Chapter 14

Markets for Factor Inputs

Topics to be Discussed

- Competitive Factor Markets
- Equilibrium in a Competitive Factor Market
- Factor Markets with Monopsony Power
- Factor Markets with Monopoly Power

Competitive Factor Markets

- Characteristics

1) Large number of sellers of the factor of production

2) Large number of buyers of the factor of production

3) The buyers and sellers of the factor of production are price takers

Competitive Factor Markets

- Demand for a Factor Input When Only One Input Is Variable
  - Demand for factor inputs is a derived demand…
    - derived from factor cost and output demand

Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

Assume

- Two inputs: Capital (*K*) and Labor (*L*)
- Cost of K is *r* and the cost of labor is *w*
- *K* is fixed and *L* is variable

Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

- Problem
  - How much labor to hire

Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

- Measuring the Value of a Worker's Output
  - Marginal Revenue Product of Labor (MRP_L)
  - $MRP_L = (MP_L)(MR)$

Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

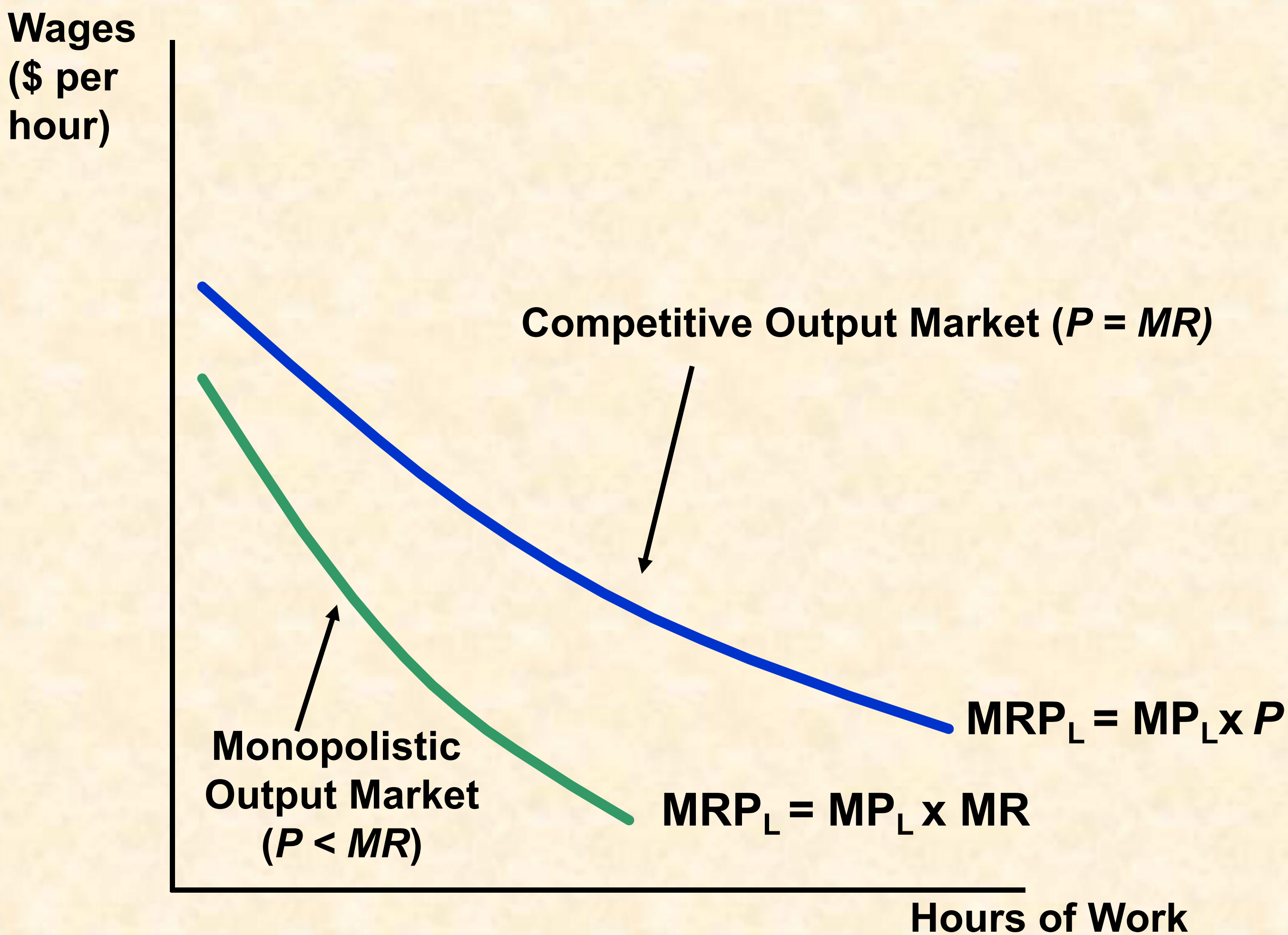
- Assume perfect competition in the product market
  - Then $MR = P$

Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

- Question
  - What will happen to the value of MRP_L when more workers are hired?

Marginal Revenue Product

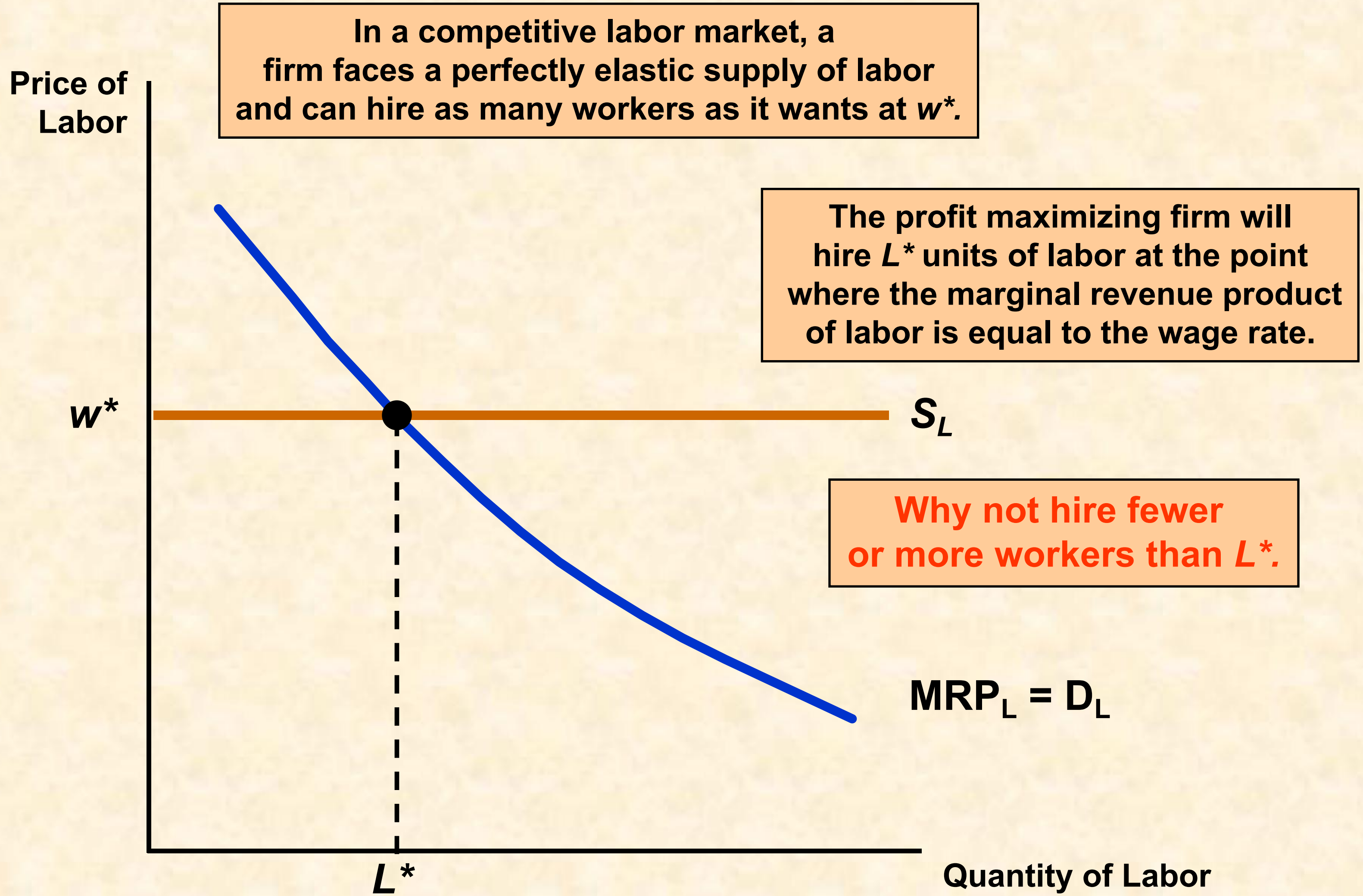


Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

- Choosing the profit-maximizing amount of labor
  - If $MRP_L > w$ (the marginal cost of hiring a worker): hire the worker
  - If $MRP_L < w$: hire less labor
  - If $MRP_L = w$: profit maximizing amount of labor

Hiring by a Firm in the Labor Market (with Capital Fixed)



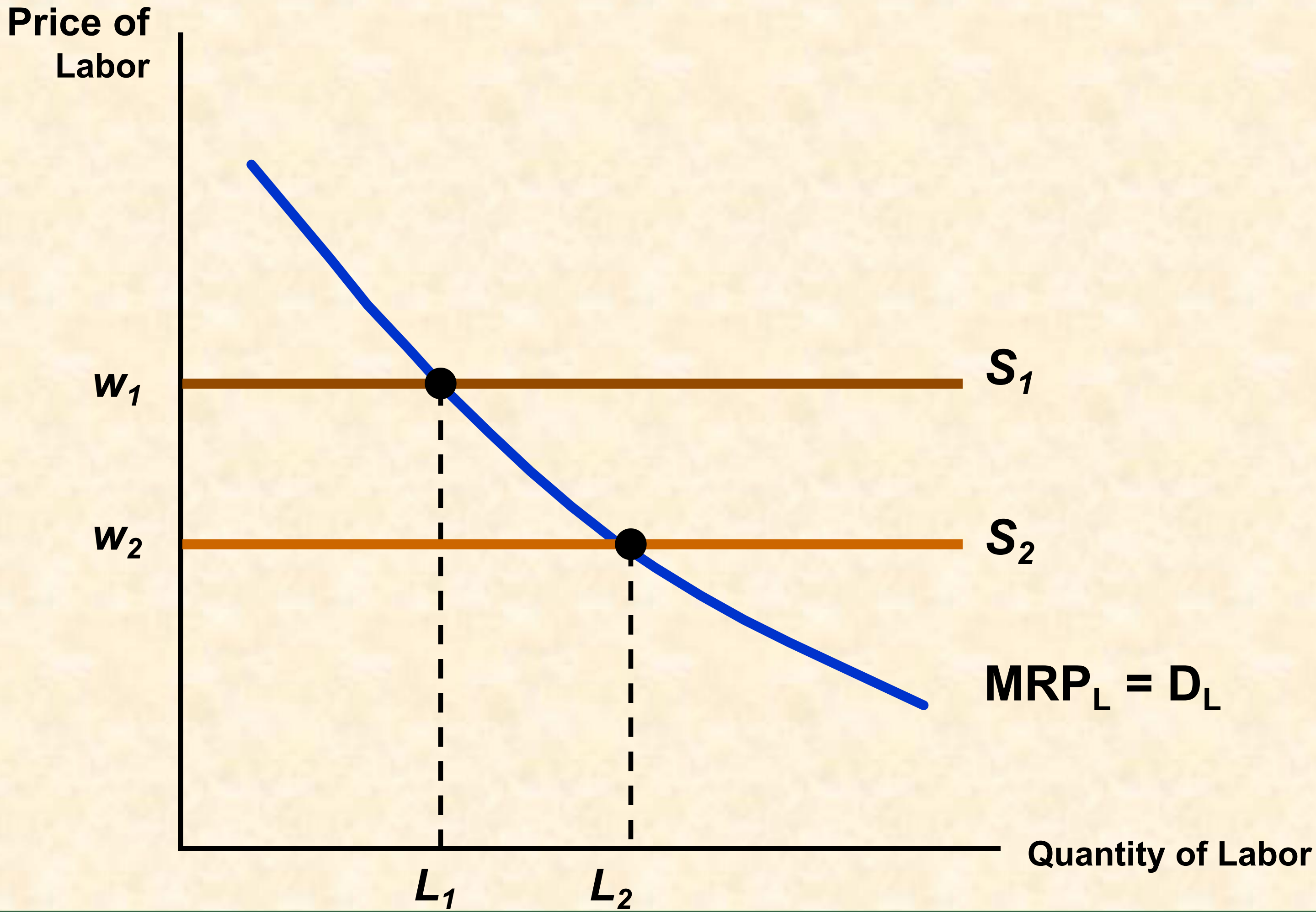
Competitive Factor Markets

Demand for a Factor Input When Only One Input Is Variable

- If the market supply of labor increased relative to demand (baby boomers or female entry), a surplus of labor would exist and the wage rate would fall.

- Question
  - How would this impact the quantity demanded for labor?

A Shift in the Supply of Labor



Competitive Factor Markets

- Comparing Input and Output Markets

$$\text{MRP}_\text{L} = (\text{MP}_\text{L})(\text{MR})$$

and at profit maximizing

number of workers $\text{MRP}_\text{L} = w$

$$(\text{MP}_\text{L})(\text{MR}) = w$$

$$\text{MR} = w/\text{MP}_\text{L}$$

$$w/\text{MP}_\text{L} = \text{MC of production}$$

Competitive Factor Markets

- Comparing Input and Output Markets
  - In both markets, input and output choices occur where MR = MC
    - MR from the sale of the output
    - MC from the purchase of the input

Competitive Factor Markets

Demand for a Factor Input When Several Inputs Are Variable

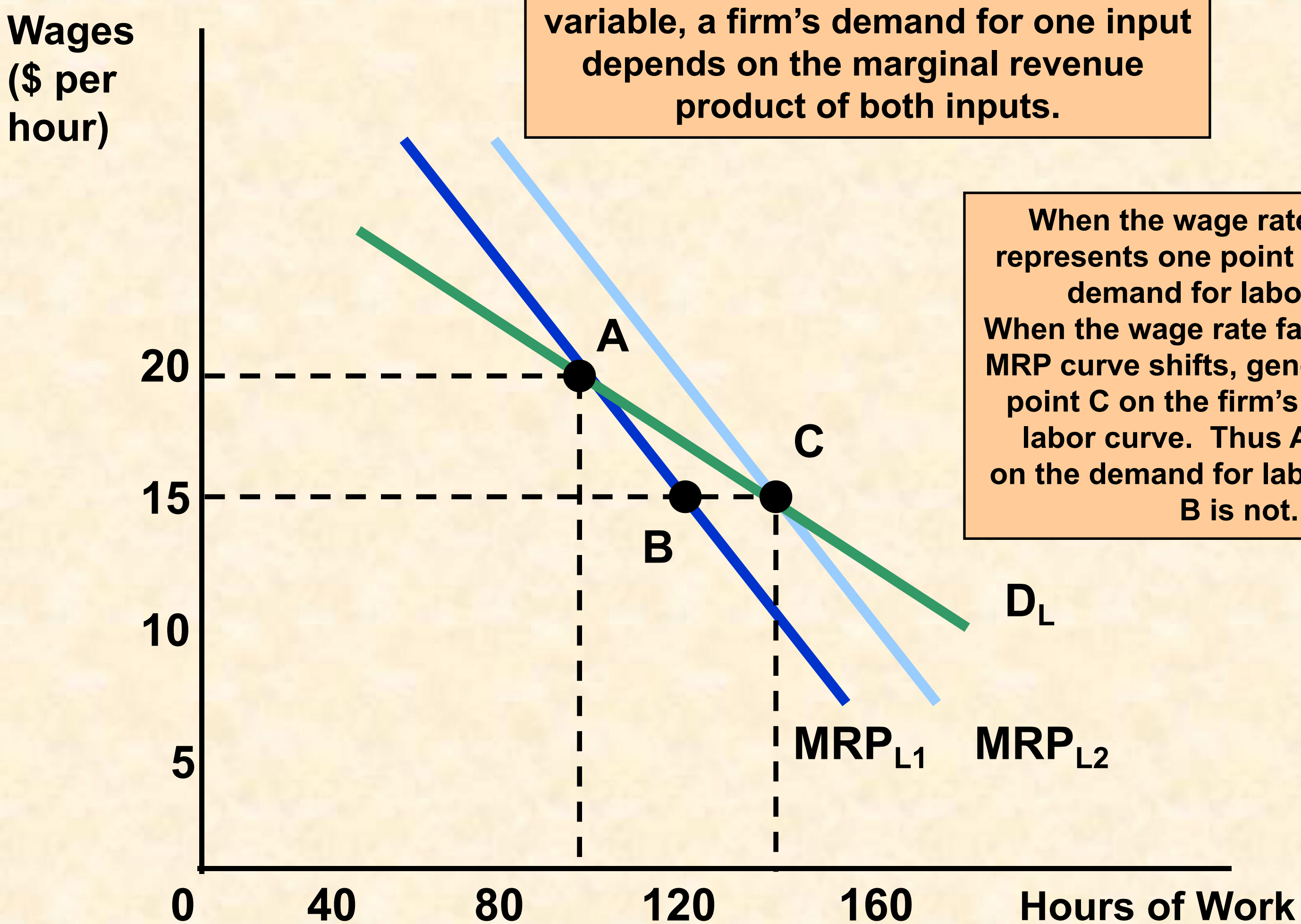
- Scenario
  - Producing farm equipment with two variable inputs:
    - Labor
    - Assembly-line machinery
  - Assume the wage rate falls

Competitive Factor Markets

Demand for a Factor Input When Several Inputs Are Variable

- Question
  - How will the decrease in the wage rate impact the demand for labor?

Firm's Demand Curve for Labor (with Variable Capital)



When two or more inputs are variable, a firm's demand for one input depends on the marginal revenue product of both inputs.

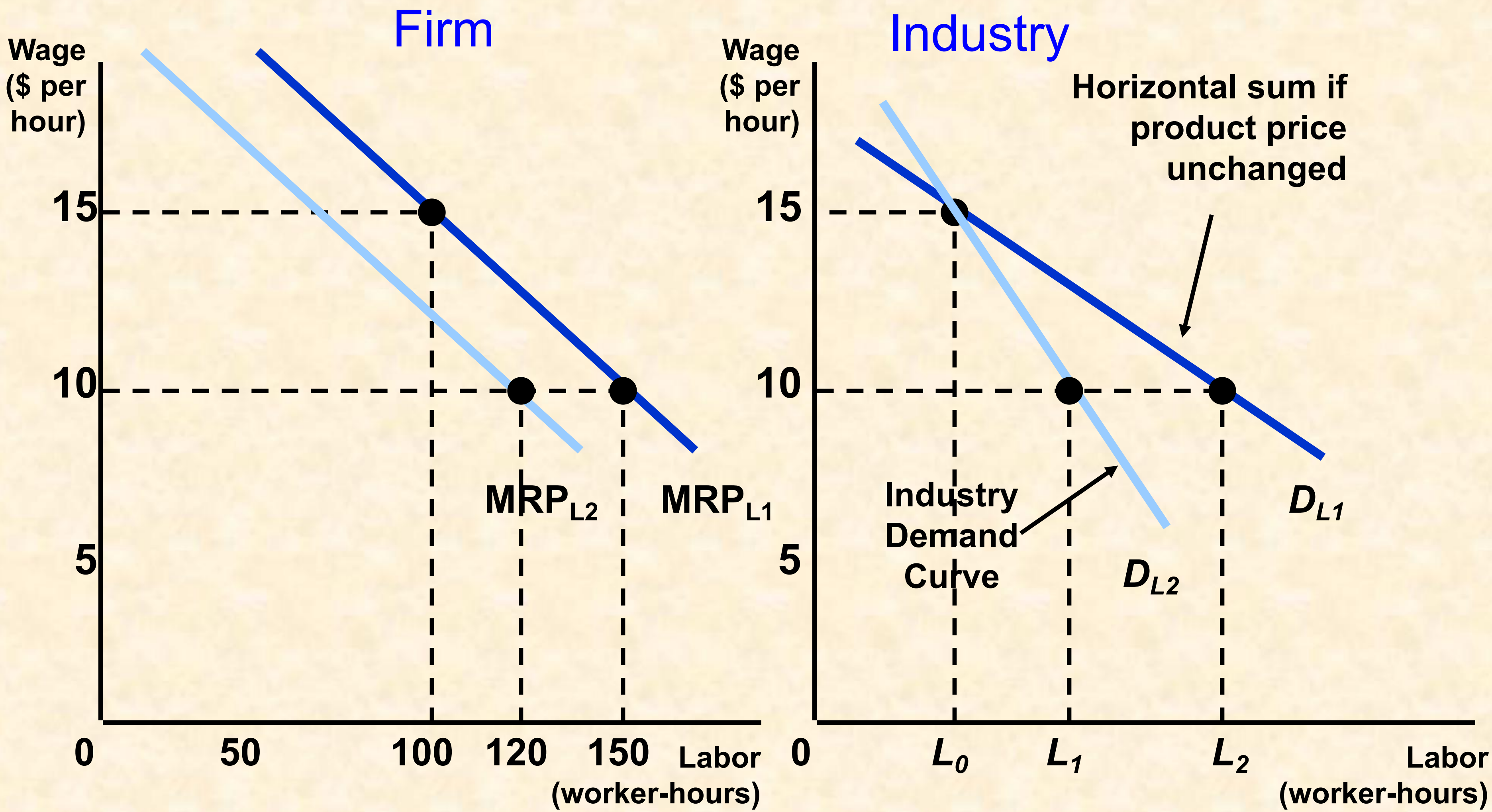
When the wage rate is $20, A represents one point on the firm's demand for labor curve. When the wage rate falls to $15, the MRP curve shifts, generating a new point C on the firm's demand for labor curve. Thus A and C are on the demand for labor curve, but B is not.

Competitive Factor Markets

Industry Demand for Labor

- Assume that all firms respond to a lower wage
  - All firms would hire more workers.
  - Market supply would increase.
  - The market price will fall.
  - The quantity demanded for labor by the firm will be smaller.

The Industry Demand for Labor



The Industry Demand for Labor

- Question
  - How would a change to a non-competitive market impact the derivation of the market demand for labor?

The Demand for Jet Fuel

- Observations
  - Jet fuel is a factor (input) cost
  - Cost of jet fuel
    - 1971--Jet fuel cost equaled 12.4% of total operating cost
    - 1980--Jet fuel cost equaled 30.0% of total operating cost
    - 1990's--Jet fuel cost equaled 15.0% of total operating cost

The Demand for Jet Fuel

- Observations
  - Airlines responded to higher prices in the 1970's by reducing the quantity of jet fuel used
  - Ton-miles increased by 29.6% & jet fuel consumed rose by 8.8%

The Demand for Jet Fuel

- Observations
  - The demand for jet fuel impacts the airlines and refineries alike
  - The short-run price elasticity of demand for jet-fuel is very inelastic

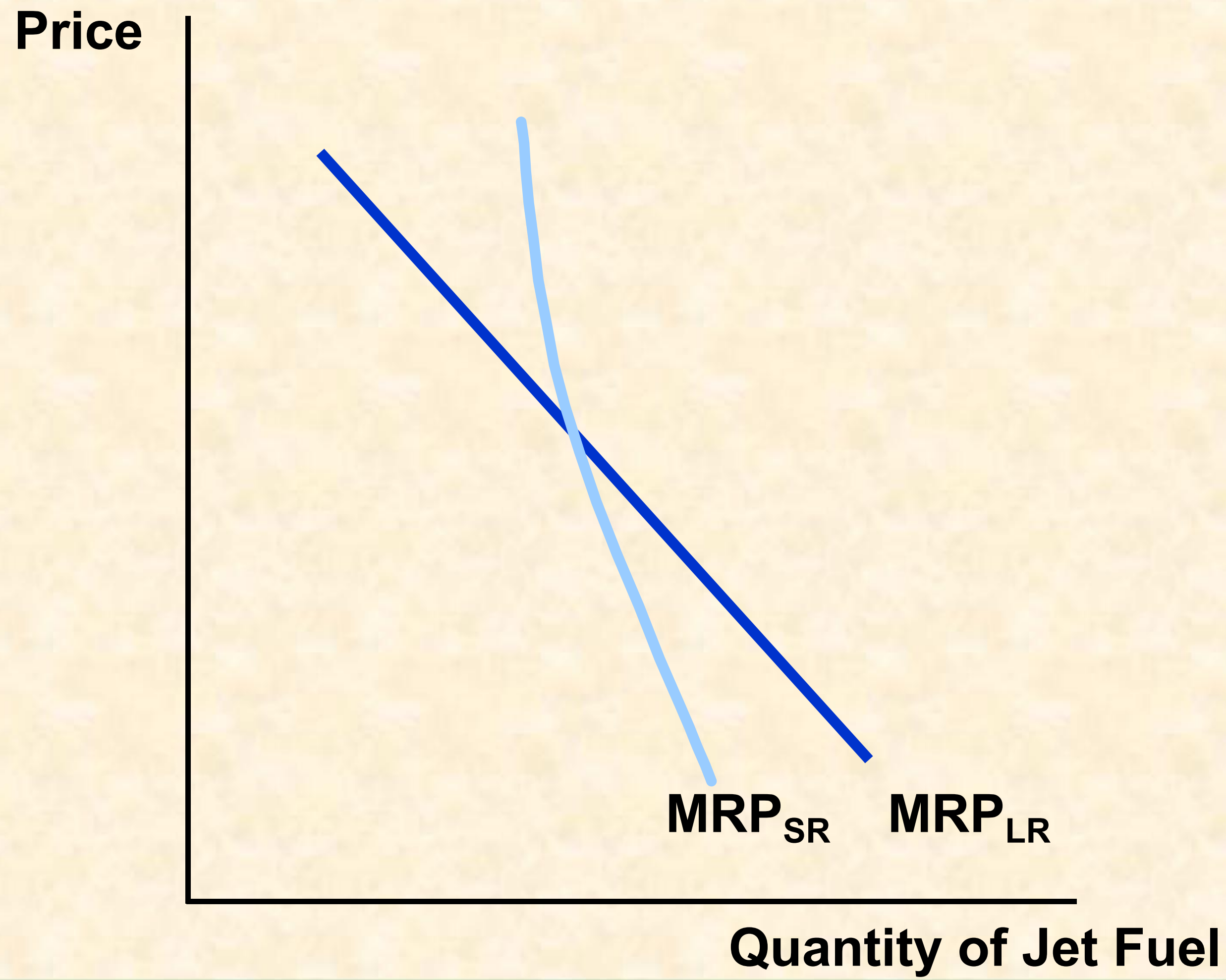
Short-run Price Elasticity of Demand for Jet Fuel

Airline	Elasticity	Airline	Elasticity
American	-.06	Delta	-.15
Continental	-.09	TWA	-.10
Northwest	-.07	United	-.10

The Demand for Jet Fuel

- Question
  - How would the long-run price elasticity of demand compare to the short-run?

The Short- and Long-Run Demand for Jet Fuel

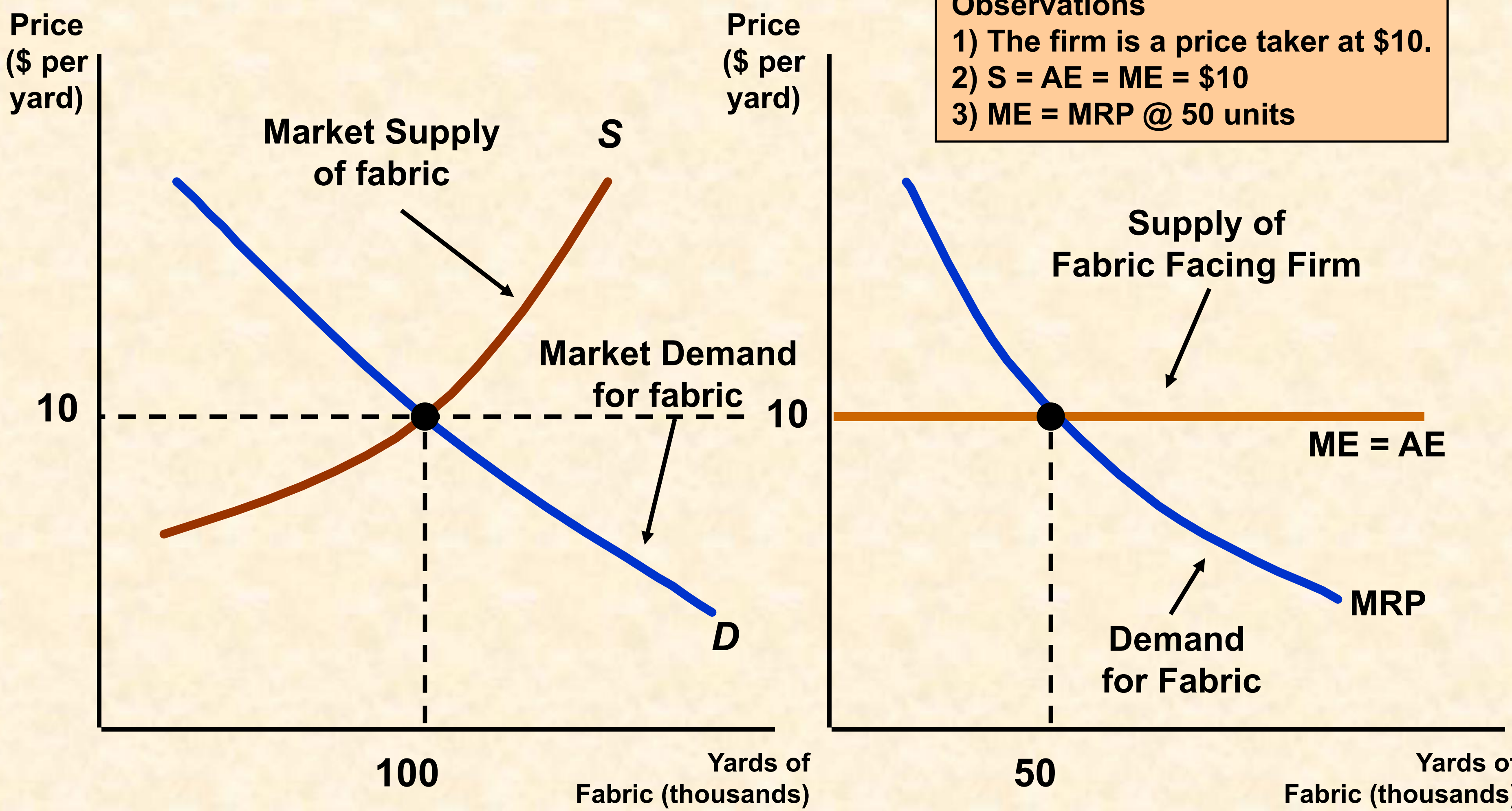


Competitive Factor Markets

- The Supply of Inputs to a Firm
  - Determining how much of an input to purchase
    - Assume a perfectly competitive factor market

A Firm's Input Supply in a Competitive Factor Market

Observations
1) The firm is a price taker at $10.
2) S = AE = ME = $10
3) ME = MRP @ 50 units



Competitive Factor Markets

- The Market Supply of Inputs
  - The market supply for physical inputs is upward sloping
    - Examples: jet fuel, fabric, steel
  - The market supply for labor may be upward sloping and backward bending

Competitive Factor Markets

- The Supply of Labor
  - The choice to supply labor is based on utility maximization
  - Leisure competes with labor for utility
  - Wage rate measures the price of leisure
  - Higher wage rate causes the price of leisure to increase

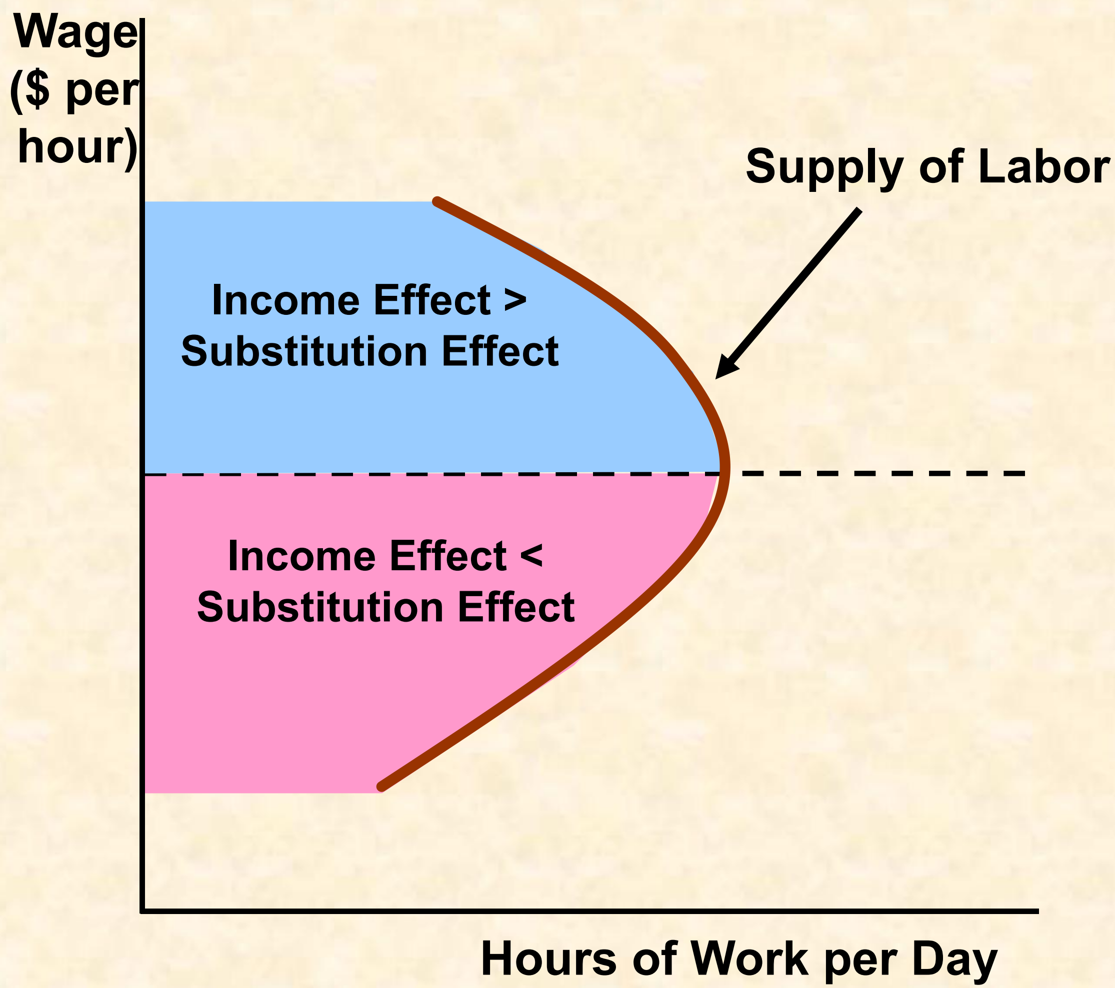
Competitive Factor Markets

- The Supply of Labor
  - Higher wages encourage workers to substitute work for leisure (i.e. the substitution effect)
  - Higher wages allow the worker to purchase more goods, including leisure which reduces work hours (i.e. the income effect)

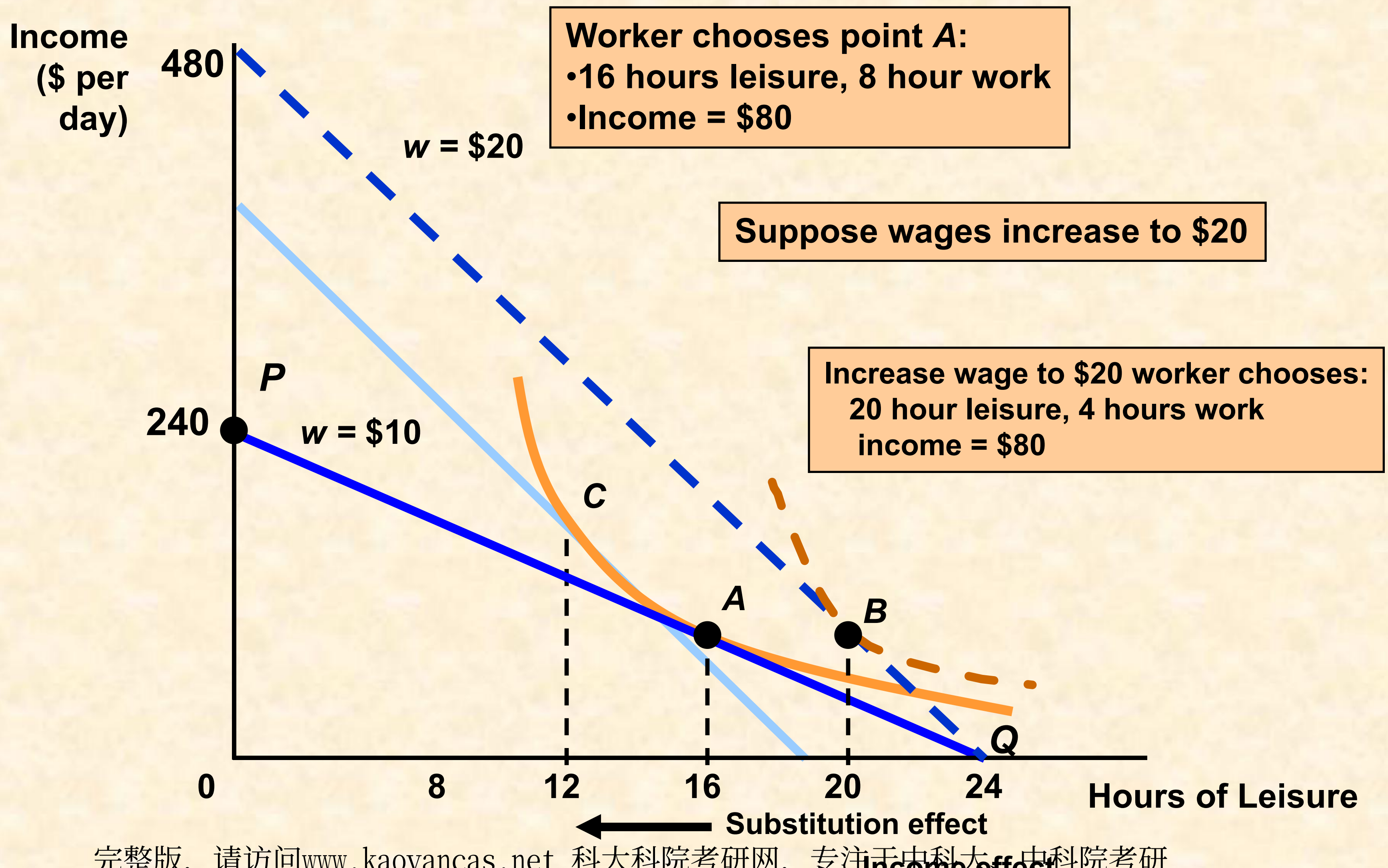
Competitive Factor Markets

- The Supply of Labor
  - If the income effect exceeds the substitution effect the supply curve is backward bending

Backward-Bending Supply of Labor



Substitution and Income Effects of a Wage Increase



Labor Supply for One- and Two-Earner Households

- Female Percent of Labor Force
  - 1950 -- 29%
  - 1999 -- 60%

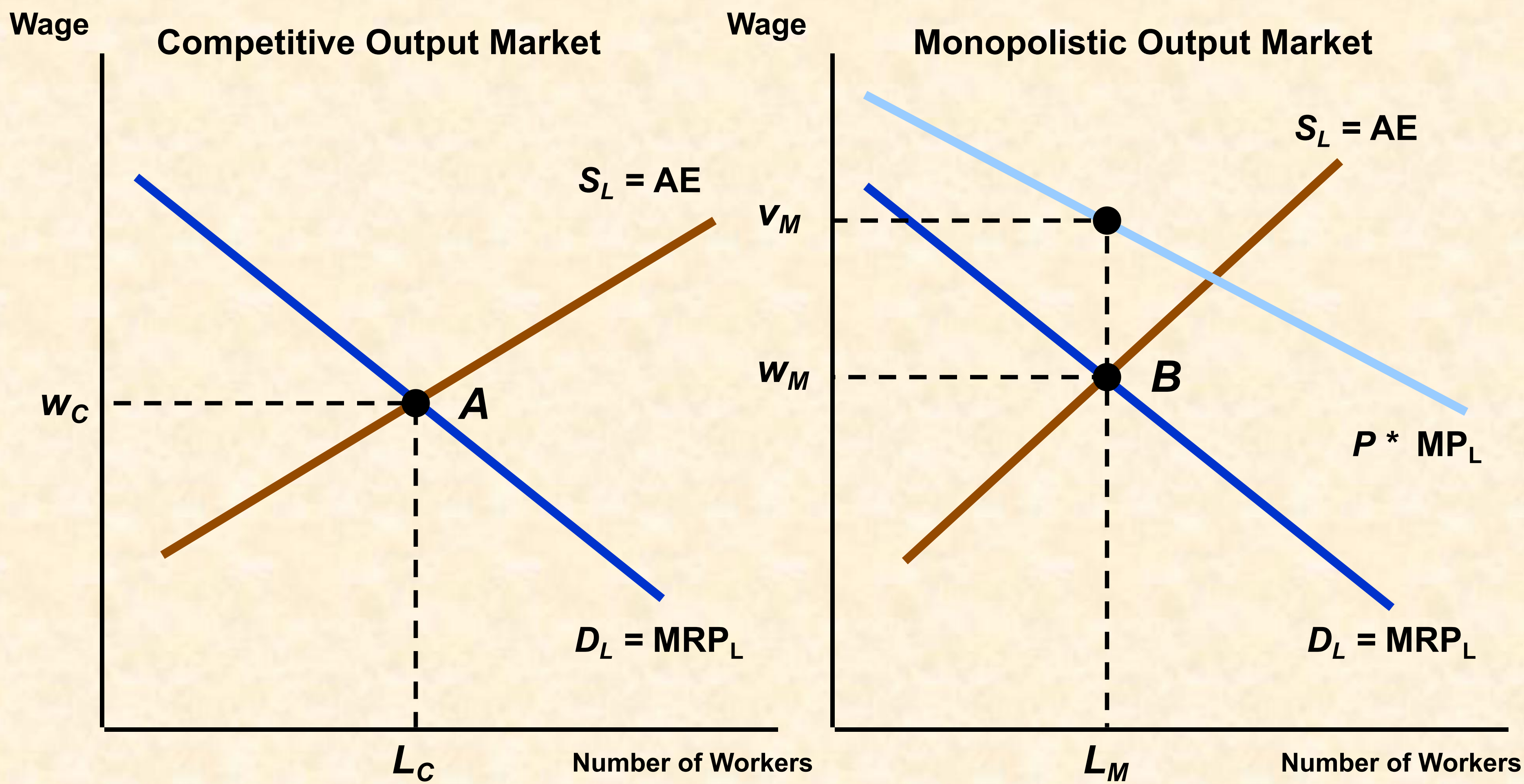
Elasticities of Labor Supply (Hours Worked)

Group	*Head's Hours with Respect to Head's Wage*	*Spouse's Hours with Respect to Spouse's Wage*	*Head's Hours with Respect to Spouse's Wage*
Unmarried males (no children)	**.026**		
Unmarried females (with children)	**.106**		
Unmarried females (no children)	**.011**		
One-earner family (with children)	**-.078**		
One-earner family (no children)	**.007**		
Two-earner family (with children)	**-.002**	**-.086**	**-.004**
Two-earner family (no children)	**-.107**	**-.028**	**-.059**

Equilibrium in a Competitive Factor Market

- A competitive factor market is in equilibrium when the price of the input equates the quantity demanded to the quantity supplied.

Labor Market Equilibrium



Labor Market Equilibrium

- Equilibrium in a Competitive Output Market
  - $D_L(\mathrm{MRP_L}) = S_L$
  - $w_C = \mathrm{MRP_L}$
  - $\mathrm{MRP_L} = (P)(\mathrm{MP_L})$
  - Markets are efficient
- Equilibrium in a Monopolistic Output Market
  - $\mathrm{MR} < P$
  - $\mathrm{MRP} = (\mathrm{MR})(\mathrm{MP_L})$
  - Hire L_M at wage w_M
  - v_M = marginal benefit to consumers
  - w_M = marginal cost to the firm

Labor Market Equilibrium

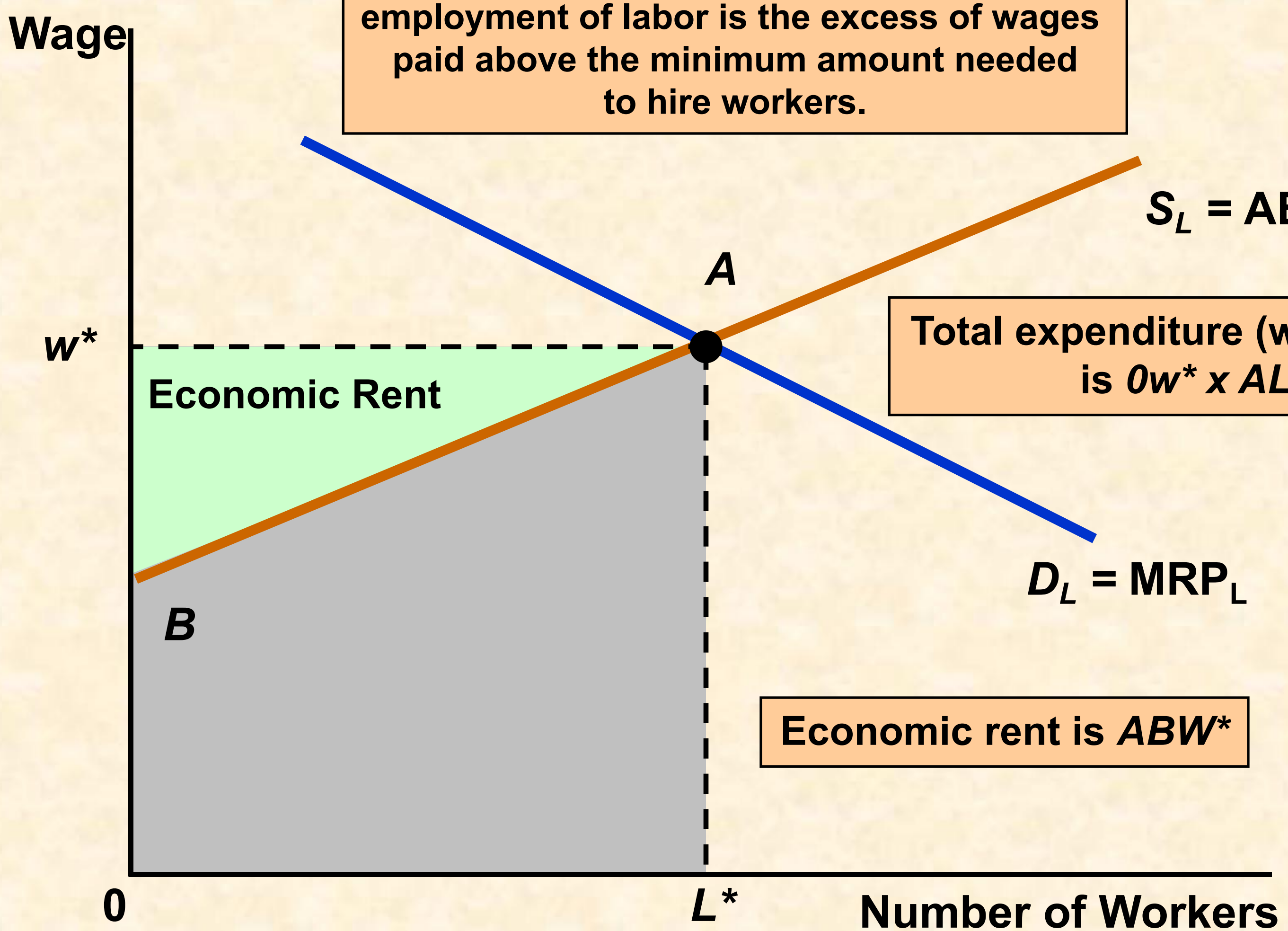
- Equilibrium in a Competitive Output Market
  - $D_L(\mathrm{MRP_L}) = S_L$
  - $w_C = \mathrm{MRP_L}$
  - $\mathrm{MRP_L} = (P)(\mathrm{MP_L})$
  - Markets are efficient
- Equilibrium in a Monopolistic Output Market
  - Profits maximized
  - Using less than the efficient level of input

Equilibrium in a Competitive Factor Market

- Economic Rent
  - For a factor market, *economic rent is the difference between the payments made to a factor of production and the minimum amount that must be spent to obtain the use of that factor.*

Economic Rent

The economic rent associated with the employment of labor is the excess of wages paid above the minimum amount needed to hire workers.



Total expenditure (wage) paid is *0w* x AL**

Economic rent is *ABW**

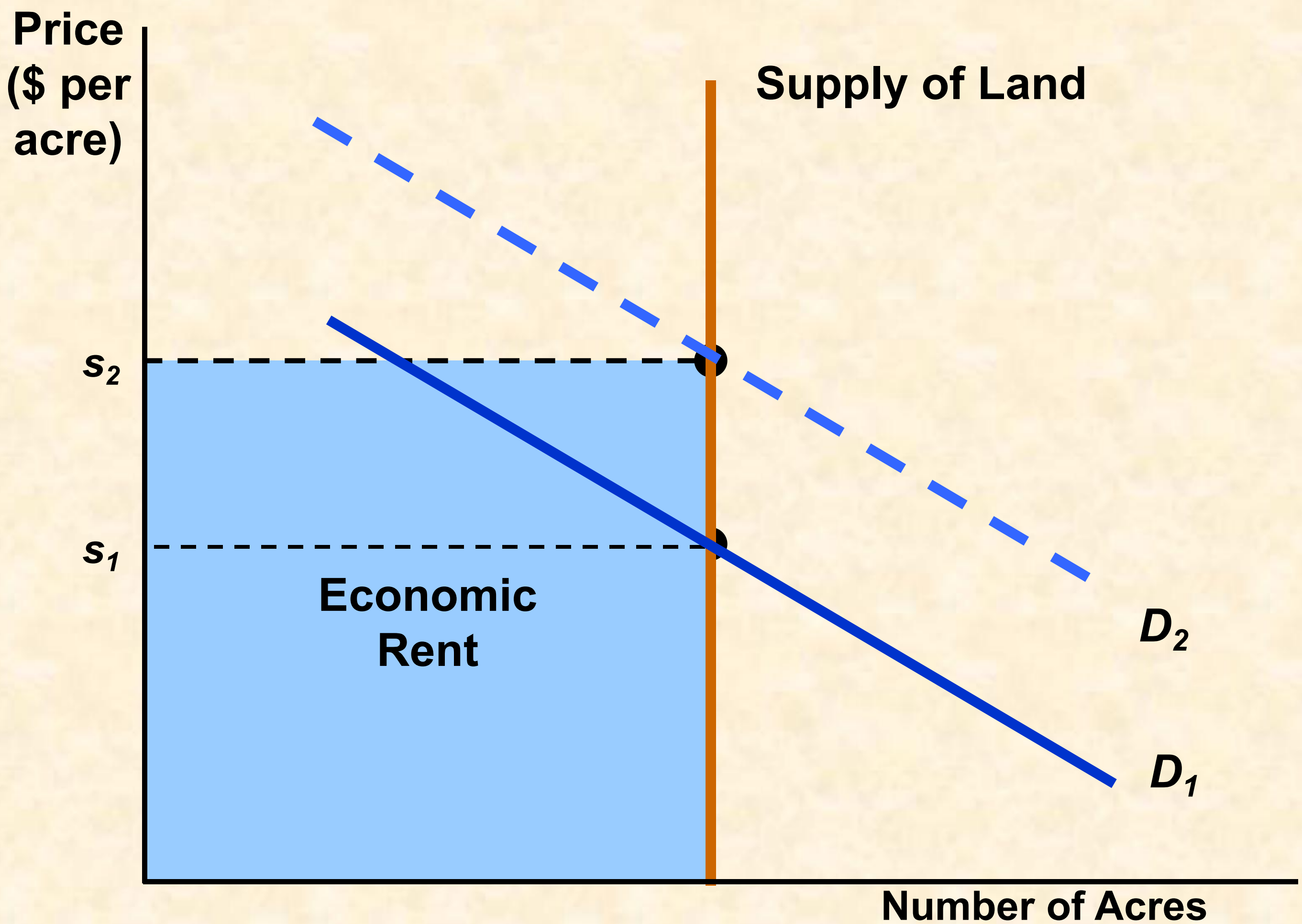
Economic Rent

- **Question**
  - What would be the economic rent if S_L is perfectly elastic or perfectly inelastic?

Equilibrium in a Competitive Factor Market

- Land: A Perfectly Inelastic Supply
  - With land inelastically supplied, its price is determined entirely by demand, at least in the short run.

Land Rent


Price
($ per
acre)
Supply of Land
s2
s1
Economic
Rent
D2
D1
Number of Acres

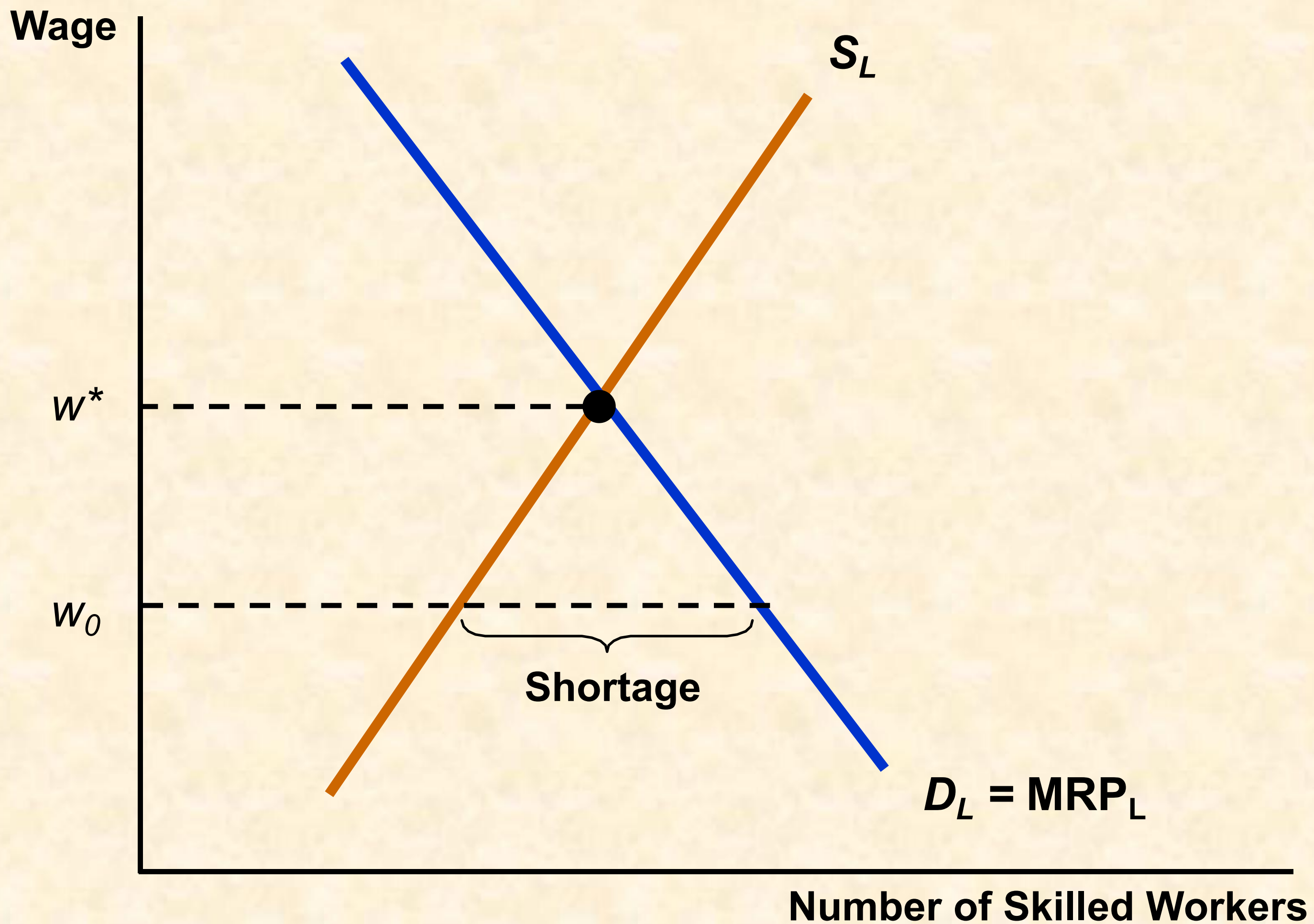
Pay in the Military

- During the Civil War 90% of the armed forces were unskilled workers involved in ground combat.
- Today, only 16% are unskilled workers involved in ground combat.

Pay in the Military

- Shortages of skilled personnel has occurred? Why?
  - Hint: If there is a shortage, the wage must be below the…?

The Shortage of Skilled Military Personnel



Pay in the Military

- Military pay is based on years of service not *MRP*.
- *MRP* increases and the private sector pay is greater than military pay.
- Many leave the military.

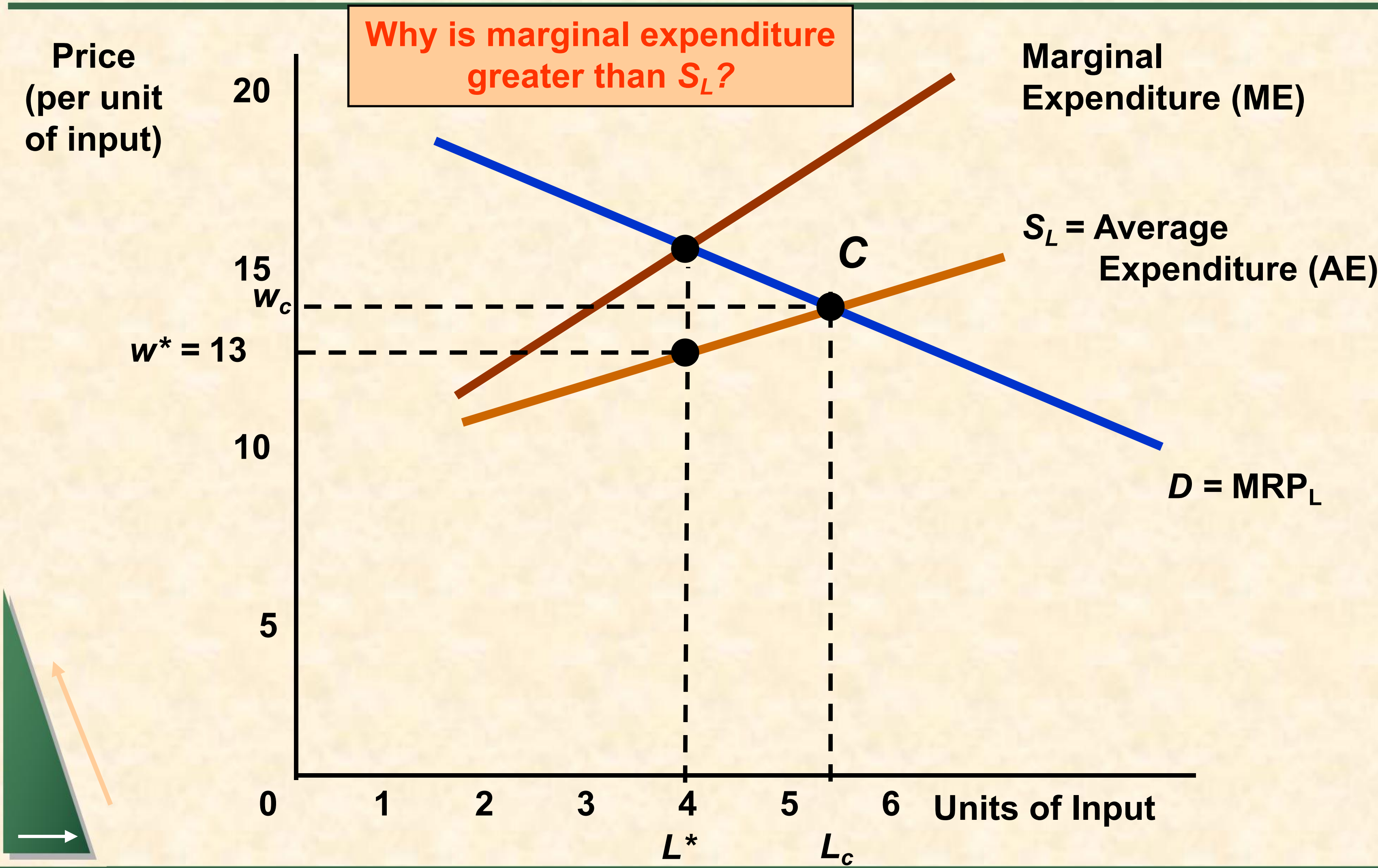
Pay in the Military

- Solution
  - Selective reenlistment bonuses
  - Base pay on *MRP*

Factor Markets with Monopsony Power

- Assume
  - The output market is perfectly competitive.
  - Input market is pure monopsony.

Marginal and Average Expenditure



Factor Markets with Monopsony Power

- Examples of Monopsony Power
  - Government
    - Soldiers
    - Missiles
    - B2 Bombers
  - NASA
    - Astronauts
  - Company town

Monopsony Power in the Market for Baseball Players

- Baseball owners created a monopsonistic cartel
  - Reserve clause prevented competition for players
  - 1975--Free agency after six years
  - 1969--Average salary was $42,000 ($200,000 in 1999 dollars)
  - 1997--Average salary was $1,383,578

Monopsony Power in the Market for Baseball Players

- Baseball owners created a monopolistic cartel
  - 1975 salaries were 25% of team expenditures
  - 1980 salaries were 40% of team expenditures

Teenage Labor Markets and the Minimum Wage

- When the minimum wage rose in New Jersey in 1992 from $4.25 to $5.05, a survey conducted found a 13% increase in employment.

Teenage Labor Markets and the Minimum Wage

- Explanations
  - Reduction in fringe benefits
  - Lower pay for more productive workers
  - Monopsony market

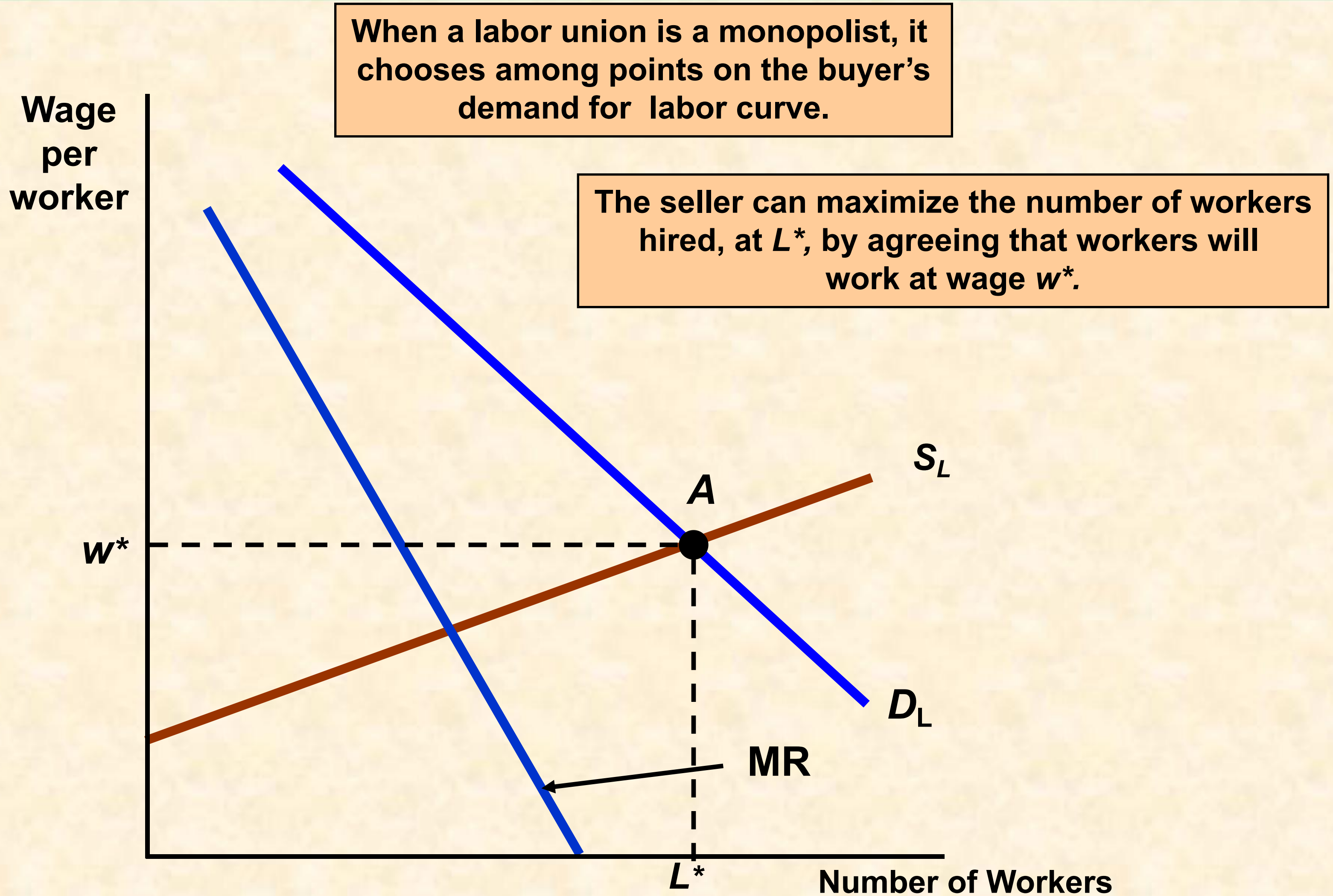
Teenage Labor Markets and the Minimum Wage

- Findings
  - None of the explanations are validated by the survey results
  - Indicates of the need for further study

Factor Markets with Monopoly Power

- Just as buyers of inputs can have monopsony power, sellers of inputs can have monopoly power.
- The most important example of monopoly power in factor markets involves labor unions.

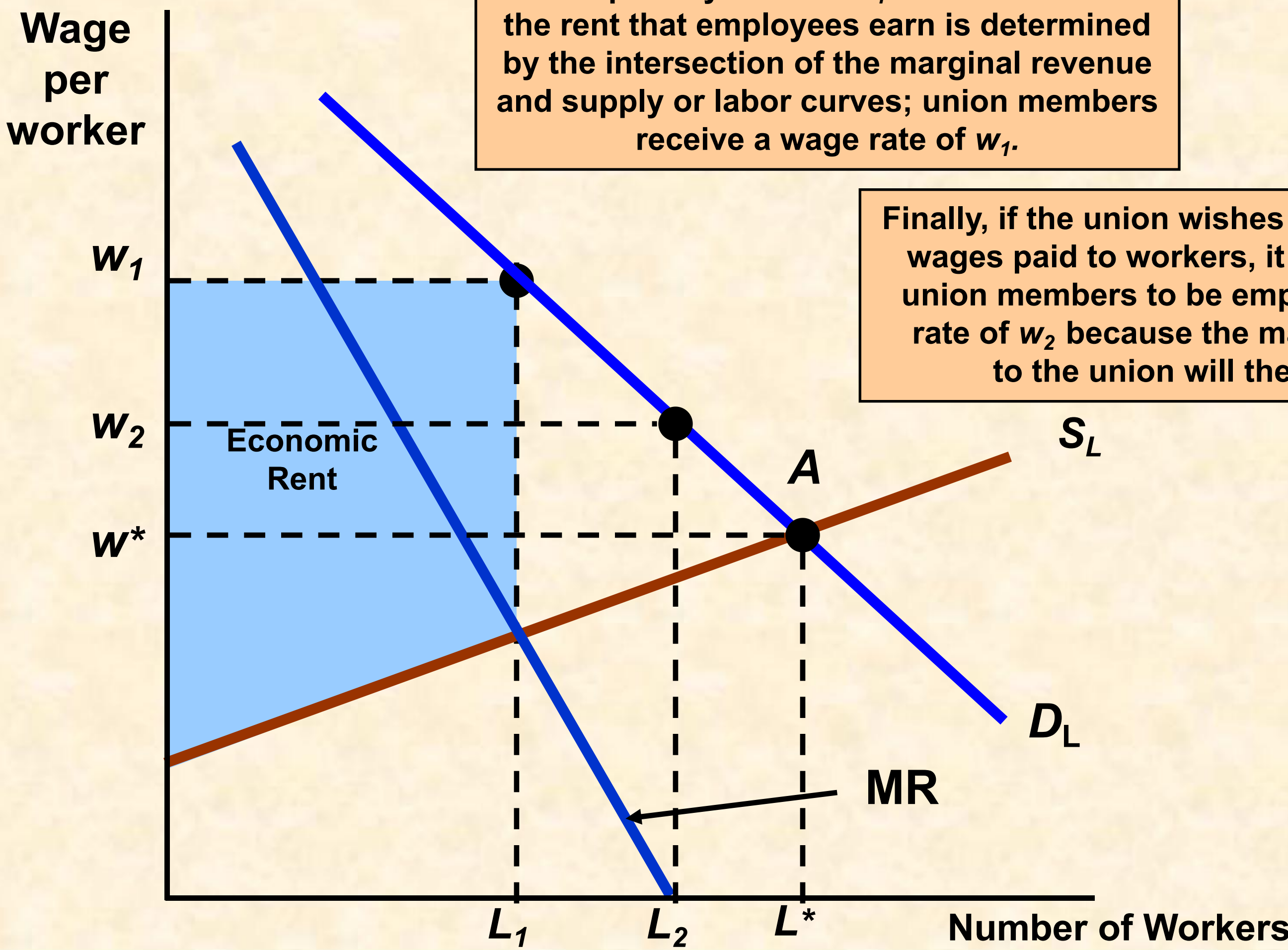
Monopoly Power of Sellers of Labor



Monopoly Power of Sellers of Labor

The quantity of labor L_1 that maximizes the rent that employees earn is determined by the intersection of the marginal revenue and supply or labor curves; union members receive a wage rate of w_1.

Finally, if the union wishes to maximize total wages paid to workers, it should allow L_2 union members to be employed at a wage rate of w_2 because the marginal revenue to the union will then be zero.



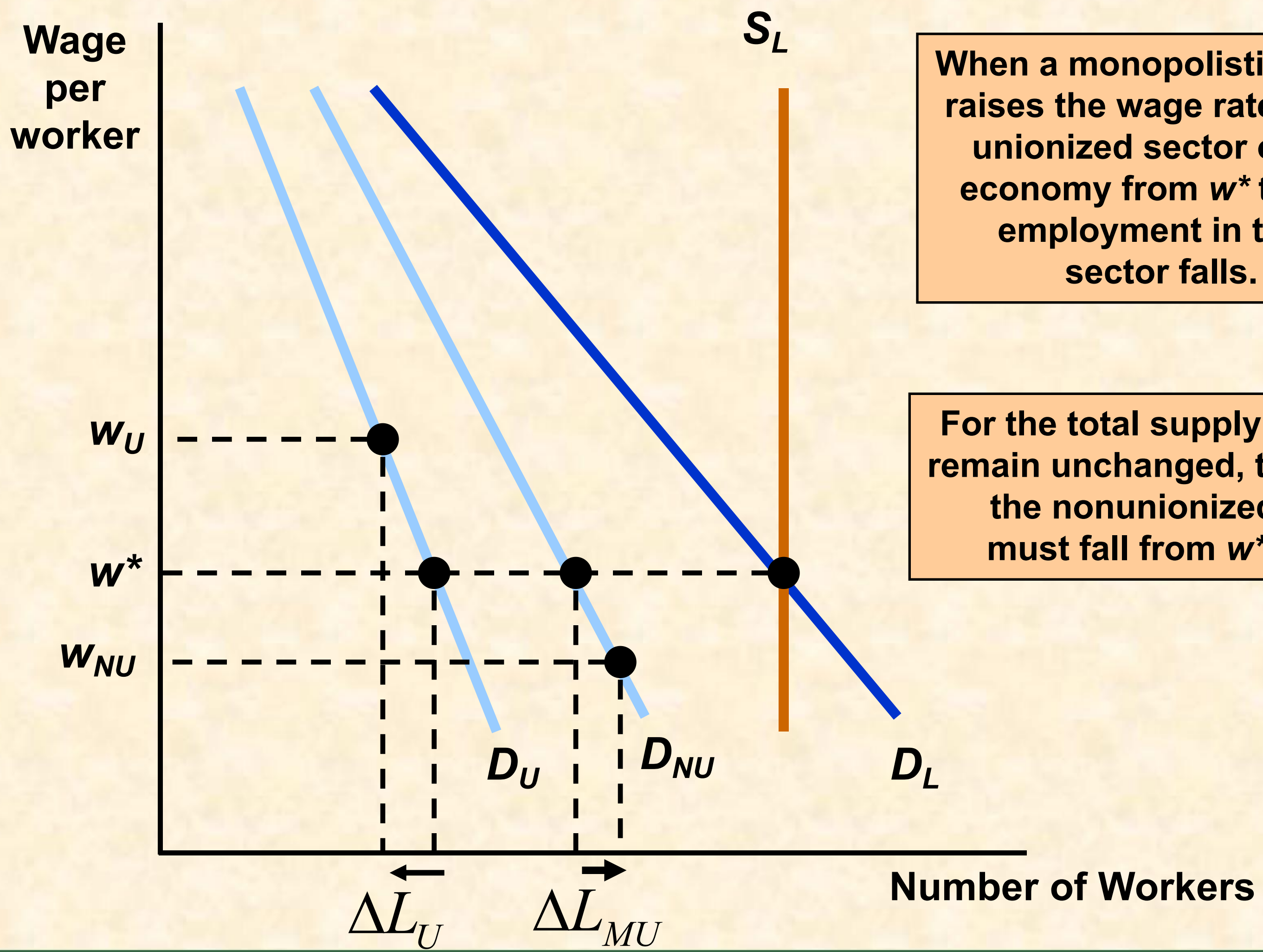
Factor Markets with Monopoly Power

- The primary determinant of controlling wage and economic rent is controlling the supply of labor

Factor Markets with Monopoly Power

- A Two-Sector Model of Labor Employment
  - Union monopoly power impacts the nonunionized part of the economy.

Wage Determination in Unionized and Nonunionized Sectors



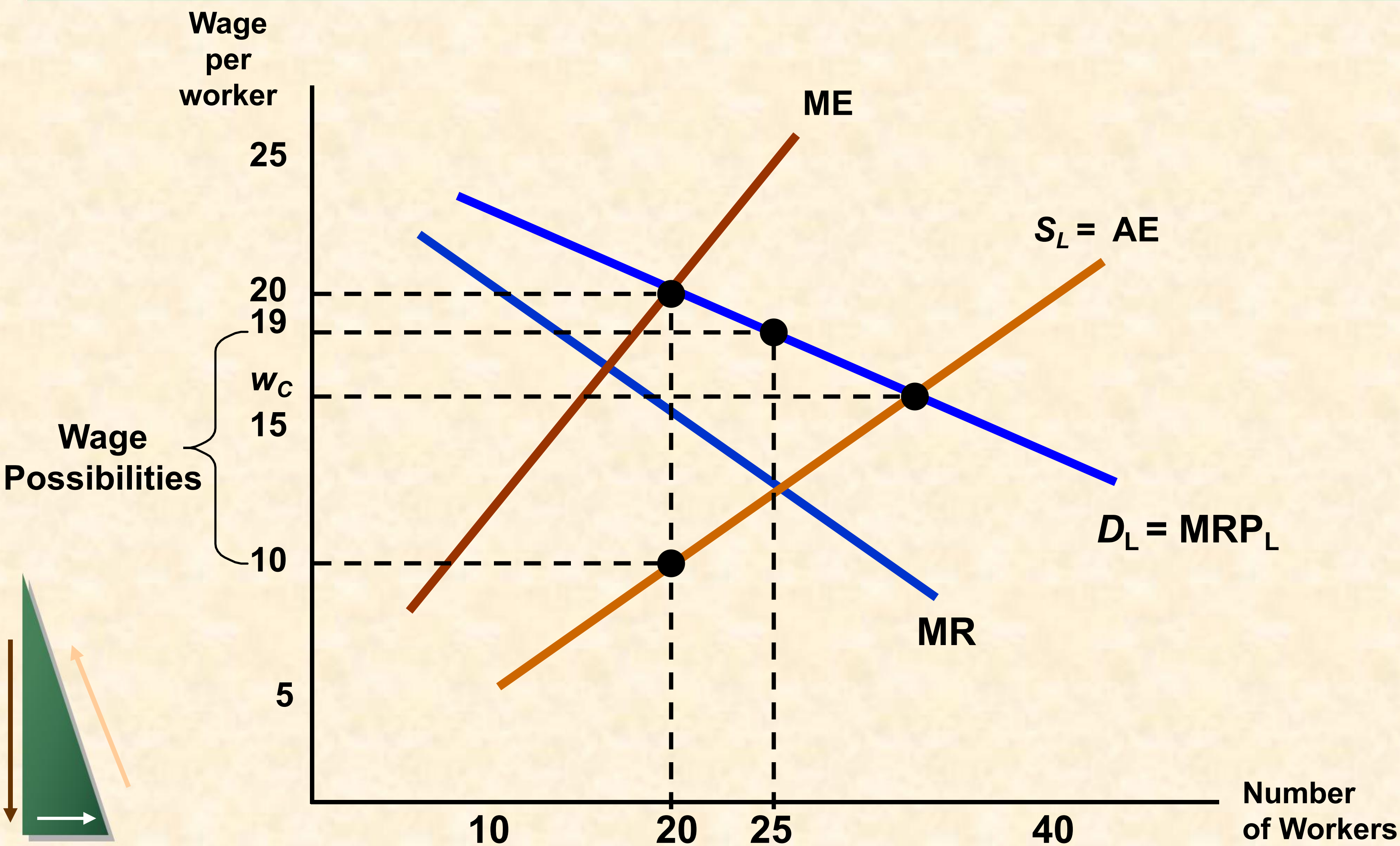
When a monopolistic union raises the wage rate in the unionized sector of the economy from w^* to w_U, employment in that sector falls.

For the total supply of labor to remain unchanged, the wage in the nonunionized sector must fall from w^* to w_{NU}.

Factor Markets with Monopoly Power

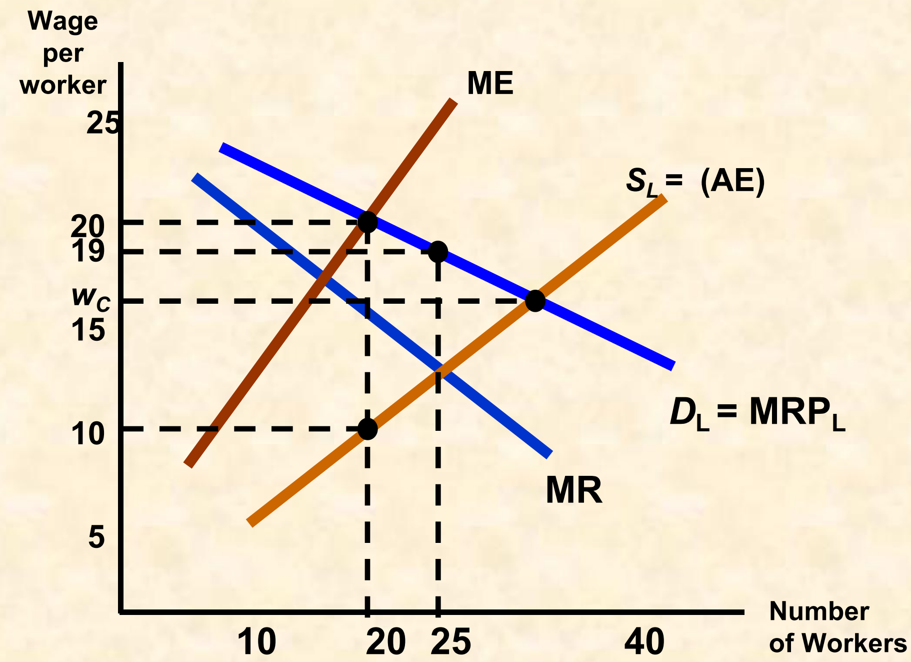
- Bilateral Monopoly
  - Market in which a monopolist sells to a monopsonist.

Bilateral Monopoly



Bilateral Monopoly

- Observations
  - Hiring without union monopoly power
    - *MRP* = *ME* at 20 workers and *w* = \$10/hr
  - Union's objective
    - *MR* = *MC* at 25 workers and *w* = \$19/hr



Bilateral Monopoly

- Who Will Win?
  - The union will if its threat to strike is credible.
  - The firm will if its threat to hire non-union workers is credible.
  - If both make credible threats the wage will be at w_c.

The Decline of Private Sector Unionism

- Observations
  - Union membership and monopoly power has been declining.
  - Initially, during the 1970's, union wages relative to nonunion wages fell.

The Decline of Private Sector Unionism

- Observations
  - In the 1980's union wages stabilized relative to non-union wages.
  - In the 1990's membership has been falling and wage differential has remained stable.

The Decline of Private Sector Unionism

- Explanation
  - The unions have been attempting to maximize the individual wage rate instead of total wages paid.
  - The demand for unionized employees has probably become increasingly elastic as firms find it easier to substitute capital for skilled labor.

Wage Inequality--Have Computers Changed the Labor Market?

- 1950 - 1980
  - Relative wage of college graduates to high-school graduates hardly changed
- 1980-1995
  - The relative wage grew rapidly

Wage Inequality--Have Computers Changed the Labor Market?

- In 1984, 25.1% of all workers used computers
- 1993 -- 46.6%
- 1999 -- nearly 60%

Wage Inequality--Have Computers Changed the Labor Market?

- Percent change in use of computers
  - College degrees
    - 1984 - 1993 -- 42 to 70%
  - Less than high school degree
    - 5 to 10%
  - With high school degree
    - 19 to 35%

Wage Inequality--Have Computers Changed the Labor Market?

- Growth in wages -- 1983 - 1994
  - College graduates using computers - 11%
  - Non-computer users -- less than 4%

Wage Inequality--Have Computers Changed the Labor Market?

- 1993 - 1997
  - High school dropouts out of school less than 10 years earned 29% less than high school graduates
  - 1963 -- The differential was only 19%

Wage Inequality--Have Computers Changed the Labor Market?

- 1993 - 1997
  - Average weekly wage for college graduates (out of school less than 10 years) was 96% higher than high school graduates.
  - College graduation premium has more than doubled.

Summary

- In a competitive input market, the demand for an input is given by the MRP, the product of the firm’s marginal revenue, and the marginal product of the input.
- A firm in a competitive labor market will hire workers to the point at which the marginal revenue product of labor is equal to the wage rate.

Summary

- The market demand for an input is the horizontal sum of the industry demands for the input.
- When factor markets are competitive, the buyer of an input assumes that its purchase will have no effect on the price of the input.

Summary

- The market supply of a factor such as labor need not be upward sloping.
- Economic rent is the difference between the payments to factors of production and the minimum payment that would be needed to employ those factors.

Summary

- When a buyer of an input has monopsony power, the marginal expenditure curve lies above the average expenditure curve.
- When the input seller is a monopolist such as a labor union, the seller chooses the point on the marginal revenue product curve that best suits its objective.

Summary

- When a monopolistic union bargains with a monopsonistic employer, the wage rate depends on the nature of the bargaining process.

End of Chapter 14

Markets for Factor Inputs