

Cobb-Douglas Production Function

A production function is relationship that specifies the maximum output attainable for a certain level of inputs. The **Cobb-Douglas production function** is a specific production function that uses as inputs labor, capital, and raw materials. It also assumes there is a geometric relationship between these inputs. The Cobb-Douglas production function looks like this:

$$Q = BL^xK^yM^z$$

$$Q = \textit{Output}$$

$$L = \textit{Labor}$$

$$K = \textit{Capital}$$

$$M = \textit{Raw Materials}$$

The B and the exponents (i.e. x, y, z) are coefficients and they are dependent on the industry being studied. This production function says that output is equal to labor multiplied by capital multiplied by raw materials.

If the sum of the three exponents (i.e. x, y, z) equals 1, then the function implies constant returns to scale; if the inputs double, the output will double.

If the sum of the three exponents (i.e. x, y, z) is less than 1, then the function implies decreasing returns to scale; if the inputs double, the output will probably increase, but not by as much as the inputs.

If the sum of the three exponents (i.e. x, y, z) is greater than 1, then the function implies increasing returns to scale; if the inputs double, the output will more than double.

Most industries are characterized by constant returns to scale. For instance, the coal industry in the United Kingdom is estimated to have the following coefficients:

$$x = 0.51$$

$$y = 0.49$$

$$z = 0.00$$