Net Present Value (Time Value of Money)

Relationship between $s today and $s tomorrow?

Future Value, Present Value, Non-Annual Compounding, Annuities and Perpetuities

Multiple Cash Flows, Compounding Periods

- Receive $100 in year 1, $300 in years 2 & 3, and -$50 in year 4; Find PV @ 10%
- FV of $300 in 4 yrs. @12% compounded monthly?
- PV of $400 to be received in 3 yrs. @11% compounded daily?
- EAR: Rate on an annual basis that *REFLECTS* compounding effects; $EAR = (1+r/m)^m - 1$;
- EAR of @14% compounded quarterly?
- FV of $100 in 2 yrs. @12% continuously compounded?

Annuities and Perpetuities

- Annuity: A series of *equal cash flows* at *equal intervals of time.*
- Perpetuity: an infinite annuity; PV? FV?

  PV = C/r
- Growing Perpetuity: PV = C/(r-g)
  - C is the CF 1 period from today
  - In real-world, can the CFs actually grow @ constant rate forever?

Annuities-- continued

- A Delayed Annuity
- e.g.: Beginning in year 6, you will receive $100/year for 4 years; I/R = 10%
  1. Find the PV of the annuity in the period **Prior to** the beginning date of the annuity
  2. Find the PV of the lump-sum

Annuities-- continued

- Annuity in advance (annuity due) vs. Annuity in arrears (ordinary)
  - Which is more valuable?
- Infrequent Annuities; e.g., an annuity of $100/2 years for 10 years @8%
  - rate/2 years = ??
- H.W. 3, 5-7, 12-17, 19-21, 25, 30, 32, 36, 41, 47, SUSIE problem

Additional Practice Problems

- You are 25 years old. You intend to work for 30 years and deposit in an IRA $2,000/year. You will discontinue working and depositing money in the IRA at the age of 55. However, you can only begin to withdraw money from the IRA when you are 65. How much will be in the IRA account when you turn 65? Assume an interest rate of 8%
- You owe $3,000 on a credit card; The card charges you an I/R of 2% per month. If you make the minimum monthly payment of $75, how long will it take for you to pay it off? What if you were to pay an additional $25 every month?

SUSIE Problem

- Your younger sister, Susie, will start college in five years. She has just informed your parents that she wants to go to Collegiate U., which will cost $8,000 per year for four years (assumed to come at the end of each year). Anticipating Susie's ambitions, your parents started investing $1,000 per year five years ago and will continue to do so for five more years. How much **more** will your parents have to invest each year for the next five years to have the necessary funds for Susie's education? Use 10 percent as the appropriate interest rate throughout this problem (for discounting or compounding).
- Susie (from Problem 1) is now 18 years old (five years have passed), and she want to get married instead of going to school. Your parents have accumulated the necessary funds for her education. Instead of her schooling, your parents are paying $2,433 for her current wedding and plan to take a year-end vacation costing $4,000 per year each year for the next three years. How much will your parents have at the end of three years to help you with graduate school, which you will start then? You plan to work on a master's and perhaps a Ph.D. If graduate school costs $5,450 per year, approximately how long will you be able to stay in school based on these funds?