Annual Percentage Rate APR

The annual percentage rate (APR) is an interest rate that is considered to be the ‘mathematical true-rate of interest for a given time period.

To get a better idea of how APR works, we could compare APR to the standard rate of Interest.

Example 1

*Note: This scenario is total fiction, but the mathematics behind the analogy is correct when using the following formula.*

A bank gives a standard interest to its deposit account holders at a basic rate of 4% per annum and interest is paid over a 5 year period. However, the bank gives APR to a select few of deposit holds. The term is also for 5 years, but the APR is calculated every month per annum.

Standard rate:

Principal amount = €15,000

Using:

P (1+i) ⁿ = F

4% ÷ 100 = ·04

€15,000(1+·04) ^5

Total after 5 years = €18,249·80

APR:

i = (1+ (r÷ m)) ^m – 1

i = APR interest per annum

r = Standard rate of interest

m = number of APR calculations per annum

i = (1+(·04÷12))^12 – 1

i=(1+·0033´)^12 – 1

i=(1·040326) – 1

i=·040326

Or

i = **4·0326%**

Using the standard rate formula again:

P (1+i) ⁿ = F

€15,000(1+·040326) ^5

Total after 5 years = €18,278·41

This produces an addition of **€28·61** compared to the standard rate. Doesn’t seem much, but if the amount is large and over a long period, the interest soon mounts up, especially if you are paying the interest instead of receiving it.

For mortgages, with the high number of payments over a longer period, the interest is applied many more times. This has the effect for a repayment mortgage with very little of the initial sum being repaid and most of the payment is interest. Only as the loan comes to the end of its term does the initial sum borrowed reduce at a higher rate.

For our calculations we will use the previous formulae, but APR in Ireland compared to other counties could be calculated differently.

In essence, the interest on the interest is calculated more frequently using APR when compared to the standard rate of interest, so naturally will produce more interest.