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FUNDAMENTALS

:: How to Calculate Future and Present Values ::

1. Calculating Future Value

If you invest £1,000 today for 3 years at annual interest rate of 10%, at the end of the third year, this present value (PV) £1,000 will increase to a value of £1,331, assuming all interests received are reinvested:



Therefore

$$FV = PV \times (1 + r)^t$$

where r is the annual interest rate, t is the number of years. If, however, the money is compounded on a semi-annual basis, the future value is then:

$$FV = PV \times \left(1 + \frac{r}{n}\right)^{nt}$$

where n is compounding frequency per year, e.g. $n = 2$ if interest is calculated semi-annually.

In the previous example, the future value of £1,000 compounded semi-annually at 10% for 3 years will be:

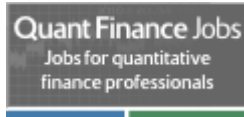
$$\begin{aligned} FV &= £1,000 \times \left(1 + \frac{0.10}{2}\right)^{2 \times 3} \\ &= £1,340.1 \end{aligned}$$

In France and Germany, most corporations pay interest on their bonds annually. In U.S. and Britain, most pay interest semi-annually.

Some financial instruments also pay at continuously compounded rate, i.e. payments are assumed to spread evenly and continuously throughout the year, where n approach infinity:

$$\begin{aligned} FV &= \lim_{n \rightarrow \infty} PV \times \left(1 + \frac{r}{n}\right)^{nt} \\ &= PV e^{rt} \end{aligned}$$

Here e is the base for natural logarithms and has the value 2.718281828.



:: Collaborations ::



2. Calculating Present Value:

The formula for calculating present value is simply the reciprocal of the future value formula:

$$PV = \frac{FV}{\left(1 + \frac{r}{n}\right)^{nt}}$$

Note that for loans where interests are paid annually, $n = 1$.

Written by Henry Tang

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