

What is the difference between effective interest rates and nominal interest rates?

Nominal interest rate is also defined as a *stated* interest rate. This interest works according to the simple interest and does not take into account the compounding periods.

Effective interest rate is the one which caters the compounding periods during a payment plan. It is used to compare the annual interest between loans with different compounding periods like week, month, year etc. In general stated or nominal interest rate is less than the effective one. And the later depicts the true picture of financial payments.

The nominal interest rate is the periodic interest rate times the number of periods per year. For example, a nominal annual interest rate of 12% based on monthly compounding means a 1% interest rate per month (compounded). A nominal interest rate for compounding periods less than a year is always lower than the equivalent rate with annual compounding (this immediately follows from elementary algebraic manipulations of the formula for compound interest). Note that a nominal rate without the compounding frequency is not fully defined: for any interest rate, the effective interest rate cannot be specified without knowing the compounding frequency *and* the rate. Although some conventions are used where the compounding frequency is understood, consumers in particular may fail to understand the importance of knowing the effective rate.

Nominal interest rates are not comparable unless their compounding periods are the same; effective interest rates correct for this by "converting" nominal rates into annual compound interest. In many cases, depending on local regulations, interest rates as quoted by lenders and in advertisements are based on nominal, not effective interest rates, and hence may understate the interest rate compared to the equivalent effective annual rate.

The term should not be confused with simple interest (as opposed to compound interest) which is not compounded.

The effective interest rate is always calculated as if compounded annually. The effective rate is calculated in the following way, where i_e is the effective rate, r the nominal rate (as a decimal, e.g. 12% = 0.12), and "m" the number of compounding periods per year (for example, 12 for monthly compounding):

$$i_e = (1 + r/m)^m - 1$$

The following two tables will illustrate the terminologies commonly used for i_e and r .

TABLE 3.1 Various Interest Statements and Their Interpretations

(1) Interest Rate Statement	(2) Interpretation	(3) Comment
$i = 12\%$ per year	$i = \text{effective } 12\%$ per year compounded yearly	When no compounding period is given, interest rate is an effective rate, with compounding period assumed to be equal to stated time period.
$i = 1\%$ per month	$i = \text{effective } 1\%$ per month compounded monthly	
$i = 3\frac{1}{2}\%$ per quarter	$i = \text{effective } 3\frac{1}{2}\%$ per quarter compounded quarterly	
$i = 8\%$ per year, compounded monthly	$i = \text{nominal } 8\%$ per year compounded monthly	When compounding period is given without stating whether the interest rate is nominal or effective, it is assumed to be nominal. Compounding period is as stated.
$i = 4\%$ per quarter compounded monthly	$i = \text{nominal } 4\%$ per quarter compounded monthly	
$i = 14\%$ per year compounded semiannually	$i = \text{nominal } 14\%$ per year compounded semiannually	
$i = \text{effective } 10\%$ per year compounded monthly	$i = \text{effective } 10\%$ per year compounded monthly	If interest rate is stated as an effective rate, then it is an effective rate. If compounding period is not given, compounding period is assumed to coincide with stated time period.
$i = \text{effective } 6\%$ per quarter	$i = \text{effective } 6\%$ per quarter compounded quarterly	
$i = \text{effective } 1\%$ per month compounded daily	$i = \text{effective } 1\%$ per month compounded daily	

TABLE 3.2 Specific Examples of Interest Statements and Interpretations

(1) Interest Rate Statement	(2) Nominal or Effective Interest	(3) Compounding Period
15% per year compounded monthly	Nominal	Monthly
15% per year	Effective	Yearly
Effective 15% per year compounded monthly	Effective	Monthly
20% per year compounded quarterly	Nominal	Quarterly
Nominal 2% per month compounded weekly	Nominal	Weekly
2% per month	Effective	Monthly
2% per month compounded monthly	Effective	Monthly
Effective 6% per quarter	Effective	Quarterly
Effective 2% per month compounded daily	Effective	Daily
1% per week compounded continuously	Nominal	Continuously

Significance:

- Effective and nominal interest rates allow banks to use the number that looks most advantageous to the consumer. **When banks are charging interest, they advertise the nominal rate, which is lower and does not reflect how much interest the consumer would owe on the balance after a full year of compounding.** On the other hand, with deposit accounts where banks are paying interest, they generally advertise the effective rate because it is higher than the nominal rate. Therefore, if you were to borrow money at 8 percent APR and immediately deposit it in an account at 8 percent APY, the deposit account will have less money at the end of the year than you owe on the debt.