




HOW FACTOR MARKETS WORK

EE211

Factor Markets: a Brief Introduction

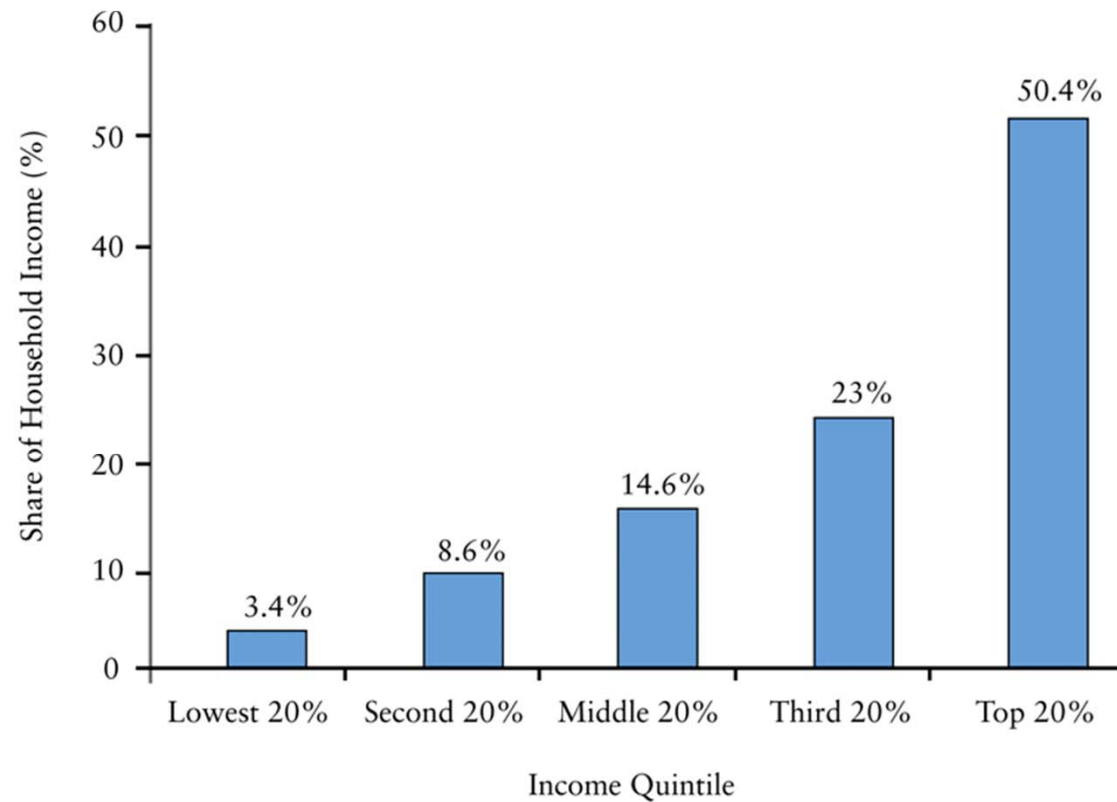
- Demand for factor as a derived demand
- The firm's demand for a factor
- The supply of a factor
- Determination of factor prices

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- Explain what determines a profit-maximizing firm's demand for a factor.
 - Describe the role of factor mobility in determining factor supply.
 - Explain the difference between temporary and equilibrium factor-price differentials.
 - Explain how economic rent is related to factor mobility.

Income Distribution

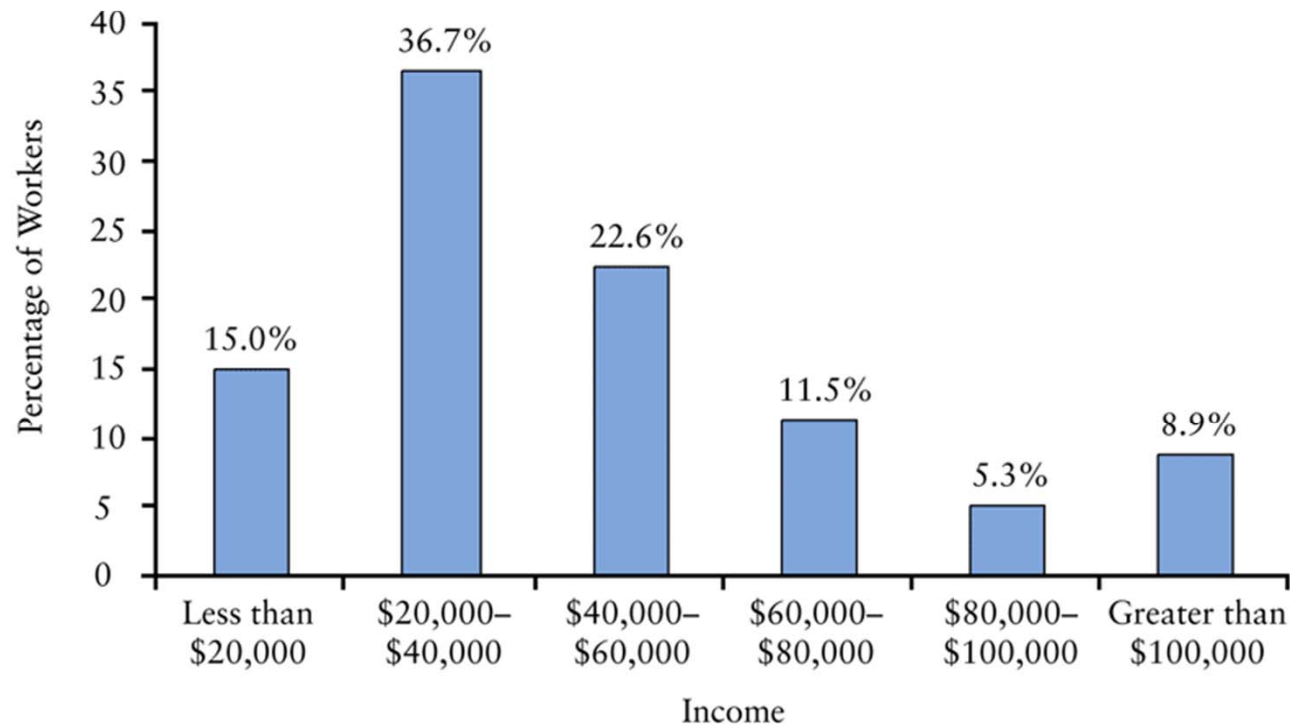
- In the 19th century, economists emphasized the functional distribution of income.
- Focusing on the sources of income lost usefulness because of the blurred distinction between “workers” and “capitalists.”
- Modern economists place more emphasis on the size distribution of income.

The Distribution of Household Income in the United States, 2005



(Source: Data are from Table A-3 in the report *Income, Poverty, and Health Insurance Coverage in the United States: 2005*. The report is available on the Web site of the U.S. Census Bureau: <http://www.census.gov>.)

Earnings of Full-Time, Full-Year Workers, 2005



(Source: Data are from the March 2006 *Annual Social and Economic Supplement to the Current Population Survey*, and are available in Table PINC-01 on the Web site of the Census Bureau: <http://www.census.gov>.)

A Glimpse of the Theory Ahead

- When market forces allocate resources among various products, they also determine factor incomes.
- Equilibrium prices and quantities in factor markets determine factor incomes.
- Factor demand: firms' profit-maximizing decisions?
- Factor supply: alternatives for factors of production?

The Demand for Factors

- The demand for any input is a derived demand.
- For example, since automobile construction uses steel extensively, we say that the demand for steel is partly derived from the demand for automobiles.

Derived demand links goods markets to factor markets.

The Firm's Marginal Decision on Factor Use


- Any profit-maximizing firm increases its output until its **MC equals to its MR**
- Since producing more output requires hiring more factors of production, we can describe this decision another way – **the firm will increase its use of any factor of production until the last unit of the factor adds as much to revenue as it does to costs**

- The increase in the firm's revenue attributed to this extra unit of the factor is called the factor's marginal revenue product (MRP)
- The factor's MRP has two components
 - A physical component- how much one unit of the factor adds to total output- the factor's marginal product
 - A dollar component- the amount that total revenue rises per extra unit of output- the firm's marginal revenue
 - Example -If the factor's MP is two units and the firm's MR is \$7.50 the factor's MRP is \$15

- Marginal revenue product (MRP) is the increase in revenue after adding one unit of a factor.
- The factor's MRP has a physical component (**MP**) and a dollar component (**MR**).

- $$MRP = MP \times MR$$

- Given the factor's market price and its **MRP**, how many units of the factor should the firm use?

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- In competitive factor markets the marginal cost of the factor is simply the factor's price, since the firm can hire any amount of the factor at a given price
 - Call this factor price w
 - Also we know that in competitive goods markets, the firm's MR is just the market price of the product, p .

Marginal Revenue Product

- A profit-maximizing firm will hire until the factor's **MC** equals its **MRP**:

$$\text{Marginal cost of the factor} = \text{Marginal revenue product of the factor}$$

If the firm is a price taker in both factor and product markets, we can simplify this condition to:


Factor price Marginal product Product price

$$w = MP \times p$$

Example

- Suppose that labor is available to the firm at a cost of \$10 per hour ($w=\10)
- Suppose also that employing another hour of labor adds three units to output ($MP=3$)
- Suppose further that any amount of output can be sold for \$5 per unit ($p=\5)

- Thus additional hour of labor adds \$15 to the firm's revenue but only \$10 to its costs. In this case, the firm will increase profits by hiring more hours of labor

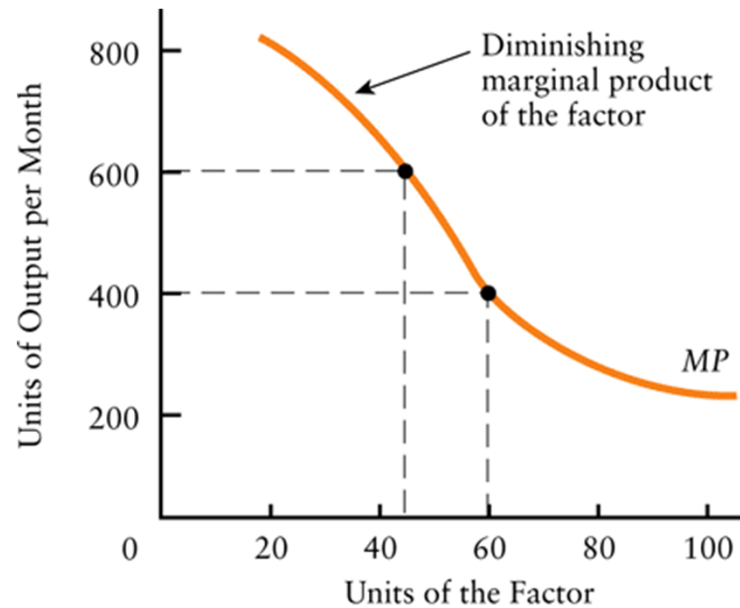


To maximize its profits, any firm must hire each factor of production to the point where the factor's marginal revenue product (MRP) equals to price

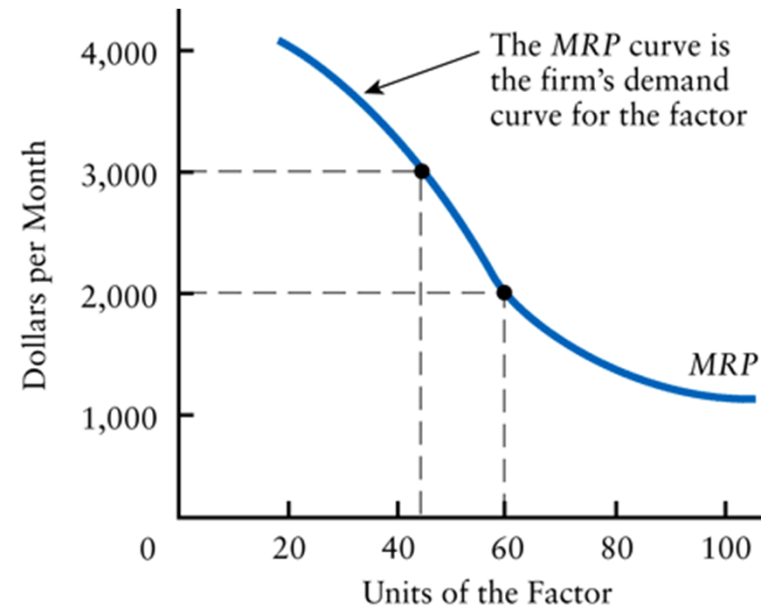
The Firm's Demand Curve for a Factor

- We wish to derive the firm's entire demand curve for a factor, which tells us how much of the factor the firm will buy at each price

From Marginal Product to Demand Curve



(i) The *MP* curve



(ii) The *MRP* curve (the demand curve)


A competitive firm's demand curve for a factor is given by the factor's MRP curve

Elasticity of Factor Demand

The elasticity of demand for factor measures the degree of the response of the quantity demanded to a change in its price

What determines the elasticity of factor demand?

1. If the ***MP*** of a factor declines rapidly as more of a factor is employed, then factor demand will be relatively inelastic.
2. The easier it is to **substitute away** from a factor, the more elastic the demand for that factor.

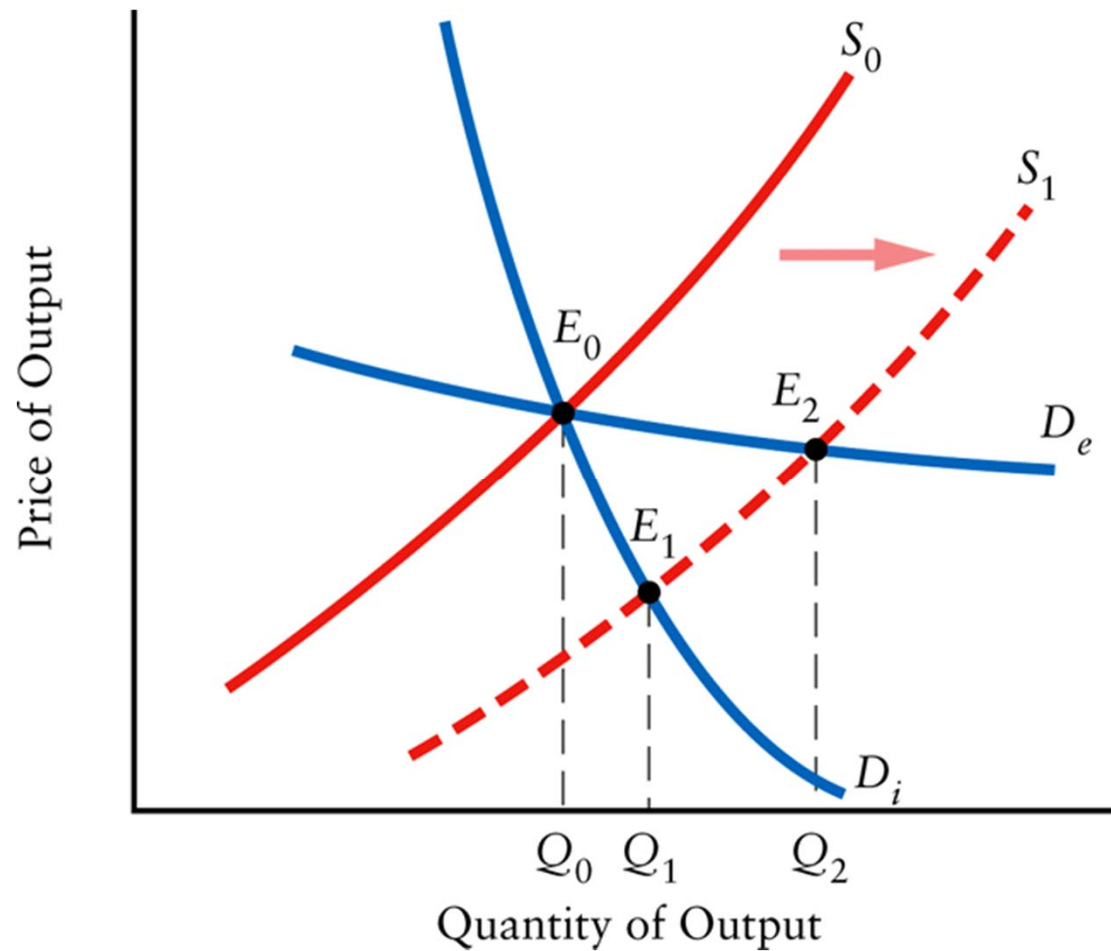
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3. The **more important** a factor is in producing some good (as a share of total costs), the more elastic the demand for that factor.
 4. The **more elastic the demand is for the firm's product**, the **more elastic will be the firm's demand for the factors used to make that product**.

Example

- For some particular firm, wages account for 50% of the MC of producing a good and raw materials account for 10%.
- A 20% rise in the price of labor raises the firm's MC by 10% (20 percent of 50 percent), but a 20% rise in the price of raw materials raises the firm's MC by only 2% (20 percent of 10 percent)
- The larger the increase in MC, the more the firm reduces its level of output, and hence reduces its demand for factor of production

- If an increase in the price of the product causes a large decrease in the quantity demanded- that is, if the demand for the product is highly elastic- there will be a large decrease in the quantity of a factor needed to produce it in response to a rise in the factor's price
- If an increase in the price of the product causes only small decrease in the quantity demanded- that is, if the demand for the product is inelastic- there will be only small decrease in the quantity of a factor needed to produce it in response to a rise in the factor's price

More Elastic Product Demand Leads to More Elastic Factor Demand



The Market Demand Curve for a Factor

The market demand curve for any factor of production is less elastic than a simple horizontal summation of all the individual firms' demand curves.

Any one firm's production will have no significant effect on the equilibrium market price, so the additional use of a factor will have no effect on that price.

But all the firms taken together *do* have an effect on the equilibrium price.

Shifts of the Market Factor Demand Curve

Demand for a factor increases when the factor's **MRP** increases:

- changes in the factor's **MP**
- changes in the firm's MR or price of the product



THE SUPPLY OF FACTORS

The Supply of Factors

We consider supply at three different levels of aggregation:

- the amount supplied to **the economy as a whole**
- the amount supplied to **a particular industry or occupation**
- the amount supplied to **a particular firm**

The elasticity of factor supply will be different at each level of aggregation due to factor mobility.

The Supply of Factors to the Economy

The total supply of each factor is given at any point in time.

These supplies respond to both economic and non-economic forces.

Physical Capital

The supply of capital in a country consists of the stock of existing machines, plants, and equipment.

The total supply of physical capital changes slowly over time — through net investment.



Land

The total area of dry land in a country is almost perfectly fixed.

But the supply of fertile land changes as more land is cleared and improved for agricultural or other purposes.

Labor

The number of people willing to work is called the labor force.

The total number of hours they are willing to work is called the supply of labor.



The supply of labor depends on:

1. the size of the population
2. the proportion of the population willing to work
3. the number of hours each individual wants to work

The population varies over time due to births, deaths, and net immigration (which tends to increase in good economic times).

The proportion of the total population that is willing to work is called the labour-force participation rate.

The Supply of Factors to a Particular Industry

A factor's elasticity of supply to a particular use is larger than its elasticity of supply to the entire economy.

Factor mobility is the ease with which factors can be transferred between uses.

Capital Mobility

Some kinds of capital equipment can be switched easily among uses; many others are less easily switched.

But in the long run, most capital is highly mobile.



Land Mobility

Although land is highly mobile among alternative uses, it is completely immobile as far as location is concerned.

Labor Mobility

Non-monetary considerations are much more important for the supply of labor than for other factors of production (e.g., working conditions).

Some individuals with very specific skills find it difficult to switch jobs over short periods of time.

Over longer periods, however, the labor force as a whole is very mobile.

The Supply of Factors to a Particular Firm

Most firms can obtain factors at the going market price.

Therefore, **individual firms usually face perfectly elastic supply curves for factors**, even though the supply for the economy as a whole may be quite inelastic.



THE OPERATION OF FACTOR MARKETS

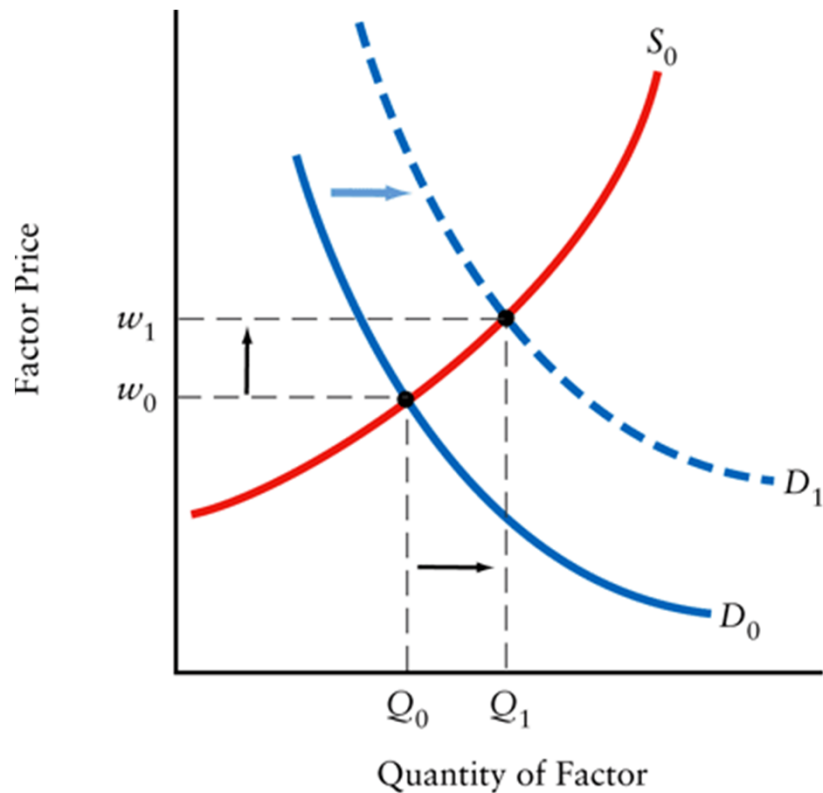
The Operation of Factor Markets

Demand and supply jointly determine the factor's price and quantity.

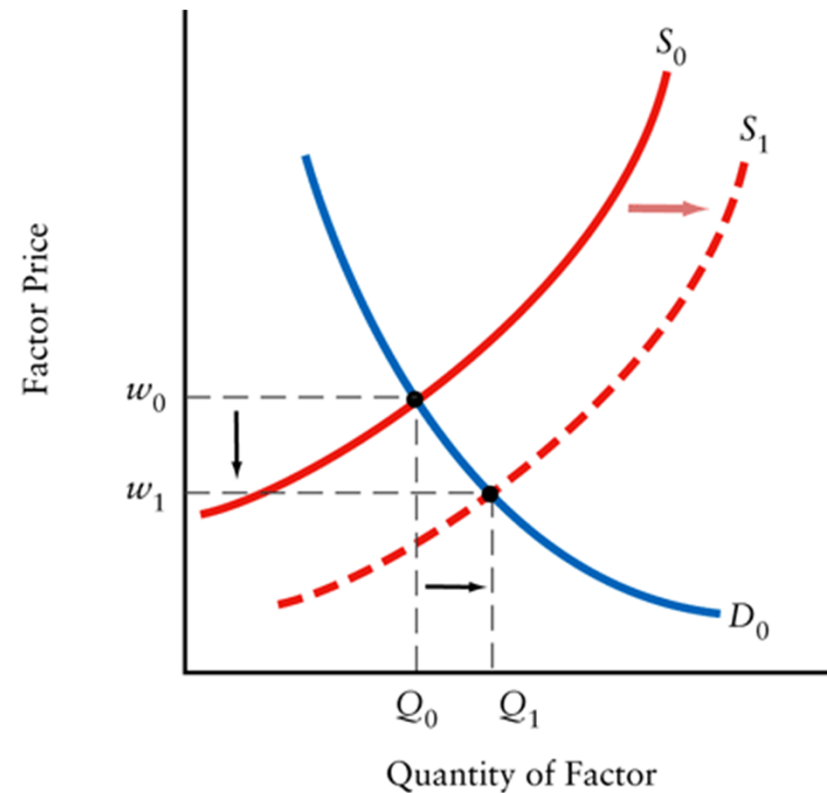
The factor's income equals price times quantity.

Changes in factor markets can occur either because of a change in demand for the factor or because of a change in the supply of the factor, or both.

Demand and Supply Shifts in a Competitive Factor Market



(i) An increase in factor demand



(ii) An increase in factor supply

Differentials in Factor Prices

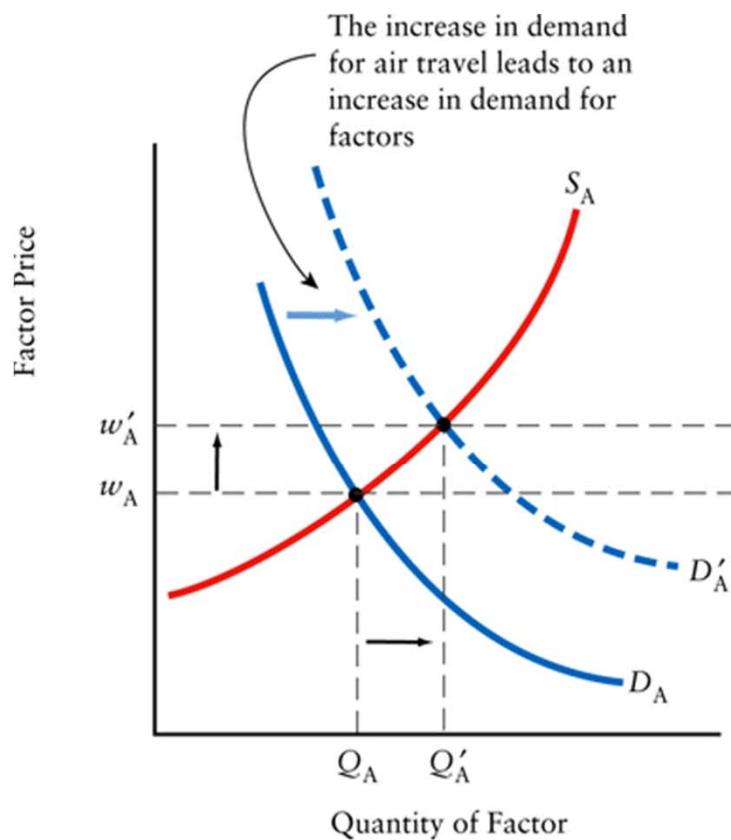
Factor-price differentials can be temporary or exist in long-run equilibrium.

Factor mobility erodes temporary factor-price differentials.

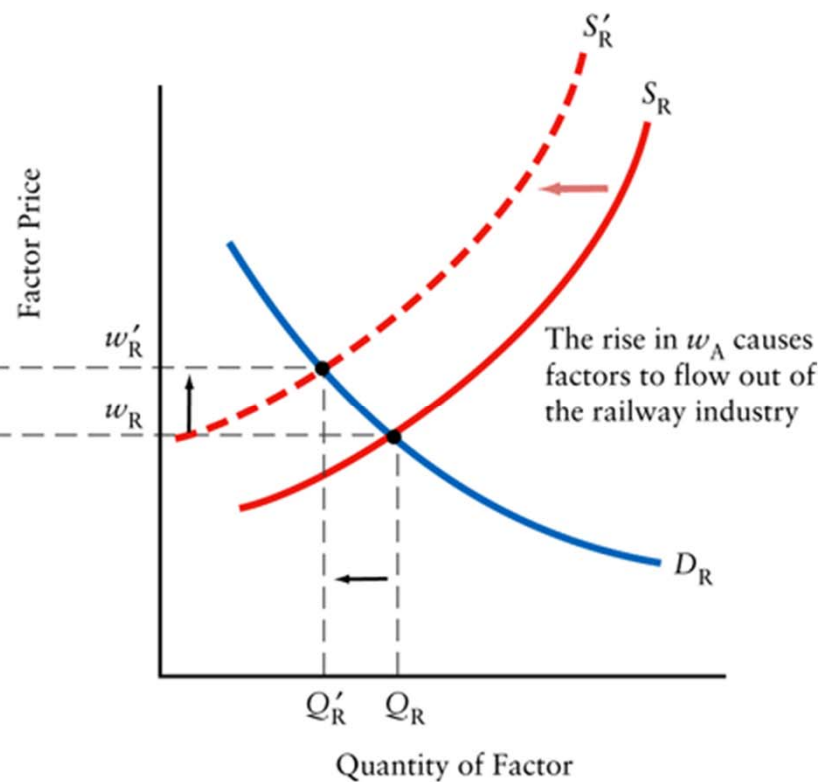
Example: An increase in demand for steel workers.

- increases in their wages
- attracts workers from other industries
- wages then fall in steel industry and rise elsewhere
- the differential is eventually eliminated

The Creation and Erosion of Temporary Factor-Price Differentials



(i) Airline industry




(ii) Railway industry

Equilibrium Differentials

Equilibrium differentials are not eliminated by factor mobility because neither workers nor jobs are identical.

Equilibrium differentials can be explained by **intrinsic differences** in the factors themselves.

In the case of labor, they can be explained by differences in the cost of acquiring skills and by the different non-monetary advantages of different occupations.



Equilibrium factor-price differentials are also called compensating differentials. For example:

- **intrinsic differences** in skills or talents
- **acquired differences** (perhaps due to education)
- non-monetary differences in job characteristics

Hazard pay is an obvious example of a **compensating differential**.

Economic Rent

Factor payments are comprised of:

- transfer earnings: the amount necessary to secure the employment of the factor
- economic rent: any payment above the transfer earnings

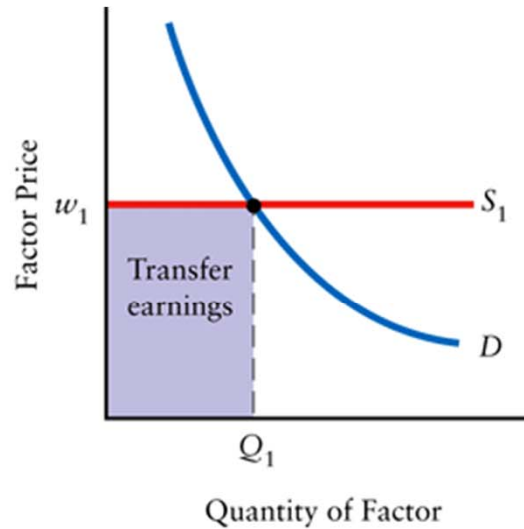
For capital and land, transfer earnings are just payments from alternative uses.

For labor, transfer earnings also depend on the non-monetary attributes of the alternative jobs.

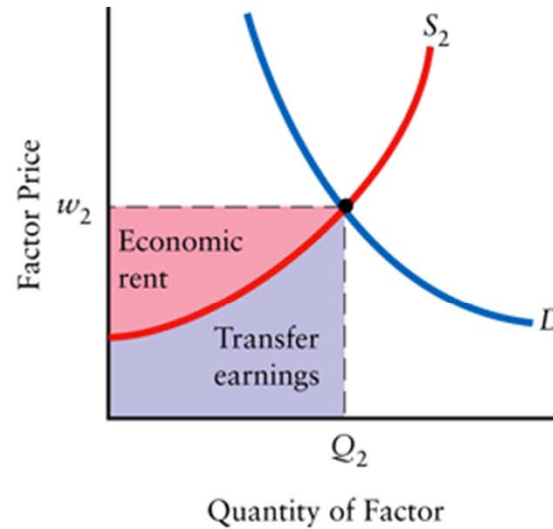
Example

- Consider a farmer who grows wheat and earns \$1000 per acre. She has calculated that if her earnings fall to \$900 per acre, she will switch to growing barley instead, her next best alternative. In this case, each acre of land growing wheat is earning \$100 of economic rent
- A famous actor earns \$15 million per year. He decides that his next best alternative to acting is to promote automobiles in television commercials, in which case he would earn \$2.5 million per year. He is earning \$12.5 million per year of economic rent

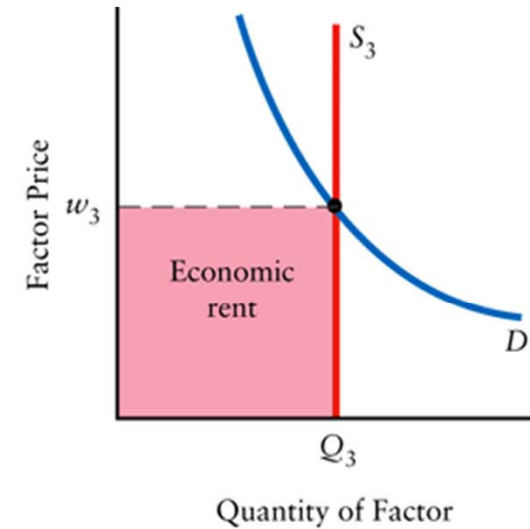
The Determination of Rent in Factor Markets



(i) Perfectly elastic supply



(ii) Positively sloped supply



(iii) Perfectly inelastic supply



Sources:

- Lipsey, Ragan, and Storer (2008)