

"Manufacturing and Production, The Exploration of the Cobb-Douglass Equation"

Brian McLeish and Crystal Stines

April 3, 2007

Dr. Karen Donnelly

The Cobb-Douglas is a function that evaluates the amount of product produced for given amounts of labor and capital

$$P = A * X^L Y^C$$

- P = Product
- A = Constant determined by the company
- X = Labor
- Y = Capital
- L and C are exponents reflecting how much labor is put in compared to capital

So What Does All of This Mean?

- $P=A*X^LY^C$
- L and C should add up to one to have an even return to scale
- If they are less than one then they are “losing” product compared to how much they placed into the operation
- If L and C add up to greater than one then more product is being returned than what was placed into the operation

Example

- Equations:

- $f(x,y) = 10 * \chi^{(3/10)} * \gamma^{(7/10)}$

- $f(x,y) = 10 * \chi^{(1/10)} * \gamma^{(3/16)}$

- $f(x,y) = 10 * \chi^{(7/10)} * \gamma^{(13/16)}$

Maple

What Would Happen if We Added a Constraint?

- A constraint is a linear equation that limits how much product can be produced because of a limited amount of money.
- $150*X + 350*Y = \$30,000$

More on Constraints

$$150*X + 350*Y = \$30,000$$

- There is set proportionality as to how much money goes into labor and how much goes to capital.
- These set amounts represent how much it costs for each unit of labor and for each unit of capital.

Example 1

- $f = 20 * X^{(.2)} * Y^{(.8)}$

- Constraint:

$$g = 150 * X + 350 * Y = \$30,000$$

Example 2

- Same f and same constraint equation but a different amount of money

- $f = 20 * X^{(.2)} * Y^{(.8)}$

- Constraint:

$$g = 150 * X + 350 * Y = \$10,000$$

Maple

Any Questions?