Chapter 4  Labor Demand Elasticities  49

■  Review Questions

Choose the letter that represents the BEST response.

The Own-Wage Elasticity of Labor Demand

1. If the wage paid to automobile workers goes up by 3.5% and the quantity of workers demanded goes down by 5.25%, the own-wage elasticity of demand for these workers is
   a. −0.67.
   b. −1.5.
   c. −1.75.
   d. −5.25.

2. If the wage paid to automobile workers goes up by 3.5% and the own-wage elasticity of demand for automobile workers is −0.5, the percentage change in the quantity of workers demanded must be
   a. −1.5%.
   b. −1.75%.
   c. −3%.
   d. −7%.

In answering Questions 3–4, please refer to Figure 4-3.

3. The own-wage elasticity of labor demand associated with a wage increase from $7 to $8 would be
   a. −0.5.
   b. −0.71.
   c. −1.4.
   d. −2.

4. The firm’s total expenditures on labor (the total income received by labor) equals the wage multiplied by the number of workers employed. What is the change in the firm’s total expenditures on labor as \( W \) rises from $7 to $8?
   a. +$5
   b. −$15
   c. +$15
   d. −$22.5

Figure 4-3
Hicks-Marshall Laws of Derived Demand

5. A firm’s demand curve for labor is thought to be more elastic in the long run than in the short run because
   a. the firm can not substitute capital for labor in the short run.
   b. consumers may not be able to easily find substitutes for the firm’s product in the short run.
   c. the producers of capital equipment might face skilled-labor and capacity constraints in the short run.
   d. all of the above.

6. The own-wage elasticity of demand is thought to be higher at the firm level than at the industry level because
   a. labor’s share of total cost will be higher at the industry level than at the firm level.
   b. the supply of capital is more inelastic at the industry level.
   c. all the firms acting together have monopoly power.
   d. the demand curve facing an individual firm under competition is highly elastic.

7. A union bargaining for wage increases will be in a stronger position if the demand for labor is inelastic, since increases in the wage will not bring about significant reductions in employment and the total income received by members will rise. According to the Hicks-Marshall laws, which factor will be a contributor to union success?
   a. Elastic product demand.
   b. The production process is very labor intensive.
   c. Supply of capital is very elastic.
   d. Labor and capital are used in fixed proportions.

The Cross-Wage Elasticity of Demand

8. If the wage of teenagers falls 5% and the employment of adults rises by 1%, the cross-wage elasticity between adults and teenagers is
   a. −0.2.
   b. +0.2.
   c. −4.
   d. −5.

9. If the cross-wage elasticity between adult and teenage labor is negative,
   a. adults and teens are gross complements.
   b. adults and teens are gross substitutes.
   c. the substitution effect associated with a rise in the price of teenage labor will dominate the scale effect.
   d. both b and c.

10. As the price of teenage labor rises, adults and teens are more likely to be gross complements if
    a. it is easy to substitute adults for teens.
    b. the supply of adult labor is elastic.
    c. teen labor accounts for a large share of total costs.
    d. the demand for the product workers are producing is inelastic.
Employment Effects of the Minimum Wage

11. In a competitive labor market where everyone is covered by the minimum wage, if employment increases when the minimum wage increases, one can conclude
   a. all other factors affecting employment were not held constant.
   b. employment would have been even higher in the absence of the minimum wage increase.
   c. labor and capital are gross complements.
   d. both a and b.

12. The possibility that an increase in the minimum wage could create an intersectoral shift in product demand implies that the employment effects of the minimum wage are best measured
   a. by looking at the employment changes of individual firms.
   b. by looking at the employment changes of large groupings of firms from many different industries.
   c. by looking at only those firms that comply with the minimum wage law.
   d. by using the monopsony model of the labor market.

Employment Effects of Technological Change

13. Technological change that results in the introduction of new and improved products typically results in
   a. labor demand becoming more elastic.
   b. job losses for those producing outdated products.
   c. increases in employment in those sectors producing the new products.
   d. all of the above.

14. Technological change that results in a reduction in the price of capital (or equivalently, the availability of a new type of capital) is more likely to stimulate demand for a particular type of labor if
   a. capital costs accounts for a small share of total costs.
   b. the demand for the final product is elastic.
   c. the supply of labor is inelastic.
   d. all of the above.

15. Technological progress of all kinds tends to lead over time to
   a. declining real wages.
   b. persistent unemployment.
   c. scale effects that enlarge and change the mix of output and employment.
   d. all of the above.

PROBLEMS

The Own-Wage Elasticity of Labor Demand

16. Suppose labor demand is given by the equation

   \[ L = 50 - 2W, \]

   where \( L \) is the number of workers and \( W \) is the wage rate.
16a. The slope of the demand curve can be viewed as the amount by which \( L \) changes for every 1 unit change in \( W \). This can be expressed formally as

\[
\text{Slope} = \frac{\Delta L}{\Delta W},
\]

where \( \Delta \) refers to a small change in the value of \( L \) or \( W \). Using this definition, find the slope associated with a wage change from $5 to $6. Would your answer be different if the wage rose from $20 to $21?

16b. Calculate the own-wage elasticity of labor demand as the wage changes from $5 to $6. How would your answer be different if the wage rose from $20 to $21?

16c. How does the slope change as one moves up this labor demand curve? How does the elasticity change as one moves up this labor demand curve? Graph this labor demand curve.

16d. The firm’s total expenditures on labor (the total income received by labor) equals the wage multiplied by the number of workers employed. Calculate the change in the firm’s total expenditures on labor when the wage changes from $5 to $6. Do the same for a change from $20 to $21.

16e. Considering your answer to 16b and 16d, what relationship can you find between the own-wage elasticity of labor demand and the change in a firm’s total expenditures on labor (the total income received by labor)?

16f. Suppose each worker at this firm always works 40 hours a week. If \( L \) were expressed in terms of labor hours instead of the number of workers, the labor demand curve would be represented by the equation

\[
L = 2000 - 80W.
\]

Find the slope of the curve and the elasticity as the wage rises from $5 to $6. Does the change in the units in which \( L \) is measured make any difference to your answers (when compared to the answers in 16a and 16b)?

16g. Why do you think the economists prefer the elasticity when compared to the slope as a measure of labor’s responsiveness to wage changes?

*17. Consider the labor demand curve given by the equation

\[
L = \frac{100}{W}.
\]

For small changes in the wage around any given point on the curve, the slope of the curve (the change in \( L \) divided by the change in \( W \)) is given by the formula

\[
\text{Slope} = -\frac{100}{W^2}.
\]

(For the reader with calculus training, the slope can be computed by taking the first derivative of \( L \) with respect to \( W \).)
*17a. Find the slope of the curve for a small change in the wage around \( W = \$5 \). Do the same for a small change in the wage around \( \$10 \). How does the slope change as one moves up this demand curve?

*17b. Find the own-wage elasticity of labor demand for a small change in the wage around \( \$5 \). Do the same for a small change in the wage around \( \$10 \). How does the elasticity change as one moves up this labor demand curve?

*17c. Graph this labor demand curve.

**Hicks-Marshall Laws of Derived Demand**

18. Consider two possible demand curves for a firm with monopoly power in the output market

\[
\text{Demand 1: } P = 36 - Q.
\]

\[
\text{Demand 2: } P = 56 - 2Q.
\]

Recall that the marginal revenue (\( MR \)) for a firm with a demand curve \( P = a - bQ \) is given by the equation \( MR = a - 2bQ \). Also, recall that a firm’s optimal output occurs where marginal revenue equals marginal cost.

18a. The price elasticity of demand is given by the equation

\[
\eta_{Q^p} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\Delta Q}{Q} \frac{\Delta P}{\Delta P} = \frac{\Delta Q}{P} \frac{P}{Q}.
\]

At any given price (e.g., \( P = \$20 \)), which of the market demand curves would be the more elastic?

18b. For each demand curve, how would the optimal output of the firm change if marginal costs increased from \( \$16 \) to \( \$24 \) because of a change in the price of labor?

18c. Would the scale effect associated with a wage change be larger if demand 1 or demand 2 applied? Would the long-run demand be more elastic if demand 1 or demand 2 applied?

**Cross-Wage Elasticity of Demand**

19. An empirical study by Daniel Hamermesh (\textit{Economic Inquiry}, July 1982, pp. 365–380) found that for every 100 teenagers who might be employed as a result of a youth subminimum wage, between 11 and 33 adult workers would be displaced.

19a. According to this finding, are teenagers and adults gross complements or gross substitutes? Would the cross-wage elasticity between teenagers and adults have a positive or negative sign?

19b. Would the substitution effect associated with a decrease in the teen wage dominate the scale effect or would the scale effect dominate the substitution effect?

19c. How would the demand curve for adult workers change if the wage paid to teenagers falls?