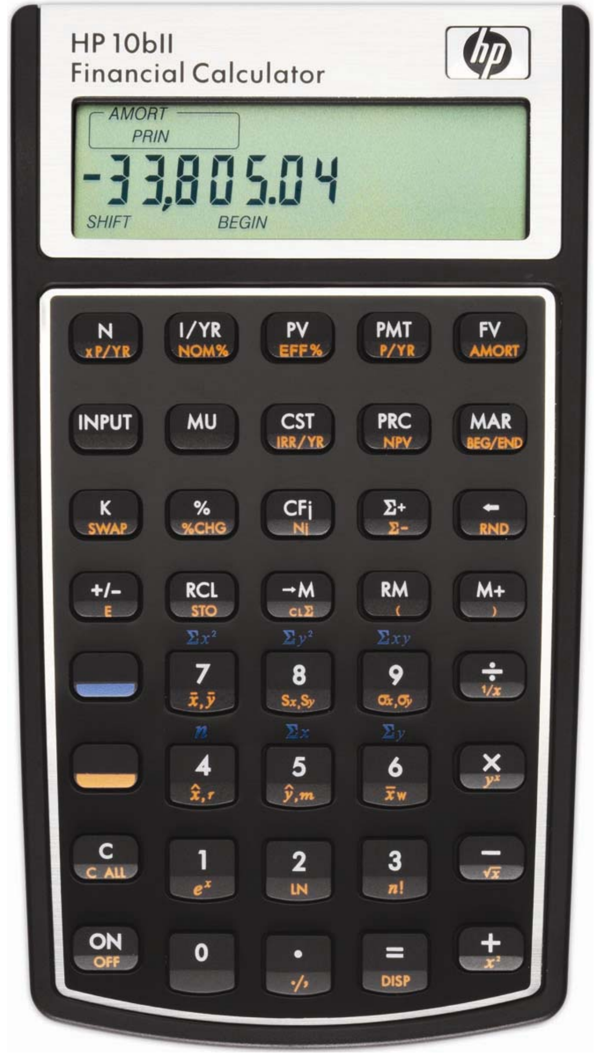
hp calculators

HP 10BII Interest rate conversions

Converting interest rates

Converting interest rates on the HP 10BII

Practice converting interest rates



Converting interest rates

There are many situations where an interest rate with a specified compounding frequency must be converted into an equivalent rate with a different compounding frequency. Examples include situations where a need exists to compare alternative interest rates with different compounding frequencies and where the payment frequency does not match the compounding frequency in an annuity problem.

The basic relationship used to convert interest rates from one compounding frequency to another is shown in figure 1 below.

$$EffectiveRate = \left(\left(1 + \frac{NominalRate}{NumberPeriodsYear} \right)^{NumberPeriodsYear} \right) - 1$$

Figure 1

The effective rate is an annually compounded interest rate that is equivalent to the nominal rate compounded more frequently. The nominal rate is the stated rate in a problem, such as 5%, compounded monthly. The number of periods per year is also stated in most problems. An interest rate compounded monthly involves 12 periods per year, for example.

Using the relationship shown in figure 1 above, any effective annual rate can be converted to a rate compounded more frequently and any rate compounded more frequently than once a year can be converted to an effective annual rate.

Converting interest rates on the HP 10BII

The HP 10BII calculator has the relationship shown in figure 1 built-in and available to the user through the yellow-shifted functions [NOM%] [EFF%] [P/YR] .

The nominal rate is entered as it would be written before a percent sign, i.e., 5% is entered as [5] [■] [NOM%] and not as [0] [•] [0] [5] [■] [NOM%] .

The effective rate is entered in the same manner by pressing [■] [EFF%] .

The number of periods per year is set using the yellow-shifted [P/YR] function. To set this value to 4 periods per year, for example, you would press [4] [■] [P/YR] .

Practice converting interest rates

<u>Example 1:</u> What annual rate is equivalent to 8%, compounded monthly?

<u>Solution:</u> [8] [■] [NOM%] [1] [2] [■] [P/YR] [■] [EFF%]

<u>Answer:</u> 8.30%. Over time, an annual rate of 8.30% would produce the same effects as 8%, compounded monthly.

<u>Example 2:</u> What rate, compounded monthly, is equivalent to an effective annual rate of 8.30%?

<u>Solution:</u> [8] [•] [3] [0] [■] [EFF%] [1] [2] [■] [P/YR] [■] [NOM%]

<u>Answer:</u> 8%

Example 3: Which interest rate would give you better returns as an investor? 4.25%, compounded quarterly or 4.15%, compounded monthly?

Solution: The way to solve problems like these is to convert each rate to an effective annual rate and then compare them.

[4] [•] [2] [5] [■] [NOM%] [4] [■] [P/YR] [■] [EFF%]

[4] [•] [1] [5] [■] [NOM%] [1] [2] [■] [P/YR] [■] [EFF%]

Answer: 4.25% compounded quarterly is equivalent to 4.32% compounded annually (or to an effective rate of 4.33%), while 4.15% compounded monthly is equivalent to 4.23% compounded annually. The

Example 4: Convert 5%, compounded monthly to an equivalent semiannual rate.

Solution: First, convert the monthly rate to an effective rate.

[5] [■] [NOM%] [1] [2] [■] [P/YR] [■] [EFF%]

Then convert this rate to a semiannual rate.

[2] [■] [P/YR] [■] [NOM%]

Answer: 5%, compounded monthly is equivalent to 5.05%, compounded semiannually (to more decimal places, it is actually 5.052373591%, compounded semiannually).

Example 5: Jack will make annual deposits of $1,500 into an account paying 4.75%, compounded monthly. How much is in his account in 10 years, assuming he makes the first deposit one year from now?

Solution: First, convert the monthly rate to an effective rate and store it as the interest rate for the annuity calculation.

[■] [C ALL]
[4] [•] [7] [5] [■] [NOM%] [1] [2] [■] [P/YR] [■] [EFF%] [I/YR]

Then continue with the rest of the annuity calculation.

[1] [■] [P/YR]
[1] [0] [N]
[1] [5] [0] [0] [PMT]
[FV]

Answer: $-18,739.45. Jack would have $18,739.45 in his account.