Present Value and Annuities

Chapter 3 Cont’d

Present Value

- Helps us answer the question:

  What's the value in today's dollars of a sum of money to be received in the future?
- It lets us strip away the effects of inflation…can also be used to determine how much to pay for stocks and bonds.

Discount Rate

- Inverse compounding—the interest rate used to bring future dollars back to the present.

Finding the Present Value Equation

Start with:

$$FV = PV (1 + i)^n$$

Solve for PV

Present-Value Interest Factor

- The value $[1/(1+i)^n]$ used as a multiplier to calculate an amount's present value.
- Table 3.3, pg. 70 Appendix B

Present Value Example 1

- You're on vacation in Florida and you see an advertisement stating that you'll receive $100 simply for taking a tour of a model condominium. However, when you investigate, you discover that the $100 is in the form of a savings bond that will not pay you the $100 for ten years. What is the present value of $100 to be received ten years from today if your discount rate is 6 percent?

Present Value Example 2

- Let's consider the impatient son of wealthy parents who wants his inheritance NOW! He's been promised $500,000 in 40 years. Assuming the appropriate discount rate is 6 percent, what is the present value of the $500,000?

- Keep in mind that there is really only one time value of money equation…the logic behind both equations is the same:

  To adjust for the time value of money, we must compare dollar values, present and future, in the same time period.

Stop & Think pg. 73

To this point,

- We’ve been examining single deposits—moving them back and forth in time…

Now…Annuities

- Annuity—a series of equal dollar payments coming at the end of each time period for a specified number of time periods.
  - Examples: mortgage payments, pension funds, insurance obligations, and interest received from bonds

Compound Annuities

- Compound Annuity—an investment that involves depositing an equal sum of money at the end of each year for a certain number of years and allowing it to grow.
  - Examples: saving money for education, a new car, or a vacation home

Future Value of an Annuity

- FV_n = PMT (FVIFA)

  where,

  FV_n = Future Value of an Annuity

  PMT = Annual Payment

  FVIFA = Future-Value Interest Factor of an Annuity (Table 3.5, pg. 74/Appendix C)

Future Value of an Annuity Example 1

- To provide for a college education you are going to deposit $500 at the end of each year for the next five years in a bank where it will earn 6 percent interest, how much will you have at the end of five years?

Future Value of an Annuity Example 2

- Rather than ask how much you'll accumulate if you deposit an equal sum in a savings account each year, a more common question is, how much must you deposit each year to accumulate a certain amount of savings?

Example 2 Cont'd

- For example, you may know that you'll need $10,000 for education in eight years. How much must you put away at the end of each year at 6 percent interest to have the college money ready?

Present Value of an Annuity

- PV_n = PMT (PVIFA)

  where,

  PV_n = Present Value of an Annuity

  PMT = Annual Payment

  PVIFA = Future-Value Interest Factor of an Annuity (Table 3.7, pg. 77/Appendix D)

Present Value of an Annuity Example 1

- As part of a class action law suit settlement against Lee's "Press On Abs" (they caused a nasty rash), you are slated to receive $1,000 at the end of each year for the next ten years. What is the present value of this ten-year, $1,000 annuity discounted back to the present at 5%?

Amortized Loans

- You're not always on the receiving end of an annuity. More often, your annuity will involve paying off a loan in equal installments over time.
  - Examples: car loans and mortgages

Amortized Loan Example 1

- Suppose you borrowed $16,000 at 8 percent interest to buy a car and wish to repay it in four equal payments at the end of each of the next four years.

Perpetuities

- Perpetuity—an annuity that continues forever.
- PV = PP/i

  where,

  PV = the present value of the perpetuity

  PP = the annual dollar amount provided by the perpetuity

  i = the annual interest (or discount) rate

Perpetuity Example 1

- What is the present value of a perpetuity that pays a constant dividend of $10 per share forever if the appropriate discount rate is 5 percent?