3.8: Non-Annual Compounding

The more frequently interest is compounded, the greater the effective yield on our savings. Many banks use non-annual compounding periods (monthly, daily, etc). In order to make comparisons, we must find the effective annual yield. This tells us how much we are earning on an annual basis.

Using a Formula to Find the Effective Annual Yield

The formula for effective annual yield is as follows:

$$k_{eff} = \left(1 + \frac{k_{nom}}{m}\right)^{m} - 1$$

where

k_{eff} is the effective annual yield
k_{nom} is the nominal or stated yield
m is the number of compounding periods per year

For example, what is the effective interest rate of 8% compounded daily?

$$k_{eff} = \left(1 + \frac{0.08}{365}\right)^{365} - 1$$

Note: Be careful not to round when you take .08/365 or you will end up with significant error after compounding it 365 times.

Using a Calculator to Find the Effective Annual Yield

As an alternative, you could use your financial calculator to find the effective interest rate. Again, using 8% compounded daily.

Calculator Steps to Find the Effective Annual Yield

HP10BII	TI-BAII+	TI-83/84
Step 1: 365 SHIFT P/YR Step 2: 8 SHIFT NOM% Step 3: SHIFT EFF%	Step 1: 2nd I Conv I Conv is the shift of the 2 key Step 2: 8 Enter ↓↓ Step 3: 365 Enter ↑ Step 4: Press the CPT key	Go to APPS⇒Finance⇒ Step 1: Select EFF(Step 2: Enter the given information in the following format: EFF(NOMINAL RATE,COMPOUNDING PERIODS PER YEAR) EFF(8,365) Step 3: Press SOLVE

Solution 8.33%.

Note for HP-10BII+: You have changed your payments per year when doing this calculation. If you go back to another TVM problem, be sure to reset your payments per year to one.

✔ Example 3.8.3: Solve a Problem Involving Non-Annual Compounding

We could also look at non-annual compounding with loans or investments. For example, consider a mortgage loan. You are borrowing $80,000 at an 8% rate with monthly payments for 30 years (note that non-annual annuities and lump sums work best with calculators), what is your monthly payment?

Solution

Step 1: Convert your calculator to monthly payments by entering 12 P/YR
Step 2: -80000 PV
Step 3: 8 I/YR
Step 4: 360 N (30 years at 12 months per year)

Step 5: 0 FV
Step 6: PMT

Solution = $587.01 per month

Be VERY careful if you change your payments per year to change it back to 1 P/YR when you are done. Also, each calculator is slightly different in how it sets the periods per year. Be sure to review the Setting up Your Financial Calculator in Appendix B for calculator specific instructions.
