

## ICE: COBB-DOUGLAS FORMULA

The Mathematician Charles W. Cobb and the economist Paul H. Douglas (picture) found in 1928 empirically a formula  $F(L, K) = bL^\alpha K^\beta$  which gives the total production  $F$  of an economic system as a function of the amount of labor  $L$  and the capital investment  $K$ .



By fitting data, they got  $b = 1.01, \alpha = 0.75, \beta = 0.25$ . By rescaling the production unit we can get  $b = 1$  and work with the formula:

$$F(L, K) = L^{3/4}K^{1/4}$$

Assume that the labor and capital investment are bound by the constraint  $G(L, K) = L^{3/4} + K^{1/4} = 1$ . Where is the production  $P$  maximal under this constraint?

$$\nabla F(L, K) =$$

$$\nabla G(L, K) =$$

$$\text{Solve: } \nabla F(L, K) = \lambda \nabla G(L, K), G(L, K) = 1:$$

