

Cost-minimizing input combinations

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Today's objectives

- Review marginal revenue productivity and firm resource demand
- Look at the optimal combination of resources for the competitive firm
- See pages 489-499

Resource pricing

- Firms demand resources
 - Focus on labor
- Resource prices are important:
 - Money-income determination
 - Cost minimization
 - Resource allocation
 - Policy issues

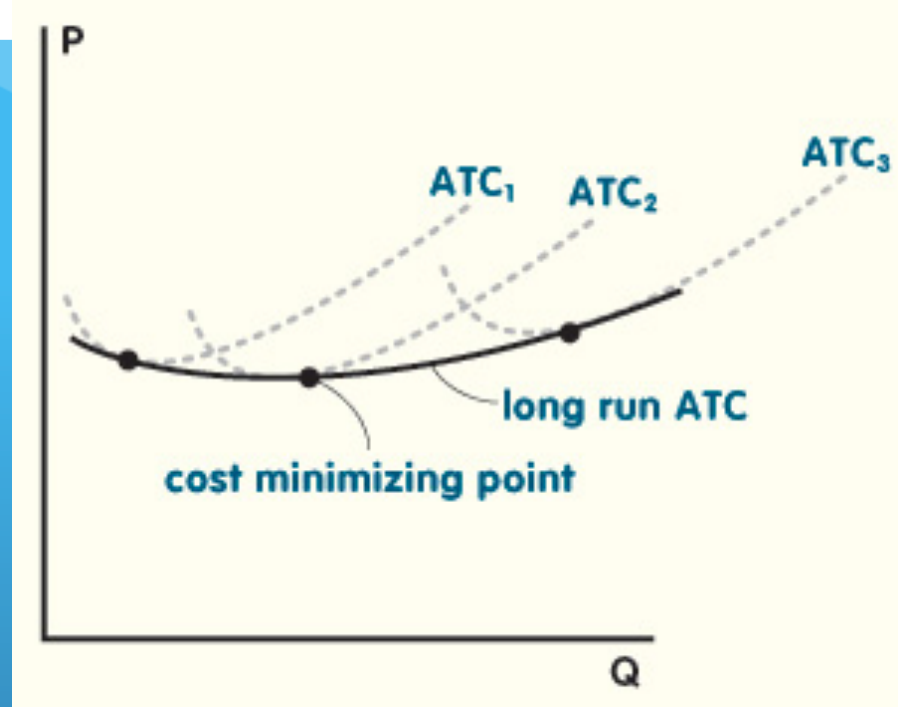
Resource pricing

- Money-income determination
 - Resources prices are a major factor in determining the income of households.
 - Wage, rent, interest and profit to the household that supply those resources.



Resource pricing

- Cost minimization
 - To the firm, resource prices are costs.
 - To obtain the greatest profit, the firm must produce the profit-maximizing output with the most efficient (least costly) combination of resources.



Resource pricing

- Resource allocation
 - Resource prices allocate resources among industries and firms.
 - The efficient allocation of resources over time calls for the continuing shift



Resource pricing

- Policy issues
 - Role of government in resource pricing.
 - For example, should the government encourage or restrict labor unions?



Resource demand

- In order to derive the resource demand, we assume that all resource markets are competitive (good and resource)
- In a competitive resource market, the firm is a price taker
- Its buying decisions do not influence the resource prices

Resource demand

- The demand for resources is a “derived demand” - from the products that the resources help produce.
- Resources do not directly satisfy customer wants but do so indirectly through their use in producing goods and services.
- Households are the source of supply and firms are the source of demand in resource markets.

Resource demand

- Marginal revenue product (MRP)
 - Change in TR resulting from unit change in resource (labor)
- A firm will hire an additional unit of a resource only if this increases the firm's profits.
 - Econ. profit = tot. revenue - tot. cost

Resource demand

- Rule for employing resources:
Marginal revenue product =
Marginal resource cost
- $MRP = \frac{\text{Change in Total Revenue}}{\text{Unit Change in Resource Quantity}}$
- $MRC = \frac{\text{Change in Total (Resource) Cost}}{\text{Unit Change in Resource Quantity}}$
- (similar to $MC = MR$ rule of output side)

Optimal level of resource use

- Marginal revenue product (MRP) = additional revenue associated with the use of an additional unit of a resource
- Marginal resource cost (MRC) = additional cost associated with the use of an additional unit of a resource
- Increase resource use if $MRP > MRC$
- Decrease resource use if $MRP < MRC$
- Optimal level of resource use: $MRP = MRC$

Optimal combination of resources

- In the long run, all resource inputs are variable
- Choose optimal combination
- Minimize cost of producing a given output
- Maximize profit

The least-cost rule

- Minimize cost of producing a given output
- Last dollar spent on each resource yields the same marginal product

$$\frac{\text{Marginal Product of labor (MP}_L\text{)}}{\text{Price of Labor (P}_L\text{)}} = \frac{\text{Marginal Product of Capital (MP}_C\text{)}}{\text{Price of Capital (P}_C\text{)}}$$

The least-cost rule

- An example

Marginal Product
of labor (MP_L)
Price of Labor (P_L)

=

Marginal Product
of Capital (MP_C)
Price of Capital (P_C)

Marginal Product
of labor (MP_L) = 10
(P_L) = 1

>

Marginal Product
of Capital (MP_C) = 5
(P_C) = 1

<https://www.youtube.com/watch?v=QzaM6JSQ6BE>

Profit-maximizing INPUT rule

- In a purely competitive market, MRP of each resource equals its price

$$P_L = MRP_L \text{ and } P_C = MRP_C$$

$$\frac{MRP_L}{P_L} = \frac{MRP_C}{P_C} = 1$$

Profit-maximizing INPUT rule

- A firm will achieve its profit-maximizing combination of resources when each resource is employed to the point at which its *MRP* equals its resource price.

Profit-maximizing OUTPUT rule

- In product markets, profit-maximizing output occurs where marginal revenue equals marginal cost ($MR = MC$).

<https://www.youtube.com/watch?v=xGkE0oHyNhk>