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Gwartney - Stroup  
Sobel - Macpherson

## The Supply and Demand for Productive Resources

**Full Length Text** — Part: 5 Chapter: 24  
**Micro Only Text** — Part: 3 Chapter: 12

To Accompany "Economics: Private and Public Choice 12th ed."  
James Gwartney, Richard Stroup, Russell Sobel, & David Macpherson  
Slides authored and animated by:  
James Gwartney, David Macpherson, & Charles Skipton

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## An Overview of Resource Markets

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## Introduction

- Productive assets are bought and sold in **resource markets**.
- These markets help determine what is produced, how it is produced, and the distribution of income.

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## The Market for Resources

- Thus far we have focused on **product markets**, where households demand goods and services are supplied by firms (*upper loop*).
- We now turn to the **resource markets**, where firms demand factors of production which are supplied by households in exchange for income (*bottom loop*).
- In **resource markets**, firms are buyers and households are sellers – just the reverse of the case for the product markets.

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## Human and Non-Human Resources

- There two classes of productive resources:
  - **Non-human resources:**
    - Physical capital
    - Land
    - Natural resources
  - **Human resources:**
    - Composed of the skills, knowledge, and experience of workers.

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## Human and Non-Human Resources

- **Investment in human capital** refers to activities that increase the human capital and productivity of individuals.
  - *Examples:* education, training, experience.
- Human resources differ from non-human resources in a few key ways:
  - Human capital is embodied in the individual.
  - Human resources can't be bought or sold.
    - Only their labor services can be sold.

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## The Demand for Resources

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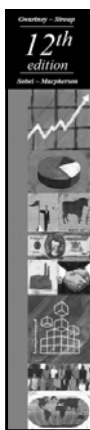
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## The Demand for Resources

- The **demand for resources** is derived from the demand for the products that the resources help produce.
- **Example:**  
A repair shop hires mechanics because of their customers' demand for maintenance and repair services.

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## The Demand for Resources

- The quantity demanded of a resource is negatively related to its price for two reasons:
  - **Substitution in production:**
    - If one resource input becomes more expensive, producers will shift to lower-cost substitute inputs.
    - The better the substitute inputs, the more elastic the demand for the resource.
  - **Substitution in consumption:**
    - A higher resource price will raise the product price and consumers will substitute toward other goods.
    - The more elastic the product's demand, the more elastic is the demand for the resource.

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### The Demand for Resources

- As a resource price increases, producers that use the resource intensively will:
  - use substitute resources, and/or
  - face higher costs
 Both of these will lead to higher prices and a reduction in output.
- At the lower rate of output, firms use less of the resource that increased in price.
- Both of these factors contribute to the inverse relationship between the price and quantity demanded of a resource.

Resource price

Quantity

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### Time and the Demand for Resources

- With time, the demand for a resource becomes more elastic ( $D_{sr} \rightarrow D_{lr}$ ):
  - in the long run, firms will be better able to switch to substitute inputs.
  - in the long run the demand for a product is more elastic, hence, the demand for the resources to produce the product will also be more elastic.
- Thus, in the long run the demand for a resource is almost always more elastic than in the short run.

Resource price

Quantity

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### Factors Shifting Resource Demand

- A change in **product demand** will cause the demand for the resources used to produce the product to change in the same direction.
- A change in the **productivity of a resource** will alter resource demand.
  - If productivity of a resource rises, the demand for the resource will rise.
- A change in the **price of related inputs** will alter the demand for a resource.
  - The following will **increase** resource demand:
    - an increase in a substitute input price
    - a decrease in a complimentary input price
  - The following will **decrease** resource demand:
    - a decrease in a substitute input price
    - an increase in a complimentary input price

Resource price

Quantity

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## Marginal Productivity and the Firm's Hiring Decision

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## Hiring Decision

- Profit-maximizing firms will hire additional units of a resource up to the point where the **marginal revenue product** of the resource equals its price.
- Marginal revenue product (MRP):** Change in total revenue from the employment of an additional unit of a resource.

$$MRP = \text{Marginal product} \times \text{Marginal revenue}$$

Remember -

$$\text{Marginal product} = \frac{\text{change in output}}{\text{change in variable input}}$$

$$\text{Marginal revenue} = \frac{\text{change in revenue}}{\text{change in output}}$$

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## Short-Run Demand Schedule of a Firm

- In this example, a computerized marketing firm uses both technology and data-entry operators to provide services. For each unit provided to the client, the firm receives \$200 (4).
- The **marginal product (3)** shows how output *changes* as new data-entry operators are hired (*given a fixed capital level*).
- The **marginal revenue product (6)** shows how hiring an additional data-entry operator affects the firm's total revenue.

Variable factor (1)	Output (per week) (2)	Marginal Product		Price (per unit) (4)	Total Revenue		MRP (= (3) x (4)) (6)
		= change in (2) / change in (1) (3)			= (2) x (4) (5)		
0	0.0	----		\$200	\$ 0		---
1	5.0	5.0		\$200	\$1,000		1000
2	9.0	4.0		\$200	\$1,800		800
3	12.0	3.0		\$200	\$2,400		600
4	14.0	2.0		\$200	\$2,800		400
5	15.5	1.5		\$200	\$3,100		300
6	16.5	1.0		\$200	\$3,300		200
7	17.0	0.5		\$200	\$3,400		100

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### The Demand for Resources

- A profit maximizing firm will use an additional unit of input if-and-only-if that unit of input adds more to revenues than to costs. Thus, the **MRP** curve is the firm's short run demand curve for the resource.
- In the short run, it will slope downward because the marginal product of the resource falls as more of it is used with a fixed amount of other resources.
- The location of the **MRP** curve will depend on these factors:
  - the product's price,
  - the productivity of the resource,
  - the quantity of other factors working with the resource.

Variable factor	MRP
0	-----
1	1000
2	800
3	600
4	400
5	300
6	200
7	100

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### Multiple Inputs

- With multiple inputs, firms will expand their usage of each until the marginal product divided by price is equal across inputs.

$$\frac{MP \text{ of skilled labor}}{\text{Price of skilled labor}} = \frac{MP \text{ of unskilled labor}}{\text{Price of unskilled labor}} = \frac{MP \text{ of machine}}{\text{Price (rental value) of machine}}$$

- Wage differentials reflect skill differentials.
  - If a high-skill worker is twice as productive as a low-skill worker, the high-skill worker will have twice the wage rate.
- When real world decision makers minimize per unit costs, the outcome will be as if they followed these mathematical procedures.

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### Questions for Thought:

- Why is the employment of a resource inversely related to its price?
- Is high productivity the primary source of high wages? Why or why not?
- “Firms will hire a resource only if they can make money by doing so.”  
-- Is this statement *true*, *false*, or *uncertain*?
- President George W. Bush's 2002 steel policy (which placed a tariff of approximately 25% on steel imports)
  - raised the price of American-made cars.
  - decreased the number of workers in the U.S. auto industry.

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## The Supply of Resources

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## The Supply of Resources

- The amount of a resource supplied is positively related to its price.
- The short-run supply elasticity of a resource is determined by how easily the resource can be transferred from one use to another, or **resource mobility**.
  - If resources are highly mobile then the supply curve will be elastic, even in the short run.
- The supply of a resource will be more elastic in the long run than the short run.
- In the long run, investment can increase the supply of both physical and human resources.

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## The Supply of a Resource

• As the price of a resource increases, individuals have a greater incentive to supply it.  
• Thus, a positive relationship will exist between a resource's price and the quantity supplied in the market.

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### Time and Resource Supply Elasticity

- The supply of Certified Public Accountant (CPA) services is an example of a resource requiring a substantial period of time before the current investment is realized and future supply expanded.
- If CPA wages increase from  $P_1$  to  $P_2$ , the short-run response will be an increase in CPA services from  $Q_1$  to  $Q_2$ . Some CPAs work more and some come out of retirement.
- Given time, supply of the resource (CPAs) becomes more elastic. ( $S_{sr} \rightarrow S_{lr}$ ) as more individuals train to become CPAs.
- At the higher wage  $P_2$ ,  $Q_3$  CPA services are supplied to the market.
- The long-run supply of a resource is almost always more elastic than the short-run supply.

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### Supply, Demand, and Resource Prices

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### Resource Prices

- The prices of resources are determined by supply and demand.
- Changes in the market prices of resources will influence the decisions of both users and suppliers.
  - Higher resource prices give users a greater incentive to turn to substitute inputs.
  - Higher resource prices give suppliers a greater incentive to provide more of the resource.

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### Equilibrium in a Resource Market

- The **market demand** of a resource, such as engineering services, is a downward sloping **MRP** curve, reflecting the declining **MRP** of the resource.
- The **market supply** curve of a resource slopes upward as higher resource prices (wages) induce individuals to supply more of a resource.
- The resource price  $P_1$  brings the choices of buyers and sellers into harmony.
- At the equilibrium price  $P_1$ , the **quantity demanded** will just equal the **quantity supplied**.

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### Adjusting to Dynamic Change

- An increase in demand for housing (**product market**) ... leads to an increase in demand for electricians (**resource market**).
- In the product market, the equilibrium price and output of houses both rise (to  $P_2$  and  $Q_2$ ).
- In the resource market, the equilibrium price and output of electrician services will increase substantially (to  $P_2$  and  $Q_2$ ).

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### Adjusting to Dynamic Change

- This significant increase in price and modest increase in output reflects the highly inelastic nature of the short-run supply for the services of *skilled* electricians.
- The higher resource price will attract new human capital investments and, with time, the resource's supply curve will become more elastic, moderating the resource price (to  $P_3$ ) and increasing its quantity supplied (to  $Q_3$ ).

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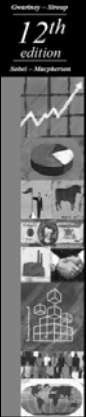
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## The Coordinating Function of Resource Prices

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## The Coordinating Function of Resource Prices

- Changes in resource prices in response to changing market conditions are essential for efficient allocation of resources.
- Profit is a reward for entrepreneurs who are able to see and act on opportunities to put resources to higher valued uses.

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## Questions for Thought:

1. "However desirable they might be from an equity viewpoint, programs designed to reduce wage differentials will necessarily reduce the incentive of people to act efficiently and use their productive abilities in those areas where demand is greatest relative to supply."  
-- Do you *agree or disagree*?
2. Evaluate the following statement:  
"The earnings of engineers, doctors, and lawyers are high because lots of education is necessary to practice in these fields."

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**Questions for Thought:**

3. Other things constant, what impact will a highly elastic demand for a product have on the elasticity of demand for the resources used to produce the product? Explain.
4. "If the demand for workers with doctorate degrees in economics increases, we would expect the wages of economists to decline in the short run and the number of economists employed to increase in the long run."  
-- Is this statement *true, false, or uncertain*?

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**End  
Chapter 24**

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