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Features



## A risky business: how to price derivatives

by Angus Brown



### 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

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

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.

## A risky business: how to price derivatives

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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