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Features


# A risky business: how to price derivatives

## by Angus Brown

BOOKMARK

### A general formula for the multi−period case

The price for the option in an $n$ period model is given by

$$C = \frac{1}{(1+r)^n} \sum_{k=0}^{n} \binom{n}{k} q^k (1-q)^{n-k} y_{u^k d^{n-k}}.$$

Here $\binom{n}{k}$ denotes the number of ways in which one can choose $k$ objects from a selection of $n$ objects (called the *binomial coefficient* you can read more in the *Plus* article Making the grade: Part II).

Explicitly it is given by

$$\binom{n}{k} = \frac{n!}{k!(n-k)!},$$

where

$$n! = n \times (n-1) \times (n-2) \times \ldots \times 2 \times 1.$$

The symbol $y_{u^k d^{n-k}}$ stands for $y$ with a subscript consisting of $k$ $u's$ and $n-k$ $d's$ – these stand for the payoffs corresponding to the various combinations of good and bad periods.

The expression

$$\sum_{k=0}^{n} \binom{n}{k} q^k (1-q)^{n-k} y_{u^k d^{n-k}}$$

means that you should sum the terms of the form

$$\binom{n}{k} q^k (1-q)^{n-k} y_{u^k d^{n-k}}$$

in turn with $k$ substituted by 0, 1, 2, etc, up to $n$.

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