

LEARN

In factor markets, the demand for a factor (such as labor, land, or capital) and the supply of a factor can both change due to shifts in their underlying determinants:

CHANGES IN FACTOR DEMAND

The demand for a factor is **derived demand**. It depends on the demand for the good or service that the factor helps produce. The labor demand curve shifts when any of the following determinants change:

- **Output (product) price:** If the price of the final good increases, the marginal revenue product ($MRP = MP \times MR$) of the factor rises, shifting factor demand rightward. This could be due to an increase in demand for a product.
- **Productivity of the factor:** If workers or machines become more productive (higher marginal product), firms are willing to hire more at every wage, shifting demand rightward.
- A decrease in either of these shifts demand leftward/

CHANGES IN FACTOR SUPPLY

The supply of a factor reflects how many workers (or other inputs) are willing and able to offer their services at different prices. The supply of labor increases or decreases (shifts) when conditions other than the wage change:

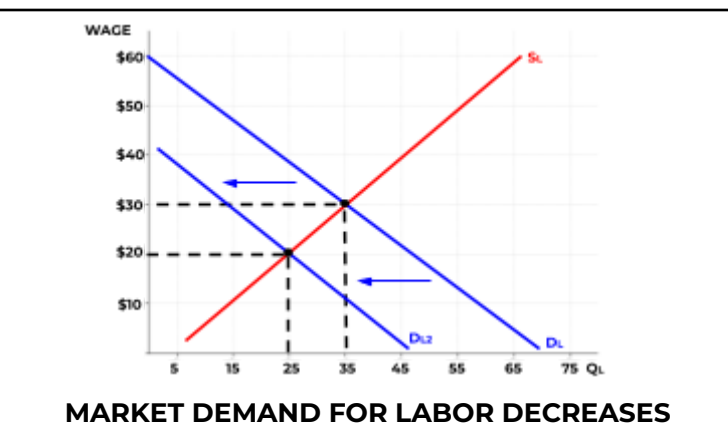
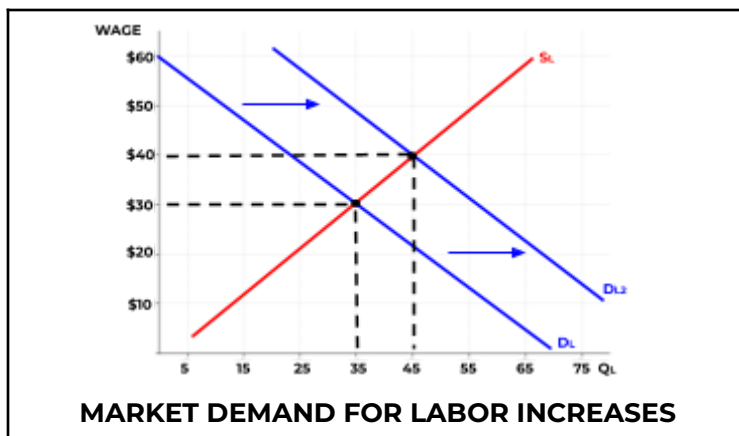
- Population Growth or Decline
- Immigration or Emigration
- Changes in Worker Preferences Between Work & Leisure
- Education
- Alternative Opportunities
- Barriers to Entry

In factor markets, the supply of labor represents how many workers are willing and able to work at different wage rates. It slopes upward because higher wages attract more workers or encourage existing workers to offer more labor hours.

PROFIT MAXIMIZATION

Firms will hire the quantity of workers where Marginal Revenue Product equals Marginal Resource Cost ($MRP = MRC$). Firms must take the wage set in the labor market and will hire more workers as long as MRP is greater than or equal to MRC. If MRC is higher than MRP, firms will reduce the number of workers they employ. Firms are price takers and must pay each worker according to the wage rate set in the market for that factor.

FACTOR MARKET GRAPHS



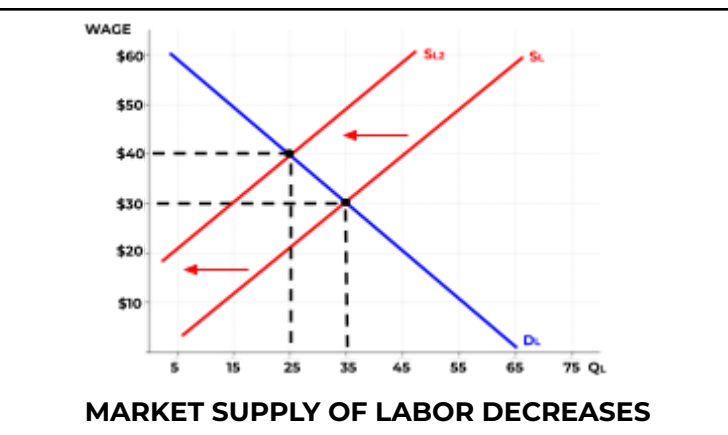
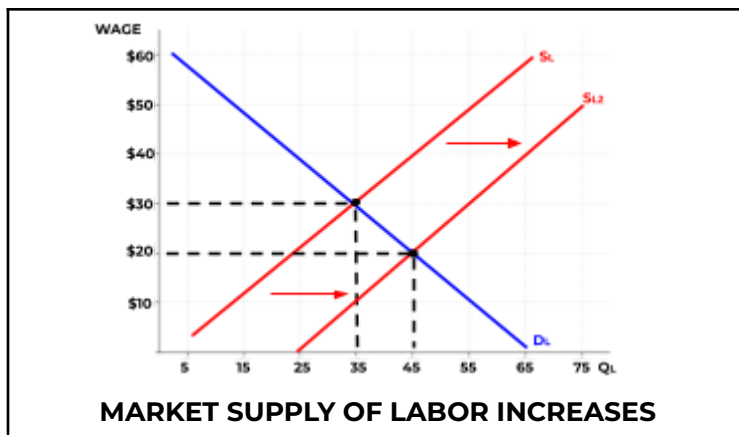
DETERMINANTS OF LABOR DEMAND

Product Price

- If the price of the product rises, the MRP of each worker increases, shifting demand for labor to the right.
- If the price of the product falls, the MRP of each worker decreases, shifting demand for labor to the left.

Productivity of the worker

- Improvements in worker productivity due to better training, education, or technology that augments the worker increase the MRP and shift labor demand to the right.
- Decreases in worker productivity shift labor demand to the left.
- Technology that replaces workers shifts labor demand to the left.



DETERMINANTS OF LABOR SUPPLY

Population Growth or Decline

- More people in the labor force increase supply of labor.
- Fewer working-age individuals or a population decline reduces supply.

Immigration or Emigration

- Influx of workers willing to work at current wages increases supply.
- Workers leaving the country or region reduces supply.

Changes in Worker Preferences Between Work & Leisure

- More people willing to work or more women entering the labor force increases supply.
- More people choosing to stay at home or stay in school longer reduces supply.

Education

- Improved education or training increases the supply of qualified workers.

Alternative Opportunities

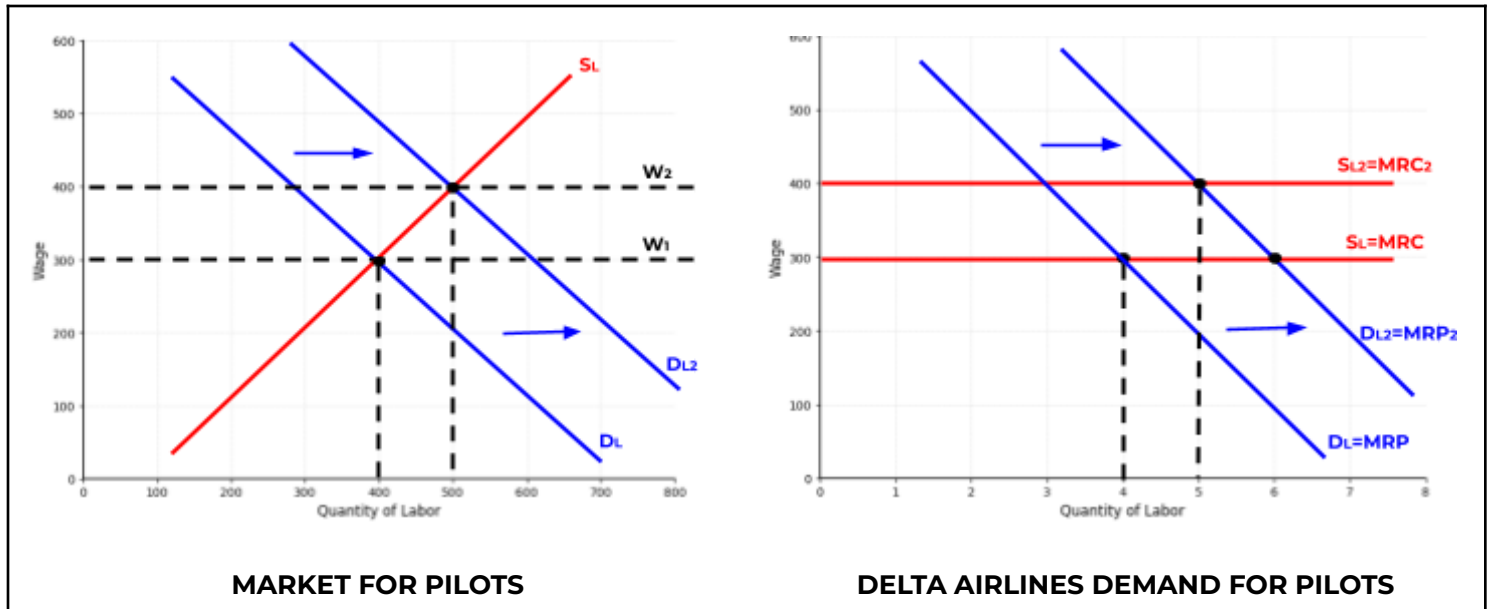
- If jobs in other markets become less attractive (lower pay, fewer benefits), workers shift toward this market.
- If alternative labor markets pay more, workers exit the current market.

Barriers to Entry

- Licensing requirements or other restrictions can limit the supply of workers.

CHANGE IN DEMAND FOR LABOR

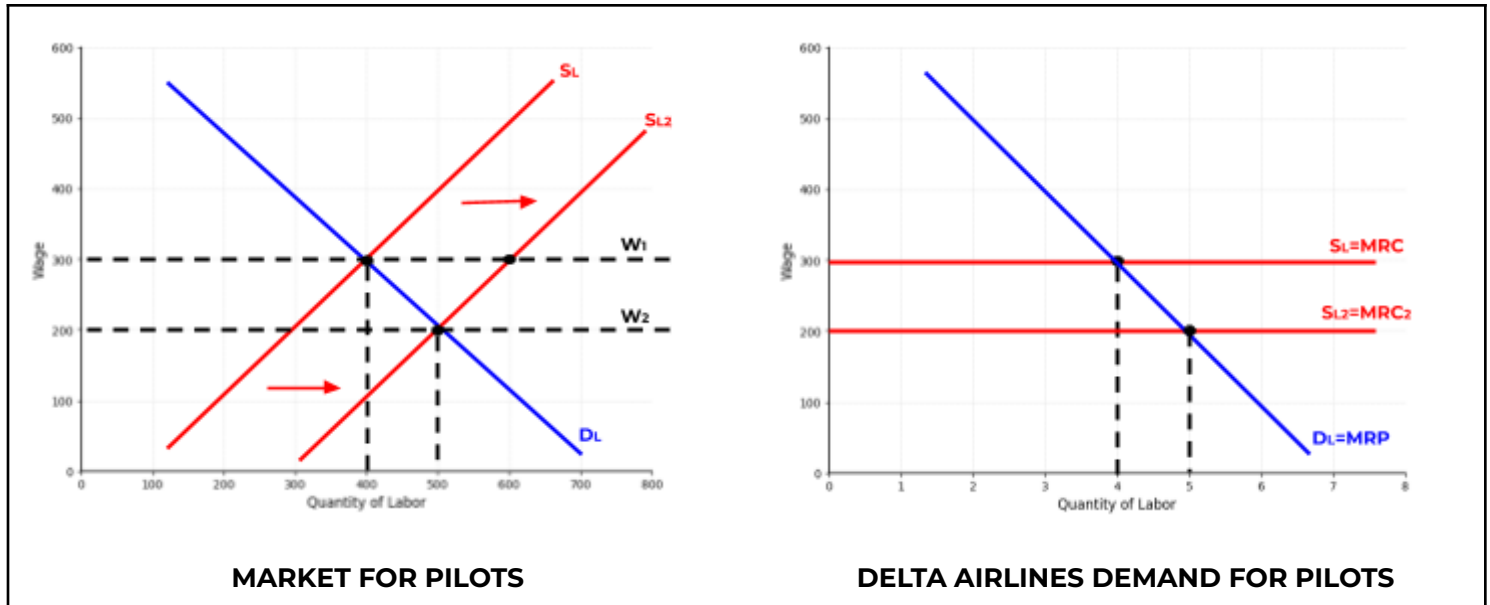
Note: This process usually begins with the firm. In the example below, if the price of airline tickets rises due to an increase in demand for travel, airlines will demand more pilots. Due to this price increase, Delta's (and other airlines) demand for pilots increases, shifting the $D=MRP$ curve to the right. The market demand for pilots is the sum of all individual firms MRP so the market demand for pilots shifts right. This drives up market wages. Each firm will hire the number of workers where $MRP=MRC$. In this example, Delta will hire 5 pilots and pay them \$400 each.



- Price of airline tickets rises. Since $MRP = \text{Price} \times MP$, this shifts the MRP curve for Delta to the right.
- Since Market Demand for labor is the sum of all individual firms MRP, the market demand curve also shifts right. At the current wage rate of \$300 there would be a shortage of pilots. The market moves toward the new equilibrium of 500 pilots and a wage rate of \$400.
- Each firm has to pay workers the \$400 wage set in the market. Delta will employ 5 pilots because that is where $MRP = MRC$ under the new conditions.

CHANGE IN SUPPLY OF LABOR

Note: This process usually begins with a change in the market supply of labor. In the example below, if there was a reduction in the time required to obtain a pilot license, there would likely be an increase in the number of people willing to supply labor as pilots. This would increase the market supply of labor, driving wages down from \$300 to \$200. This market change drives MRC down for each individual firm. At 4 workers MRP is greater than MRC so Delta can hire an additional worker until MRP is equal to MRC.



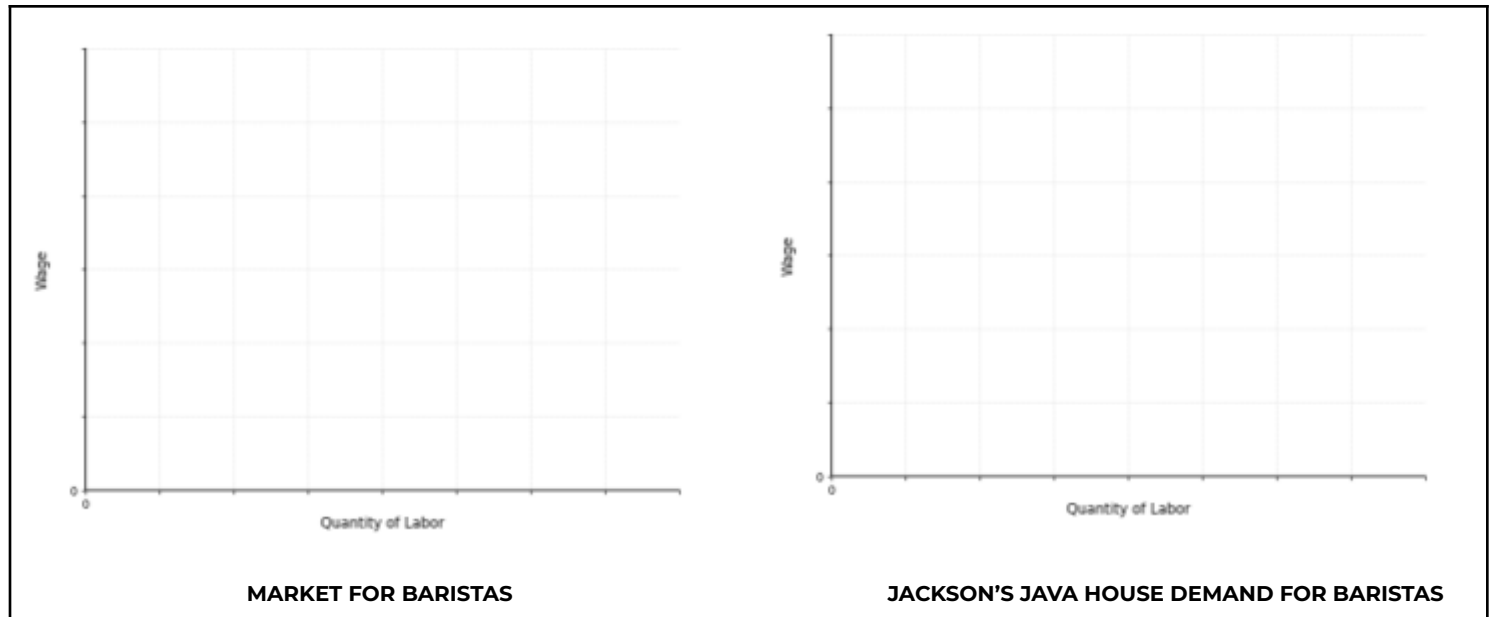
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| <p>1. A reduction in regulations reduces the time required to receive a pilot license. This increases the supply of labor in the market for pilots. This would cause a surplus of labor at the original wage rate of \$300.</p> | <p>2. The new market situation drives wages down to a new equilibrium of \$200 as airlines increase the quantity of pilots demanded at lower wages and the quantity of pilots supplied will decrease due to the lower wage rate.</p> | <p>3. Each individual airline takes the wage rate set in the market as their new MRC. At this lower MRC Delta finds it profitable to increase the number of pilots it hires until MRP equals the new MRC.</p> |
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PRACTICE

Jackson's Java House and the Market for Baristas

Jackson's Java House hires workers in a perfectly competitive labor market for baristas.

1. Using correctly labeled side-by-side graphs for the market for baristas and for Jackson's Java House, show each of the following:
 - a. The equilibrium wage and quantity of baristas in the market, labeled W_E and Q_E , respectively.
 - b. The wage paid by Jackson's Java House and the quantity of baristas hired, labeled W_J and Q_J , respectively.



2. Is the marginal resource cost (MRC) of labor for Jackson's Java House greater than, less than, or equal to the market wage? Explain.

3. Now assume that the government imposes an effective minimum wage for baristas.
 - a. Show the minimum wage on your graphs in #1, labeled W_{MIN} .
 - b. On the labor market graph, show the quantity of baristas supplied as a result of the minimum wage, labeled Q_S , and the quantity of baristas demanded, labeled Q_D .
 - c. As a result of the new minimum wage, will the marginal revenue product (MRP) of the last barista hired by Jackson's Java House increase, decrease, or stay the same? Explain.

Harbor Freight Logistics

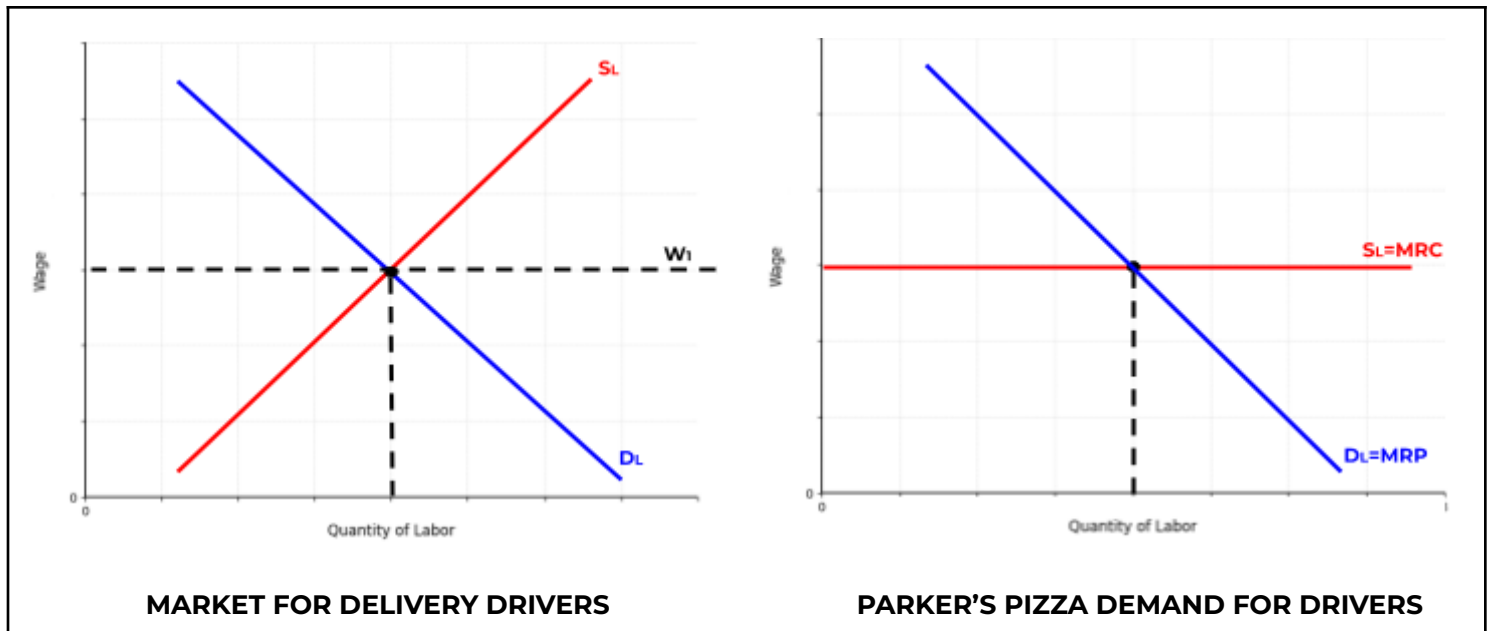
Harbor Freight Logistics hires workers in a perfectly competitive labor market with a downward-sloping demand curve for labor. Suppose the number of workers available in the market decreases.

1. What will happen to the wage rate? Explain.

2. What will happen to the marginal revenue product (MRP) of the last worker hired? Explain.

Parker's Pizza and the Market for Delivery Drivers

Parker's Pizza hires workers in a perfectly competitive labor market for pizza delivery drivers. The following graph shows the market demand for labor (D_L), market supply of labor (S_L), and Parker's marginal revenue product (MRP) and marginal resource cost (MRC) curves.



1. Identify the market structure of the labor market in which Parker's Pizza hires workers. Explain how the wage is determined in this market.

2. Assume the equilibrium wage in the labor market is \$15 per hour. If Parker's Pizza's marginal product of labor for the last worker hired is 4 pizzas per hour, calculate the price of a pizza.

3. Now assume that the demand for pizza increases, causing the price of pizza to rise to \$5 per pizza.
- a. What will happen to Parker's marginal revenue product (MRP) curve? Explain.

- b. What will happen to the quantity of labor hired by Parker's Pizza in the short run? Explain.

4. Instead of hiring workers in a perfectly competitive labor market, assume Parker's Pizza is now the only employer of delivery drivers in town (a monopsony). Will the number of workers hired increase, decrease, or stay the same compared with the perfectly competitive outcome? Explain.

PROVE - ADVANCED PRACTICE QUESTIONS

1. If the demand for electric vehicles increases significantly, what will most likely happen in the market for lithium, an input used in EV batteries?
- The demand for lithium will decrease.
 - The demand for lithium will increase.
 - The supply of lithium will decrease.
 - The supply of lithium will increase.
 - The price of lithium will fall.
2. A new technology allows factory workers to produce twice as many smartphones per hour. As a result, the firm's demand for labor will most likely
- shift left because labor has become less expensive.
 - shift right because labor has become more productive.
 - remain unchanged because wages are fixed in the short run.
 - move downward along the demand curve as wages rise.
 - move upward along the demand curve as wages fall.
3. If immigration increases the number of skilled carpenters in a city, what will happen to the equilibrium wage and quantity of carpenters employed, assuming demand for carpenters is unchanged?
- Wage increases, quantity decreases
 - Wage decreases, quantity increases
 - Both wage and quantity increase
 - Both wage and quantity decrease
 - Wage increases, quantity unchanged

4. Which of the following will most likely increase the demand for nurses?
- An increase in the price of nursing uniforms
 - An increase in the wages paid to nurses
 - An increase in the demand for hospital services
 - A decrease in the productivity of nurses
 - A decrease in the population of elderly patients
5. If the price of lumber decreases, what will happen in the market for construction workers, assuming other factors remain constant?
- The demand for construction workers will increase.
 - The demand for construction workers will decrease.
 - The supply of construction workers will decrease.
 - The supply of construction workers will increase.
 - There will be a leftward shift in the supply of lumber.
6. A decrease in the productivity of farm laborers due to drought conditions will cause the
- demand for farm labor to increase, raising wages.
 - demand for farm labor to decrease, lowering wages.
 - supply of farm labor to increase, lowering wages.
 - supply of farm labor to decrease, raising wages.
 - equilibrium wage and employment level to both increase.
7. Suppose the federal government increases funding for road construction projects. What is the most likely effect in the market for heavy-equipment operators?
- Supply increases and wages fall.
 - Supply decreases and wages rise.
 - Demand increases and wages rise.
 - Demand decreases and wages fall.
 - Demand remains constant but quantity supplied increases.
8. If the number of workers who value leisure more than income increases, what happens to the labor market equilibrium?
- Labor supply shifts right, lowering wages.
 - Labor supply shifts left, raising wages.
 - Labor demand shifts right, raising wages.
 - Labor demand shifts left, lowering wages.
 - Both labor demand and labor supply shift right.
9. An increase in the price of steel causes automakers to produce fewer cars. What happens in the market for auto workers?
- Demand for auto workers increases and wages rise.
 - Demand for auto workers decreases and wages fall.
 - Supply of auto workers increases and wages fall.
 - Supply of auto workers decreases and wages rise.
 - Demand for auto workers remains unchanged.
10. A new government policy offers tax credits for working parents who enter the labor force. Which of the following best describes the impact on the labor market?
- Labor demand increases, raising wages.
 - Labor supply increases, lowering wages.
 - Labor demand decreases, lowering wages.
 - Labor supply decreases, raising wages.
 - Both labor demand and supply decrease, lowering employment.

SCAN TO SEE THE CORRECT ANSWERS AND EXPLANATION



WONDER - BEYOND THE GRAPH

Read [*The Divergence Between Wages and Productivity. Mirage or Reality?*](#) independently. Then, respond to the following three questions. Be prepared to discuss your answers with a partner and the whole class in order to be exposed to a variety of perspectives.

1. According to Walter Block, what role do competition and profit-seeking play in aligning workers' wages with their productivity?

2. Why does Block argue that the Economic Policy Institute's method of measuring productivity is flawed?

3. What is the most accurate indicator of a worker's productivity, and why?

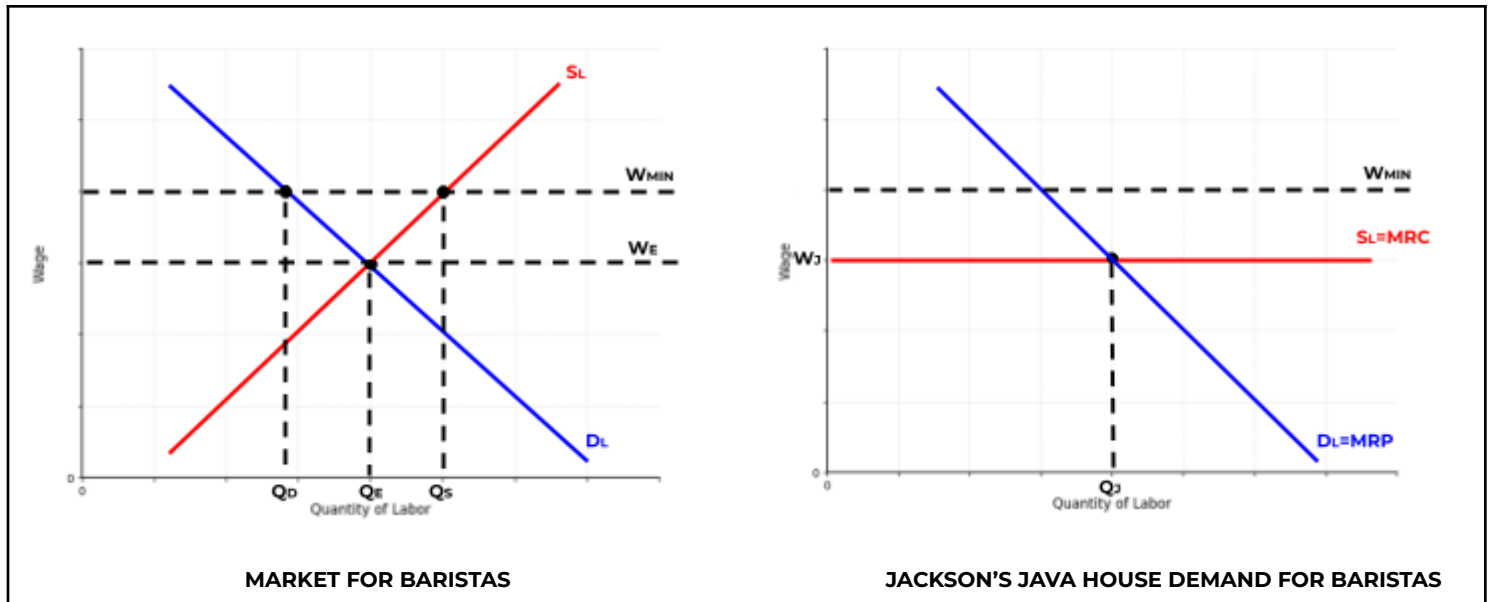
TEACHER ANSWER KEY

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2. Is the marginal resource cost (MRC) of labor for Jackson's Java House greater than, less than, or equal to the market wage? Explain.

The marginal resource cost (MRC) of labor for Jackson's Java House is equal to the market wage.

In a perfectly competitive labor market, each firm is a wage taker — it can hire as many workers as it wants at the prevailing market wage, but it cannot influence that wage. Because every additional worker hired is paid the same wage as the previous one, the cost of hiring one more worker (MRC) is constant and equal to the wage rate. $MRC = \text{Wage}$

3. Now assume that the government imposes an effective minimum wage for baristas.
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 - b. On the labor market graph, show the quantity of baristas supplied as a result of the minimum wage, labeled Q_S , and the quantity of baristas demanded, labeled Q_D .
 - c. As a result of the new minimum wage, will the marginal revenue product (MRP) of the last barista hired by Jackson's Java House increase, decrease, or stay the same? Explain.

The marginal revenue product (MRP) of the last barista hired by Jackson's Java House will increase.

When the government imposes an effective minimum wage, Jackson's Java House will hire fewer baristas because the wage (MRC) is now higher. The firm still hires where $MRC = MRP$.

Since the firm moves up along its downward-sloping MRP curve to a smaller quantity of labor, the MRP of the last worker hired must be higher—equal to the new, higher minimum wage.

Harbor Freight Logistics

Harbor Freight Logistics hires workers in a perfectly competitive labor market with a downward-sloping demand curve for labor. Suppose the number of workers available in the market decreases.

1. What will happen to the wage rate? Explain.

The wage rate will increase.

When the number of workers available decreases, the labor supply curve shifts to the left. With fewer workers willing and able to work at each wage, a labor shortage occurs at the original equilibrium wage. To attract enough workers, firms must offer higher wages. The new equilibrium occurs where the new labor supply curve intersects the labor demand curve, resulting in a higher equilibrium wage and a lower quantity of labor employed in the market.

2. What will happen to the marginal revenue product (MRP) of the last worker hired? Explain.

The marginal revenue product (MRP) of the last worker hired will increase.

When the number of available workers decreases, firms hire fewer workers overall. Because of diminishing marginal returns, having fewer workers means each remaining worker adds more to total output than before. At the same time, the wage rate rises, so firms will hire workers up to the point where $MRP = \text{wage}$. Since the new equilibrium wage is higher, the MRP of the last worker hired must also be higher to justify that wage.

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1. Identify the market structure of the labor market in which Parker's Pizza hires workers. Explain how the wage is determined in this market.

In a perfectly competitive labor market, there are many firms competing to hire workers and many workers offering their labor, so no individual firm or worker has the power to influence the wage. The wage is determined by the intersection of the market demand for labor (D_L) and the market supply of labor (S_L). This intersection sets the equilibrium wage (W_E).

Each individual firm, such as Parker's Pizza, is a wage taker, meaning it must hire workers at that market wage. The firm's marginal resource cost (MRC) curve is therefore horizontal at the equilibrium wage, and the firm hires labor up to the point where $MRC=MRP$.

2. Assume the equilibrium wage in the labor market is \$15 per hour. If Parker's Pizza's marginal product of labor for the last worker hired is 4 pizzas per hour, calculate the price of a pizza.

$$MRP = MP \times \text{Price of output (P)}$$

$$15 = 4 \times P$$

$$P = (15/4) = \$3.75$$

3. Now assume that the demand for pizza increases, causing the price of pizza to rise to \$5 per pizza.
 - a. What will happen to Parker's marginal revenue product (MRP) curve? Explain.

The MRP curve will shift to the right (or upward) because the higher pizza price increases the additional revenue generated by each worker's output.

- b. What will happen to the quantity of labor hired by Parker's Pizza in the short run? Explain.

At every quantity of labor, workers now contribute more revenue to the firm, so Parker's Pizza will find it profitable to hire more workers until MRP once again equals the market wage.

4. Instead of hiring workers in a perfectly competitive labor market, assume Parker's Pizza is now the only employer of delivery drivers in town (a monopsony). Will the number of workers hired increase, decrease, or stay the same compared with the perfectly competitive outcome? Explain.

The number of workers hired will decrease compared with the perfectly competitive outcome. Because a monopsonist must raise the wage to attract additional workers—and pay that higher wage to all employees—the marginal resource cost (MRC) of labor lies above the labor supply curve. The firm hires workers where $MRP = MRC$, which occurs at a smaller quantity of labor than in a competitive market. The wage it pays (found on the labor supply curve at that quantity) is also lower than the competitive wage.

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1. According to Walter Block, what role do competition and profit-seeking play in aligning workers' wages with their productivity?

Competition among employers for productive workers pushes wages toward each worker's marginal revenue product. If a firm pays less than a worker produces, rival firms can profit by offering a higher wage. This bidding process continues until the wage roughly equals productivity. Profit-seeking entrepreneurs and market competition thus ensure that wages and productivity remain closely linked without government intervention.

2. Why does Block argue that the Economic Policy Institute's method of measuring productivity is flawed?

Block criticizes the EPI for measuring productivity by dividing GDP by total hours worked, which attributes all output to labor alone. He argues this ignores the essential contributions of capital and land, implicitly assuming a Marxist labor theory of value. Moreover, that approach measures average productivity, while market wages are determined by marginal productivity—the value of the last unit of labor hired. Therefore, their conclusion about a “divergence” between wages and productivity misrepresents how markets actually function.

3. What is the most accurate indicator of a worker's productivity, and why?

In a free market, the wage itself is the best indicator of productivity. Employers must continually estimate worker productivity, but only those who guess correctly survive. Firms that underpay lose workers to better offers; those that overpay lose money and exit the market. The competitive process “weeds out” bad judgments and rewards accurate ones, aligning wages with true productivity over time.