Topic 2: The Time Value of Money: Compounding and Discounting
07-Sep-2018

***   Topic 2 contains the key information that we want all MBAs to understand by the first day of class in October. If you are new to finance, take your time with this topic.

Intro: This otherwise good introductory video is marred by an unfortunate choice of words. I've brought the language to the company's attention and suggest they remove it. Please accept our apologies regarding language.

2.1   Good intro

2.2   All calculators are different. We suggest using Excel for calculations if you are new to finance. Please see examples on the "Excel" page at the end of these notes.

In the examples, the presenter progresses very quickly to using calculator functions when solving the problems. It may be useful for students to pause a video and solve some problems manually (as they do in the 1st video of Section 2.2) and then solve again with Excel. Doing a problem manually will help clarify what is going on when you enter numbers into either a calculator or into Excel.

Don't worry about references to "Chapter 5" or "Chapter 6" in the 2nd video. You don't have the textbook mentioned and you definitely don't need it.

Please ignore knowledge check question #3 "Holding all else equal …" We find the wording confusing and the learning value marginal.

2.3   This section mentions "Effective Yield". Heads up for October: In our class (FIN 502) I will use the term "EAR" or "Effective Annual Rate". They are the same.

Paragraph 2, 3rd Sentence: This is the first time the term "discount factor" is used. The discount factor is related to the discount rate and number of years (periods) that one is discounting. For a single cash flow that is promised to be paid 8 years from today. If the discount rate is 5.5%, then the discount factor is: $DF_8 = 1 / (1.055)^8 = 0.6516$

Discount factors are discussed more if you read on in this section.

Entering numbers into a calculator and notation can cause some confusion. At times, the presenters discuss inputs as follows:

> PV = 10,000
> N = 3
> I/Yr = 12
> Solve PMT = -4,163.49

Some/many calculators have you enter numbers by first putting the value and then the key or register. For the same problem as above, one may type the following key strokes:

> 10,000 PV
> 3 N
> 12 I/Yr
> Solve PMT = -4,163.49

Present value of an annuity:

Consider annual cash flows of $60 and a discount rate 5.5%. The PV of a perpetuity ($1,090.9) is much larger than the PV of an 8 year annuity ($380.1). However the PV of a perpetuity is almost the same as the PV of a 200 year annuity. Why?

You might hear or read something like: "Look at the annuity formula when n goes to infinity." What does this mean? First, understand that we can write $(1 / (1+i))^n$ as $(1 / (1+i)^n)$, it means the same thing. Second, if the discount rate is greater than zero, then as "n" gets bigger and bigger, the term $(1 / (1+i)^n)$ gets closer and closer to zero. The net result is that the PV of the perpetuity and the PV of a 200 year annuity are almost exactly equal.

2.4   Disregard references to "the text". If you want to learn about something (say a "perpetuity") go online to Investopedia. You can easily Google terms such as:

> "Investopedia Perpetuity"
>   or
> "Investopedia Annuity Due"

Excel Example:

Many financial problems can be done on a financial calculator using the "four of five inputs" method. A similar method applies to Excel as well. You give your calculator or Excel four numbers, then ask for the fifth and … voila … you get an answer. The five inputs are mentioned in the Topic 2 videos. In Excel the five possible inputs are:

NPER: Number of periods
RATE: Rate per period
PV: Present value
FV: Future value (or extra amount on top of final period's payment)
PMT: Payment made each period (same amount each period)

Here is one of the knowledge check problems: "A bank recently quoted you an annual interest rate of 5% on an automobile loan for a new sedan that is currently priced at $28,950. If the length of the loan is 6 years (or 72 months), what will your monthly payment be?"

To do this problem in Excel, first understand that we are being asked to solve for the monthly payment (PMT). This means we need to supply the other four inputs. They are:

RATE: $0.05 / 12 = 0.4166667\%$
NPER $6 \times 12 \quad = \quad 72$
PV $= \quad 28,950$ Number is positive because the bank gives you a loan
FV $= \quad 0$ The loan will be fully paid by the end of six years
                                                There is no extra amount you owe

Here is the Excel formula:

= PMT(RATE, NPER, PV, FV)

= $-466.24   The answer is negative indicating that you pay the bank
                                              this amount each month.

Please download and look over the associated Excel file