond buyer must pay the bond seller the accrued interest.
 - **Full price/Dirty Price** = bond price + accrued interest
 - **Price/Clean price** = bond price only
- **Callable bonds:** A bond issue that gives **the issuer a right** to call/retire an issue **prior to the stated maturity date**
 - Thus, a **call provision** in a bond's contract effectively allows the issuer to alter the maturity of a bond
 - **Advantages for issuer:** Allows issuers to replace an old bond issue with a lower-interest cost issue if interest rates in the market decline
 - The price which the issuer must pay to retire the issue is referred to as the call price/redemption price.
 - This can be 1) fixed regardless of the call date, 2) based on a price specified in the call schedule or 3) based on a make-whole premium provision
- **Convertible bond:** an issue that grants the bondholder the right to convert the bond for a specified number of shares of common stock
- **Put provision:** grants the bondholder the right to sell the issue back to the issuer at a specified price on designated dates
 - **Advantage for bondholder:** If interest rates rise (Resulting in the bond's price dropping), the bondholder can exercise their right to sell the issue to the issuer and redeem the par (typically unless price schedule given)
- **Embedded options:** These are options that are embedded in the issues (i.e. provisions in the indenture) rather than stand alone options purchased over the counter.
 - Embedded options granted to issuers (mostly linked to IRs):
 - Right to call the issue (callable bonds)
 - Right of the underlying borrowers in a pool of loans to prepay principal above the scheduled principal payment
 - The accelerated sinking fund provision
 - A cap on a floater
 - Embedded options granted to bondholders:
 - Conversation privilege
 - The right to put the issue
 - Floor on a floater

- **Issues with embedded options:**
 - One of the reasons fixed income securities have become more complex since the 1980s is due to embedded options which make projection of cash flows more difficult
 - The cash flow for a fixed income security is defined as = interest + principal payments
 - To value a fixed income security with embedded options, we need to:
 - 1) model the factors that determine whether or not an embedded option will be exercised over the life of the security
 - 2) for option granted to issuer/borrower, model the behaviour of issuers and borrowers to determine the **conditions** necessary for them to exercise the embedded options
 - Note that embedded options affect the value AND the total return of the bond.