

Effective Interest Rates

Extract from Study Design:

- *difference between nominal and effective interest rates and the use of effective interest rates to compare investment returns and the cost of loans when interest is paid or charged, for example, daily, monthly, quarterly*

Previously we have looked at paying off a loan at a set interest rate, however we have found the amount of interest paid would vary with different compounding terms (daily, weekly, monthly, etc.). The **effective annual interest rate** is used to compare the annual interest between loans with these different compounding terms.

To calculate the effective annual interest rate, use the formula:

$$r = \left(1 + \frac{i}{n}\right)^n - 1$$

where

r = the effective annual interest rate

i = the nominal rate, as a decimal

n = the number of compounding periods per year

Now let's use the effective interest rate formula to compare loans with different compounding periods.

Example

Liana wants to invest her money, she has done some research and found the best offers from four different Financial Institutions. They are:

Bank 1: 8.60% p.a. compounded daily; **Bank 2:** 8.70% p.a. compounded fortnightly;

Bank 3: 8.65% p.a. compounded monthly; **Bank 4:** 8.75% p.a. compounded quarterly

Which bank should Liana choose if she wants to earn the most interest?

Bank 1: 8.60% p.a. compounded daily	Bank 2: 8.70% p.a. compounded fortnightly	Bank 3: 8.65% p.a. compounded monthly	Bank 4: 8.75% p.a. compounded quarterly
$i=0.0860$	$i=0.087$	$i=0.0865$	$i=0.0875$
$n=365$	$n=26$	$n=12$	$n=4$
$r = \left(1 + \frac{0.0860}{365}\right)^{365} - 1$	$r = \left(1 + \frac{0.087}{26}\right)^{26} - 1$	$r = \left(1 + \frac{0.0865}{12}\right)^{12} - 1$	$r = \left(1 + \frac{0.0875}{4}\right)^4 - 1$
$r = 0.08980$	$r = 0.09074$	$r = 0.09001$	$r = 0.09041$
$r = 8.98\%$	$r = 9.07\%$	$r = 9.00\%$	$r = 9.04\%$
effective interest is: 8.98% p.a.	effective interest is: 9.07% p.a.	effective interest is: 9.00% p.a.	effective interest is: 9.04% p.a.

Liana should choose **Bank 2** as it pays the **highest** effective interest rate of **9.07%** and will therefore pay more interest.