

Classical Model of Labor Demand

Chapter 3

1. Production function
2. Marginal product of capital
3. Marginal product of labor
4. Labor demand by firms

1 Production function

Relates the quantity of real output ($Y = GDP$) to inputs of capital (K) and labor (N) for a given level of technology (A).

$$Y = AF(K, N)$$

1.1 Cobb-Douglas production function

A specific production function in which capital's share of income (α) and labor's share of income ($1 - \alpha$) is constant.

$$Y = AK^\alpha N^{1-\alpha}$$

In many industrialized nations, capital's share is about .3. Therefore, we will often use

$$Y = AK^{0.3}N^{0.7}$$

2 Marginal Product of Capital

- The increase in output when capital increases by one unit with all other variables (technology and labor) held constant.
- Slope of production function with output as a function of capital.
- Law of diminishing marginal productivity of capital. - as capital increases with other factors held constant, the MPK must eventually decrease
- Graph output on vertical axis with capital on horizontal axis (Y as a function of K)
- Graph MPK as a function of K .

3 Marginal Product of Labor

- The increase in output when labor increases by one unit with all other variables (technology and capital) held constant.
- Slope of the production function with output as a function of labor.
- Law of diminishing marginal productivity of labor. - as labor increases with other factors held constant, the MPN must eventually decrease
- Graph output on vertical axis with labor on horizontal axis (Y as a function of N).
- Graph MPN as a function of N .

4 Labor Demand by Firms

- Assumptions
 - Workers are identical
 - Firms are price-takers in the labor market, implying that they take the wage as given
 - Firms maximize profits
- Holding capital stock fixed, how many workers will a firm hire?

$$MPN = \varpi$$

4.1 Labor demand is MPN

- MPN is labor demand - graph
- Aggregate labor demand sums all firm demands

4.2 Shifts in labor demand

- Anything which shifts MPN
 - change in productivity
 - change in capital stock