



UNIVERSITY OF THE PEOPLE

ECON 1580-01-INTRODUCTION TO ECONOMICS-AY2024-T3

WRITTEN ASSIGNMENT UNIT 3

INSTRUCTOR: CHRISTOPHER STUTTS

Suppose a firm finds that the marginal product of capital is 60 and the marginal product of labor is 20. If the price of capital is \$6 and the price of labor is \$2.50, describe how the firm should adjust its mix of capital and labor? What will be the result?

Our approach to this issue should center on the fundamental principle of profit maximization. The company should allocate more resources to obtaining the input factor that produces the product with the highest marginal revenue to cost ratio in order to accomplish this.

I must first determine the marginal revenue product (MRP) for labor and capital. The additional money made by using one more unit of that input is known as the MRP.

For capital, the marginal product is 60. If we take the output price as \$1, then as per calculations
 Marginal Revenue Product of Capital (MRPK) = Marginal Product of Capital x Output Price = 60
 x \$1 = \$60

Meanwhile for the labor: Marginal Revenue Product of Labor (MRPL) = Marginal Product of Labor x Output Price = 20 x \$1 = \$20

Now I can compare the MRPs to the prices of each input:

MRPK = \$60 Price of Capital = \$6 MRPL = \$20 Price of Labor = \$2.50

For capital, the MRPK of \$60 is 10 times higher than its price of \$6. But for labor, the MRPL of \$20 is only 8 times higher than its price of \$2.50.

So clearly capital is providing a much higher return per dollar spent compared to labor in this situation. The firm is not optimizing its use of inputs.

Hence, to reach towards the profit-maximizing mix goals, the firm should increase its usage of the more profitable capital input, while decreasing its usage of the relatively less profitable labor input.

As the firm hires more capital, the diminishing marginal returns will cause the marginal product and MRPK to decrease. And as the firm hires less labor, the marginal product and MRPL will increase.

The firm should continue adjusting the input mix in this way - increasing capital and decreasing labor - until the ratios of MRP to price are equal for both inputs:

$$\text{MRPK/Price of Capital} = \text{MRPL/Price of Labor}$$

This equality signals that the firm has reached the profit-maximizing input combination, given the current input prices and productivities. The result will be:

- A higher ratio of capital to labor employed.
- Lower marginal products for both capital and labor compared to the original values.
- But maximum possible profits, since both inputs provide equal returns per dollar spent.

So, by iteratively adjusting the input mix based on the relative MRP-to-price ratios, the firm can optimally allocate its resources to the most profitable uses. This allows it to get the highest overall return on its spending on capital and labor.

Reference:

Rittenberg, L. & Tregarthen, T. (2009). Principles of Economics.