

Microeconomics, Module 20: "The Demand for Factors of Production" (Chapter 15)

Illustrative Test Questions (representative of the final exam questions)

(The attached PDF file has better formatting.)

Question 20.1: Marginal Revenue Product of Labor

Suppose a firm hires labor in a competitive labor market. If the marginal revenue product of labor is less than the wage rate, then

- A. The firm can increase its profit by hiring less labor.
- B. The firm can increase its profit by replacing labor with capital.
- C. The firm can increase its profit by hiring more labor.
- D. The firm's profit is maximized.
- E. The firm has losses in the short run.

Answer 20.1: A

If the firm hires less labor, the savings in costs exceed the decline in revenues.

Question 20.2: Output Prices and Demand for Labor

How will an increase in the price of a competitive firm's output affect its short-run demand curve for labor?

- A. The demand curve may shift either to the left or to the right, depending on whether labor is a regressive factor.
- B. The demand curve will become more elastic.
- C. The demand curve will shift to the right.
- D. The demand curve will shift to the left.
- E. The demand curve is unaffected by changes in output prices.

Answer 20.2: C

The increase in the price of its output increases its demand for labor, which moves the demand curve for labor to the right.

Illustration: An increase in the price of auto policies caused by higher demand (not by higher loss costs) increases the demand for pricing actuaries, moving the demand curve for pricing actuaries to the right and increasing their wages.

Question 20.3: Capital Changes and the Marginal Product of Labor

If an increase in the amount of capital causes the marginal product of labor to rise, then

- A. Labor and capital are complements in production.
- B. Labor and capital are substitutes in production.
- C. Labor is a regressive factor.
- D. The supply curve for labor is backward bending.
- E. Labor usage is independent of scale effects.

Answer 20.3: A

Illustration: If an increase in the computer equipment used by pricing actuaries raises their marginal productivity, labor and capital are complements. If an increase in the computer equipment used by reserving actuaries reduces their marginal productivity, labor and capital are substitutes.

Question: Why would an increase in computer equipment reduce the productivity of reserving actuaries? An actuary can make better projections with computer equipment.

Answer: The scenario is as follows:

- With no computer or actuary, an insurer does not know its reserve requirements.
- With no computer and 1 actuary, an insurer know its reserve requirements to the nearest \$100,000.
- With reserving software and no actuary, an insurer know its reserve requirements to the nearest \$20,000.
- With reserving software and 1 actuary, an insurer know its reserve requirements to the nearest \$10,000.

We consider the marginal productivity of an actuary with or without a computer. If the insurer has no reserving software, an actuary adds great value. If the insurer has reserving software, the actuary adds little value.

Question 20.4: Substitutes and Complements

If an increase in computer equipment causes actuarial consulting firms to increase the number of actuaries and decrease the number of secretaries, we may infer that

- A. Actuaries and capital are substitutes; secretaries are capital are complements.
- B. Actuaries and capital are complements; secretaries are capital are substitutes.
- C. Actuaries are paid more than secretaries.
- D. Actuaries have higher marginal efficiency than secretaries.
- E. Secretaries are a regressive factor of production.

Answer 20.4: B

Question: Is this the reason that the demand for secretaries is decreasing?

Answer: Thirty years ago, most secretarial work was taking dictation, typing, taking phone messages, setting up meetings, filing, and mailing letters. These tasks have since been automated. Word processing software, email, voice mail, and meeting maker software replace traditional secretarial roles; email archives have replaces paper files for many messages.

Question: Demand for clerical work is decreasing because firms outsource the functions to India, not because they substitute capital.

Answer: The outsourcing is possible only because computer technology eliminates the need for a physical presence in the office.

Question 20.5: Substitutes

Suppose labor and capital are substitutes in production. How will an increase in the amount of capital affect the total product of labor curve?

- A. There will be no shift in the total product of labor curve.
- B. There will be a parallel shift upward in the total product of labor curve.
- C. There will be a parallel shift downward in the total product of labor curve.
- D. The total product of labor curve will become steeper at every level of labor usage.
- E. The total product of labor curve will rise and become flatter at every level of labor usage.

Answer 20.5: E

Capital deepening almost always increases the total product of labor. If labor and capital are substitutes, an additional unit of labor is less useful if the firm has more capital, so the marginal productivity of labor declines.

Question 20.6: Long-Run Demand for Labor

Which of the following is *not* held fixed when the firm's long run demand curve for labor is derived?

- A. The technology available to the firm.
- B. The rental rate of capital.
- C. The amount of capital that the firm employs.
- D. The market price of the firm's output.
- E. The unemployment rate.

Answer 20.6: C

The short run means that labor is variable but capital is fixed; the long run means that both labor and capital are variable. The other four items are held fixed for both the short and long-run demand curve for labor.

Question 20.7: Regressive Factor

If labor is a regressive factor, then an increase in the wage rate will

- A. Increase the marginal product of labor.
- B. Decrease the firm's long run marginal cost of production.
- C. Cause the firm to reduce its output in the long run.
- D. Increase the quantity of labor demanded by the firm.
- E. Decrease the supply of labor in the economy.

Answer 20.7: B

If the wage rate increases, the firm automates production with a larger plant size and lower ultimate costs of production. It is hard to judge Landsburg's perspective. Increases in labor costs force firms to automate, which leads to lower average costs of production. But if firms are rational and know their labor costs, they may automate anyway and end up with even lower costs of production.

Illustration: A reserving actuary costs \$100,000 a year, and a large multi-line insurer has three reserving actuaries. An increase in the demand for pricing actuaries causes many reserving actuaries to take up ratemaking, and the cost of reserving actuary climbs to \$150,000 a year.

Faced with the higher labor costs, the insurer buys reserving software for \$100,000. With the new software, one reserving actuary can do the work previously done by three actuaries.

Question 20.8: Substitution and Scale Effects

If the substitution and scale effects are in opposite directions, then

- A. The scale effects must outweigh the substitution effects.
- B. The firm's long run demand curve for labor is upward sloping.
- C. Labor and capital are complements in production.
- D. Labor is a regressive factor.

E. Labor is price inelastic.

Answer 20.8: D

Question 20.9: Industry Demand Curve for Labor

Assume that labor is *not* a regressive factor. Why is the industry's demand curve for labor less elastic than the horizontal sum of individual firms' demand curves?

- A. Changes in the firms' use of capital must be taken into account.
- B. Changes in the market price of the firms' output must be taken into account.
- C. Firms' interdependence and their use of strategic behavior must be taken into account.
- D. Shifts in the firm's marginal product of labor must be taken into account.
- E. Labor is provided in an international market.

Answer 20.9: B

Illustration: Suppose ten house-cleaning firms operate in California. Each hires Mexican immigrants for \$6.00 an hour, equips them with cleaning materials, and provides house cleaning services at \$10.00 per worker-hour.

There are many workers willing to clean houses in California. The market for house cleaning is competitive, and the firms make the minimum profit needed to stay in business.

If the costs per worker rose to \$6.50 for a single firm, it would not be able to provide cleaning services at \$10.00 per hour. If it charged more than \$10.00 per hour, it would lose its business.

For each firm, the labor demand is elastic: it hires as many workers at \$6.00 an hour as it can find, but it won't hire workers at \$6.50 an hour.

If the wage costs rise for all firms to \$6.50 an hour, the market price of house cleaning services rises to \$10.50 per worker-hour. All firms continue to make their minimum required profit, and the number of workers hired does not change.

Question 20.10: Monopsonist

A profit-maximizing monopsonist hires labor up to the point where the marginal revenue product of labor equals

- A. The wage rate.
- B. The marginal product of labor.
- C. The marginal labor cost.
- D. The rent paid to labor.
- E. The rental rate of capital.

Answer 20.10: C

Marginal cost equals marginal revenue means that the marginal labor cost equals the marginal product of labor.

Question: What does this have to do with a monopsonist? Don't all firms hire labor up to the point where the marginal labor cost equals the marginal product of labor?

Answer: Suppose 100 farmers in California hire workers to pick berries. Each worker can pick a box of berries an hour, which can be sold for a profit of \$20.

The workers have different required wage rates. One worker will work for \$10.10 an hour, a second worker demands \$10.20 an hour, a third worker demand \$10.30 an hour, and so forth.

In a competitive labor market, the wage rate is \$20.00 an hour, and 100 workers are hired. If any worker were receiving less than \$20.00 an hour, he could find a farmer willing to pay him more (up to \$20.00 an hour). The farmers get no profit, and the workers receive the full value of their production. This is similar to a competitive product market with a flat (horizontal) marginal cost curve and a downward sloping demand curve. The consumers get all the social gain: consumers' surplus = the social welfare gain and producers' surplus = zero.

Suppose the farmers combine into a single monopsonist who hires workers. If Q workers are hired, the wage rate is $\$10.00 + \$0.10 \times Q$. All workers are paid the market wage rate, just as in the competitive equilibrium. The total wages are $\$10.00Q + \$0.10 \times Q^2$, and the marginal wage costs are $\$10.00 + \$0.20 \times Q$. Setting the marginal cost equal to the marginal product of labor give $\$10.00 + \$0.20 \times Q = \$20.00 \Rightarrow Q = 50$ workers.

Let us verify this result.

- With 50 workers, the wage rate is $\$10.00 + \$0.10 \times 50 = \$15.00$ an hour. Total wages are $50 \times \$15 = \750 an hour. The workers pick 50 boxes of berries, with a profit of $50 \times \$20.00 = \$1,000$ an hour. The farmers earn \$250 an hour.
- With 51 workers, the wage rate is $\$10.00 + \$0.10 \times 51 = \$15.10$ an hour. Total wages are $51 \times \$15.10 = \770.10 an hour. The workers pick 51 boxes of berries, with a profit of $51 \times \$20.00 = \$1,020$ an hour. The farmers earn $\$1,020.00 - \$770.10 = \$249.90$ an hour.

Question: This explanation is good. It shows the dangers of allowing multinational corporations to hire workers in low-wage countries (Asia, Africa) where they are the only firms hiring workers and exploiting their labor.

Answer: Labor costs are lower in developing countries because workers have fewer other choices, so the opportunity costs of labor are lower. In some developing countries, there are thousands of workers willing to work at low wages because these low wages are better than other alternatives. If multinational corporations were not permitted to hire workers, they would work at lower paying jobs or be unemployed.

Question 20.11: Factor Shares

In the long run competitive equilibrium, if production exhibits constant returns to scale, factor shares add to

- A. Zero
- B. The firm's variable cost.
- C. The firm's revenues.
- D. Producers' surplus.
- E. Net after-tax profits.

Answer 20.11: C

All the firm's revenues are paid to some factor: labor, capital, land, or entrepreneurs.

Question 20.12: Rent

What factors earn the largest proportion of their income in the form of rent?

- A. Fixed factors of production.
- B. Regressive factors of production.

- C. Factors of production that are paid a high price.
- D. Factors of production that have highly elastic supply.
- E. Factors of production bought by a monopsonist.

Answer 20.12: A

The most common rent is the income paid to owners of land, since land is a fixed factor of production.