

# APR and Present Value of Cash Flows

- An APR is an annual discount rate that computes the income you will earn over a year.
- In that year you will earn several interest payments but you do not re-invest them.

- The APR will provide you with 2 pieces of information:
  - The Annual Interest Rate
  - How many interest payments you are due every year (compounding periods)
  - Example: The loan charges monthly payments with an APR of 12%

- The APR is not a correct measure of the annual return you earn (or have to pay)
- The correct annual return must include the compounding effect coming from all the intermediate interest happening inside the year.

- The APR is only the correct measure of return for the compounding period expressed in the rate
  - Example: An APR of 12% compounded monthly means that you earn 1% per month.
- You just need to divide the APR by the number of compounding periods.

- The true interest you earn after one year will be the compounded effect of the interest earned in each compounding period, compounded as many times as many compounding periods there are.
  - Example: 1% per month actually means 12.68% per year.
- This interest rate is called the Effective Annual Rate (EAR)

# APR and Present Value

- The Present Value calculations rely on the compounding of interest principle.
- For this reason, using an APR to discount future cash flows is wrong.
- You need to use an Effective Rate that covers the length of time in between Cash Flows

- Beginning with an APR, the determination of the correct discount rate is done in two steps.
- Three possible cases
  - The timing of Cash flows is the same as the compounding periods of the APR
  - The timing of Cash Flows is less frequent than the compounding periods of the APR
  - The timing of Cash Flows is more frequent than the compounding periods of the APR

- Example 1: You have monthly Cash Flows and the appropriate discount rate is 12% APR compounded monthly
  - Step 1: Determine monthly rate from APR
$$12\%/12=1\%$$
  - Step 2: Done! Use the 1% as discount rate for Cash Flows

- Example 2: You have quarterly cash flows and the appropriate discount rate is 12% compounded monthly
  - Step 1: : Determine monthly rate from APR
$$12\%/12=1\%$$
  - Step 2: Determine Effective quarterly rate
$$(1.01)^3-1=3.03\%$$

- Example 3: You have monthly cash flows and the appropriate discount rate is 12% compounded quarterly
  - Step 1: : Determine quarterly rate from APR
$$12\%/4=3\%\%$$
  - Step 2: Determine Effective monthly rate
$$(1.03)^{(1/3)}-1=0.99\%$$