CHAPTER 4 Labor Demand Elasticities

In addition to the multiple choice problems listed below, complete the following end of chapter questions: Review questions 1, 3, 4, 6 and 7. Problems 1, 2, 3 and 5.

Multiple-Choice

1. The own-wage elasticity of demand measures
   A) change in wages divided by change in quantity of labor demanded.
   B) change in quantity of labor demanded divided by change in wages.
   C) percentage change in wages divided by percentage change in quantity of labor demanded.
   D) percentage change in quantity of labor demanded divided by percentage change in wages.

2. If an increase in the minimum wage leads to higher aggregate earnings by the workers affected, then the own-wage elasticity of demand is
   A) elastic.
   B) inelastic.
   C) of unit elasticity.
   D) uncertain; more information is needed.

3. Moving from the upper to the lower portion of a straight labor demand curve, the elasticity
   A) changes from elastic to inelastic.
   B) changes from inelastic to elastic.
   C) stays the same.
   D) could change from inelastic to elastic, or from elastic to inelastic.

4. If the quantity of steel workers demanded falls from 30,000 to 20,000 when the equilibrium wage increases from $9.00 per hour to $11.00 per hour, then the own-wage elasticity of demand for these workers is
   A) -2.0
   B) -0.5
   C) -0.4
   D) -0.2

5. If the quantity of auto workers demanded decreases from 66,000 to 54,000 when the equilibrium wage increases from $12.00 per hour to $14.00 per hour, then the own-wage elasticity of demand for these workers is
   A) inelastic.
   B) elastic.
   C) zero.
   D) neither elastic nor inelastic.

6. If Industry A can substitute capital for labor easily and Industry B cannot, then (other things equal)
   A) Industry A's own-wage elasticity of demand will be higher than Industry B's.
   B) Industry B's own-wage elasticity of demand will be higher than Industry A's.
   C) the industries' own-wage elasticities of demand will be equal.
   D) we cannot predict which firm's own-wage elasticity of demand will be higher.

7. If two inputs are gross complements, the cross-wage elasticity of demand for the two inputs will be
   A) zero.
   B) one.
   C) positive.
   D) negative.
8. If teenagers and adults are substitutes in production, and the wage of teenagers falls, then
   A) they must be gross substitutes and the employment of adults will fall.
   B) they must be gross complements and the employment of adults will fall.
   C) they could be either gross substitutes or gross complements and the employment of adults could rise
      or fall.
   D) they must be gross substitutes and the employment of adults will rise.

9. Own-wage elasticities of demand are
   A) always positive.
   B) always negative.
   C) either positive or negative.
   D) positive for gross complements, negative for gross substitutes.

10. If the own-wage elasticity of demand for professors is -0.5, then an increase in the wage of professors
     from $45,000 to $55,000 will cause the quantity demanded to fall by
     A) 2%.
     B) 5%.
     C) 10%.
     D) 20%.

11. The short run own-wage labor demand elasticity
     A) includes only part of the scale effect.
     B) includes only part of the substitution effect.
     C) includes both scale and substitution effects.
     D) includes all the scale effect.

12. According to empirical estimates, when wages are increased by 10% the quantity of labor demanded
     typically falls by about
     A) 3% in the short run, but 6% in the long run.
     B) 5% in the short run, but 10% in the long run.
     C) 10% in the short run, but 20% in the long run.
     D) more in the short run than in the long run.

13. Cross wage elasticities of demand are
     A) always positive in magnitude.
     B) always negative in magnitude.
     C) either positive or negative in magnitude.
     D) positive for gross complements, negative for gross substitutes.

14. Empirical estimates of cross-wage elasticities show that
     A) well-educated labor is more likely to be complementary with capital than is unskilled labor.
     B) the extent of substitution in production between immigrant and native workers is very high.
     C) labor and energy are complements in production.
     D) labor and raw materials are complements in production.

15. Empirical estimates of the short-run employment effects of minimum wage increases
     A) have produced a consensus that teen employment will fall by almost 10% for every 10% increase in
        the minimum wage.
     B) are very low, partly because it takes a long time for employers to adjust fully to changes in the
        minimum wage.
     C) are very high, partly because it takes a long time for employers to adjust fully to changes in the
        minimum wage.
     D) have produced a consensus that teen employment will not fall at all when the minimum wage is
        increased by 10%.
16. Other things equal, an elastic demand for an industry's output will tend to make the industry's own wage elasticity of demand
   A) high.
   B) low.
   C) positive.
   D) zero.

17. If labor is a small percentage of the total costs of an industry, this will tend to make the own wage elasticity of labor demand
   A) high.
   B) low.
   C) positive.
   D) zero.

18. Own wage elasticity of labor demand tends to
   A) increase with skill level.
   B) decrease with skill level.
   C) be unrelated to skill level.
   D) remain unchanged with skill level.

19. Other things equal, the own-wage elasticity of demand for a category of labor is higher when
   A) the price elasticity of demand for the product being produced is low.
   B) other factors of production can be easily substituted for the category of labor.
   C) the supply of other factors of production is highly inelastic.
   D) the cost of employing the category of labor is a small share of the total costs of production.

20. The introduction of new forms of capital generally
   A) decreases the own-wage elasticity of labor demand.
   B) increases the bargaining power of unions.
   C) increases the own-wage elasticity of labor demand.
   D) shifts the labor demand curve to the right.

21. The minimum wage is a relatively blunt instrument with which to reduce poverty because
   A) only about half the labor force is covered by the minimum wage.
   B) only about half the employers comply with the law.
   C) most workers whose wages are affected by minimum wage increases do not live in poor families.
   D) minimum wage increases cause large increases in unemployment.

22. If the labor market is competitive and coverage is complete, then legislation to enact a minimum wage above the equilibrium wage level would
   A) increase both wages and employment.
   B) decrease both wages and employment.
   C) decrease wages and increase employment.
   D) increase wages and decrease employment.

23. Employment often increases after an increase in the minimum wage because
   A) more people want to work at the new, higher wage.
   B) independently, labor demand increases significantly at the same time.
   C) the minimum wage is below the equilibrium level of wages.
   D) the labor supply curve is vertical.
The answers to odd numbered review questions and problems are at the back of the book. The answers to the assigned even numbered questions are below.

### Answers to Even-Numbered Review Questions

4. The public utilities commission in a state lifts price controls on the sale of natural gas to manufacturing plants and allows utilities to charge market prices (which are 30% higher). What conditions would minimize the extent of manufacturing job loss associated with this price increase?

**Answer:** This question involves the cross-elasticity of demand. A higher price of natural gas will have a substitution effect that could favor increased employment, and a scale effect that tends to reduce employment. Factors that minimize the extent of job loss are those that make for a robust substitution effect and a small scale effect. A large substitution effect will tend to occur if labor is easily substituted for natural gas in the production process, and if the supply of labor is relatively elastic. A small scale effect would be created if natural gas is a small part of the overall cost of production, and if the demand for the products made using natural gas is relatively inelastic.

6. In 1942 the government promulgated regulations that prohibited the manufacture of many types of garments by workers who did the sewing, stitching, and knitting in their homes. If these prohibitions are repealed, so that clothing items may now be made either by workers in factories or by independent contractors doing work in their homes, what effect will repealing the prohibitions have on the labor demand curve for factory workers in the garment industry?

**Answer:** Repealing the prohibitions enables garment manufacturers to substitute home workers for factory workers. Assuming that the 1942 regulations were constraining, one can presume that there will be at least some substitution of home workers for factory workers; this substitution will tend to shift the labor demand curve for factory workers to the left. However, there may be a favorable scale effect for certain factory workers performing tasks (such as packaging and shipping) complementary with home production.

Besides the shift to the left of the labor demand curve, the new substitution possibilities opened up by repealing the 1942 regulations should serve to make the labor demand curve for factory workers more elastic. Just as the greater ability to substitute capital for labor will tend to make the labor demand curve more elastic, so too will the ability to substitute home labor for factory workers.

### Answers to Even-Numbered Problems

2. Professor Pessimist argues before Congress that reducing the size of the military will have grave consequences for the typical American worker. He argues that if one million individuals were released from the military and were instead employed in the civilian labor market, average wages in the civilian labor market would fall dramatically. Assume that the demand curve for civilian labor does not shift when workers are released from the military.
First, draw a simple diagram depicting the effect of this influx of workers from the military. Next, using your knowledge of (i) the definition of the own-wage elasticity of labor demand, (ii) the magnitude of this elasticity for the economy as a whole, and (iii) the size of civilian employment in comparison to this flood from the military, graph these events and estimate the magnitude of the reduction in wages for civilian workers as a whole. Do you concur with Professor Pessimist?
Answer: Because you were asked about the effects on civilian wages as a whole, you will probably not concur with Professor Pessimist. Own-wage elasticity of demand for labor = \( \%\Delta(\text{quantity demanded})/\%\Delta(\text{wage}) = (\Delta Ld/Ld)/(\Delta W/W) \). In this case \( \Delta Ld = 1 \text{ million} \), \( Ld = 147 \text{ million} \) employed workers, and the own-wage elasticity of demand for labor is approximately \(-1\). Thus, \(-1 = (1 \text{ million}/147 \text{ million})/(\Delta W/W) \), so \( \Delta W/W \) will be very small—about \(-1/147 \) (or \(-0.0068\)). This implies that wages will fall by 0.68%.

However, the military recruits in a very narrow segment of the labor market—mostly high school grads who do not attend college, and who are between ages 17–21. Thus, downsizing would have the greatest effect on this segment of the market. If there were only 13.5 million, say, in this age group, a labor demand elasticity of \(-1\) would yield a wage effect of the military downsizing of closer to \(-7.4\%\) on this group of the population.

4. The following table gives the demand for labor at Homer’s Hideaway, a motel in a small town.

<table>
<thead>
<tr>
<th>Number of Hours</th>
<th>Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$10</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

a. Draw the demand for labor curve.

b. Calculate the wage elasticity of demand along the demand curve. Indicate whether the elasticity is elastic, inelastic, or unitary elastic.

c. As you slide down along the demand curve, does the demand curve become more or less elastic?

Answer: a. Simple plot of tabular data.
b.

<table>
<thead>
<tr>
<th>Number of Hours</th>
<th>Wage</th>
<th>Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$10</td>
<td>\——</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>((3 - 2)/2)/(8 - 10)/10 = [1/2]/[-2/10] = -2.5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>((4 - 3)/3)/(6 - 8)/8 = [1/3]/[-2/8] = -1.32</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>((5 - 4)/4)/(4 - 6)/6 = [1/4]/[-2/6] = -0.76</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>((6 - 5)/5)/(2 - 4)/4 = [1/5]/[-2/4] = -0.40</td>
</tr>
</tbody>
</table>

The demand curve is elastic at its upper end and inelastic at its lower end.

c. The demand curve becomes less elastic (or more inelastic) as you slide down along the curve.
Calculate the own-wage elasticity of demand for Occupations $a$, $b$, and $c$ below. $E_D$ and $W$ are the original employment and wage. $E'_D$ and $W'$ are the new employment and wage. State whether the demand is elastic, inelastic, or unitary elastic.

a. \( \% \Delta E_D = 5 \), \( \% \Delta W = -10 \)

b. \( E_D = 50 \), \( W = 7 \)
   \( E'_D = 40 \), \( W' = 8 \)

c. \( E_D = 80 \), \( W = 8 \)
   \( E'_D = 100 \), \( W' = 6 \)

**Answer:**

a. \( \eta_D = \frac{\% \Delta E_D}{\% \Delta W} = \frac{5}{(-10)} = -0.5 \) [inelastic]

b. \( \frac{(40 - 50)/50}{(8 - 7)/7} = \frac{-0.20}{0.14} = -1.43 \) [elastic]

c. \( \frac{(100 - 80)/80}{(6 - 8)/8} = \frac{20/80}{-2/8} = -1 \) [unitary elastic].