Chapter 18

1.   Suppose that labour is the only variable input in the production process for a competitive profit-maximizing firm that produces coffee mugs. The firm's production function is shown below.

Labour (number of workers)	Output per Hour	Marginal Product of Labour	Value of MPL when $P = €3$	Value of MPL when $P = €5$
0	0			
1	9			
2	17			
3	24			
4	30			
5	35			
6	39			
7	42			
8	44			

a.   Fill out columns three and four of the table above (the marginal product of labour and the value of the marginal product of labour when the price of output equals €3 per mug).

Answer:

Labour (number of workers)	Output per Hour	Marginal Product of Labour	Value of MPL when P = €3
0	0		
		9	€27
1	9		
		8	24
2	17		
		7	21
3	24		
		6	18
4	30		
		5	15
5	35		
		4	12
6	39		
		3	9
7	42		
		2	6
8	44		

b. Suppose that the competitive wage for workers who can make coffee mugs is €19 per hour. How many workers should this firm hire? Why?

Answer:
Three workers because the value of the marginal product of each of the first three workers exceeds the €19 wage so each worker adds to profits but the fourth worker only has a value of marginal product of €18 so hiring the fourth worker would reduce profits.

c.   Suppose that colleges that teach pottery skills increase the supply of workers that can make coffee mugs and that this lowers the competitive wage for coffee mug workers to €13 per hour. How many workers should this firm hire? Why? Does this represent a shift in the firm's demand for labour or a movement along the firm's demand for labour? Explain.

Answer: Five workers because the value of the marginal product of each of the first five workers now exceeds the €13 wage but the sixth worker only has a value of marginal product of €12 so hiring the sixth worker would reduce profits. This is a movement along the firm's demand curve for labour because the value of the marginal product of labour for each worker is remaining the same but the wage facing the firm has changed.

        d.   Suppose there is an increase in the demand for coffee mugs and that the price of coffee mugs rises to €5 per mug. Fill out the last column of the table above to show the value of the marginal product of labour when the price of mugs is €5 per mug.
        e.   Suppose that the competitive wage for coffee mug workers remains at €13 per hour and the price of mugs is €5 per mug. How many workers should this firm now hire? Why? Does this represent a shift in the firm's demand for labour or a movement along the firm's demand for labour? Explain.

Answer:
See the fifth column in the table.

Labour (number of workers)	Output per Hour	Marginal Product of Labour	Value of MPL when P = €3	Value of MPL when P = €5
0	0			
		9	€27	€45
1	9			
		8	24	40
2	17			
		7	21	35
3	24			
		6	18	30
4	30			
		5	15	25
5	35			
		4	12	20
6	39			
		3	9	15
7	42			
		2	6	10
8	44			

Answer: Seven workers because the value of the marginal product of each of the first seven workers exceeds the €13 wage but the eighth worker only has a value of marginal product of €10 so it would be unprofitable to hire that worker. This is a shift in the demand curve for labour because the value of the marginal product of labour has increased for each worker because the price of output rose. Thus, the firm demands more workers at the same €13 wage.
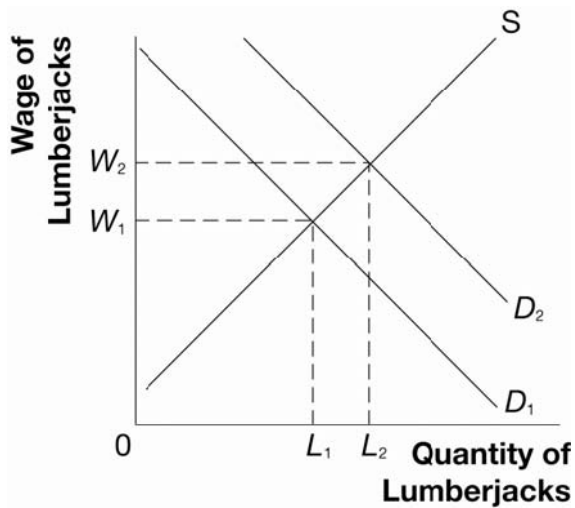
2. Suppose there is an increase in the demand for lumber, which raises the price of lumber.

a. Show the impact of the increase in the price of lumber on the market for lumberjacks in Exhibit 1.

Exhibit 1
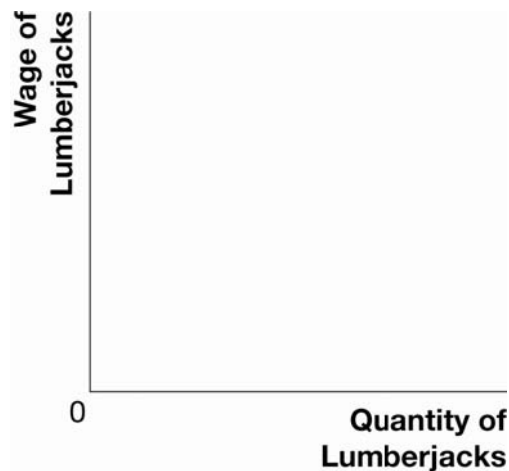
Answer: See Exhibit 4.

Exhibit 4

b.   What did the increase in the price of lumber do to the value of the marginal product of lumberjacks and the wage of lumberjacks? Explain.

Answer:
Increase the value of the marginal product of labour and the wage.

c.   What will happen to the value of the marginal product and the rental rate for timber-growing land and for capital that is used for cutting and shipping timber? Explain.

Answer:
When the price of output rises, the value of the marginal product of all of the inputs increases accordingly. Thus, the value of the marginal product of both land and capital will rise and so will their rental rates.

d.   How has this development affected the prosperity of the firm and the owners of the factors of production employed by the firm? Explain.
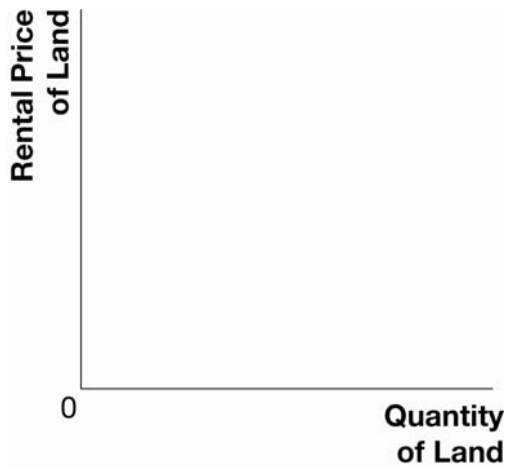
Answer:
When the price of output changes, the prosperity of the firm and the owners of the factors of production move together. In this case, the prosperity of the firm and the owners of the factors of production are increased.

3.   Suppose that an enormous amount of forest land is cleared for agricultural use in Brazil.

a.   Show the impact of this event on the market for agricultural land in Brazil in Exhibit 2. What has happened to the marginal product of land and the rental price of land in Brazil?
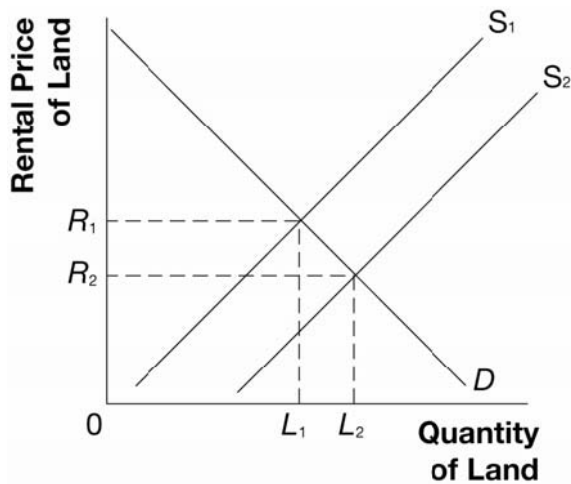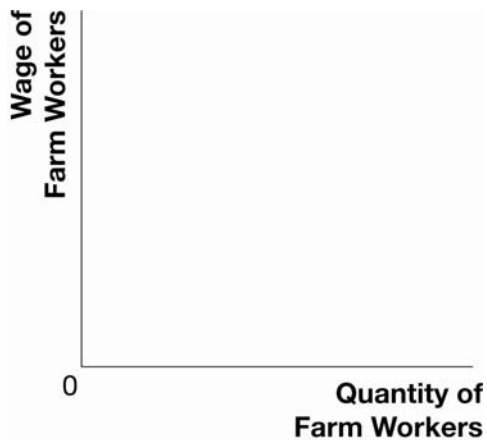
Exhibit 2

Answer:
See Exhibit 5. This event increases the supply of agricultural land and decreases the marginal product of land and the rental price of land.

Exhibit 5

b.   Show the impact of this event on the market for Brazilian farm workers in Exhibit 3. What has happened to the marginal product of farm labour and the wage of farm labour?
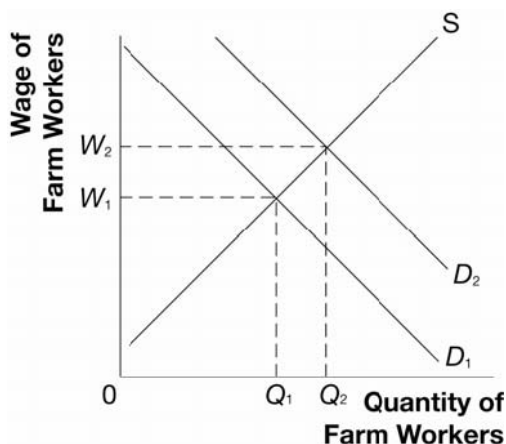
Exhibit 3

Wage of Farm Workers

0 Quantity of Farm Workers

Answer:
See Exhibit 6. The increase in the supply of agricultural land increases the marginal product of labour and shifts the demand for farm labour to the right, which increases the wage.

Exhibit 6

Wage of Farm Workers

W_2
W_1

S
D_2
D_1

0 Q_1 Q_2 Quantity of Farm Workers

4.   Describe the impact of the following events on the market for car workers in Swindon, England. (Note that Honda operates a factory in Swindon.)

a.   Honda expands its factory in Swindon.

Answer:
The increase in capital available for workers increases the marginal product of labour, shifts the demand for labour to the right, and increases the wage.

b.   A well respected consumer affairs magazine declares Honda to be the best-made cars in its class.

Answer:
This event increases the demand for Hondas and increases the price of Hondas. The increase in the price of Hondas increases the value of the marginal product of labour, shifts the demand for labour to the right, and increases the wage.

c.   Migrants with manufacturing skills from Poland and Romania relocate to Swindon.

Answer:

This event increases the supply of labour, increases the amount of labour per unit of capital, and so decreases the marginal product of labour, and decreases the wage.