Ch. 3: Fixed Income Securities

IME 611

Fixed Income Securities

- **Financial Instruments** Bonds, annuities, futures, mortgages etc.
  - Traded as a piece of paper or entry in a database
  - Value derived from their promises

- If there is a well-developed market for an instrument, for its trading, then that instrument is termed a **security**

- **Fixed income securities** are financial instruments that are traded in market
  - Promise a fixed income to the holder over a span of time and the eventual return of principal at maturity

Fixed Income Securities

- **Savings Deposits**
  - **Demand deposits** – depositors can withdraw any or all of funds without penalty or prior notice. Interest rate depends on market conditions – regular checking, and savings account
  - **Term (time) deposits** – deposit is maintained for a given length of time and the interest is guaranteed
    - Certificate of deposits (CD) – like term deposits, offered by banks that offer an interest premium for a fixed deposit for a given time period

Fixed Income Securities

- **Money Market Instruments** Money market refers to the market for short-term (1 year or less) loans by corporations and financial intermediaries
  - Commercial papers – unsecured loans to corporations

- **Government Securities** – means to obtain loan
  - **Treasury bills** short-term fixed maturity, can be redeemed easily prior to the maturity
  - **Treasury notes** maturities of 1 to 10 years, a coupon payment every 6 months until maturity
  - **Treasury bonds** maturities of more than 10 years, similar to treasury notes

Fixed Income Securities

- Other Bonds
  - **Zero-coupon bonds** Gives face value of the bond upon reaching maturity
  - **Municipal bonds** Issued by state and local governments - NHAI
  - **Corporate bonds** Issued by corporations

Fixed Income Securities

- Mortgages
  - A future homeowner *sells* a home mortgage to generate immediate cash to pay for a home. It is structured so that equal monthly payments are made throughout its term.
  - Allows for early repayment – the income stream is not completely fixed
  - Usually a contract between two parties
  - Mortgages can be bundled into large packages and traded among financial institutions – called **Mortgage-Backed Securities**

Fixed Income Securities

- Annuities
  - A contract that pays the holder (the annuitant) money periodically (usually annually hence the term annuity), for a fixed period
  - Many variations, for example pension benefits
    - Periodically pay a fixed amount until a random time, T.

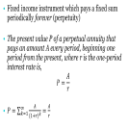
Value Formulas: Perpetual Annuities

- Fixed income instrument which pays a fixed sum periodically *forever* (perpetuity)

- *The present value P of a perpetual annuity that pays an amount A every period, beginning one period from the present, where r is the one-period interest rate is,*

$$P = \frac{A}{r}$$

- $P = \sum_{k=1}^{\infty} \frac{A}{(1+r)^k} = \frac{A}{r}$



Finite-life Streams

- If the stream consists of n periodic payments of amount A, then

$$P = \sum_{k=1}^{n} \frac{A}{(1+r)^k} = \frac{A}{r}\left[1 - \frac{1}{(1+r)^n}\right]$$

- Professional tables as a function of $\frac{P}{A}$, r and n
- **Amortization:** the process of substituting periodic payments (A) for a current obligation (P)

Loan Calculation

- Suppose you borrow ₹100,000 from the local bank. You repay it monthly at the yearly interest rate of 12% compounded monthly over 5 years. How much are the monthly payments?
- $n = 60, r = 1\%, P = ₹100{,}000$ therefore $A = ₹2224.5$

Purchase of a New Machine

- The purchase of new machine for ₹100,000 (at $t = 0$) is expected to generate revenues of ₹25,000 for the next 10 years starting at year 1. Is this a profitable investment at discount rate of 16%
  - NPV of the project ₹ 1,20,830.69
  - Annuity for the project ₹ 20690.11 < ₹25,000

Annual Percentage Rate (APR)

TABLE 3.1
MORTGAGE BROKER ADVERTISEMENT

Rate	Pts	Term	Max amt	APR
7.625	1.00	30 yr	$203,150	7.883
7.875	.50	30 yr	$203,150	8.083
8.125	2.25	30 yr	$600,000	8.399
7.000	1.00	15 yr	$203,150	7.429
7.500	1.00	15 yr	$600,000	7.859

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- **APR** describes fee and expenses
- **Points** is the % of the loan amount that is charged for providing the mortgage
- Example: consider the first entry, it has monthly payment $A =$ ₹1474
  - Using $r = \frac{0.07625}{12}$, and $A =$ ₹1474, total payment is, ₹208,267
  - Total fee and expenses are $208{,}267 - 203{,}150 = 5{,}117$
  - The loan fee is 1 point, i.e., 2032
  - Hence, other expenses are: 5117-2032=3085