



LECTURE NINE - PART TWO

A Derived Demand

- Demand for factors in general and for labor in particular is a **derived demand**.
- Factor resources usually do not directly satisfy consumer wants, but do so indirectly by producing goods and services.

Derived Demand Example

- No one wants to consume an acre of land, a John Deere tractor, or the labor services of a farmer.
- Households do want to consume the food and fiber products these resources help produce.



More Derived Demand

- The demand for automobiles creates a demand for auto workers.
- The demands for such services as income tax preparation, haircuts, and child-care create **derived demands** for accountants, barbers, and child-care workers.

An Important Insight

- The derived nature of resource demand implies that the strength of the demand for a factor such as labor will depend on two things:
 1. The productivity of the factor helping to create the product, and
 2. The market price of the product that the factor is helping to produce.

(1) Units of labor resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$
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0	0	7
1	7	6
2	13	5
3	18	4
4	22	3
5	25	2
6	27	1
7	28	

* Δ indicates a "change in."

Pause presentation to
think about the answer

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$
-----------------------------	-------------------------	---

0	0	7
1	7	6
2	13	5
3	18	4
4	22	3
5	25	2
6	27	1
7	28	

* Δ indicates a "change in."

That's right.
The law of
diminishing
returns.

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price
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0	0		\$2
1	7	7	2
2	13	6	2
3	18	5	2
4	22	4	2
5	25	3	2
6	27	2	2
7	28	1	2

* Δ indicates a "change in."

We are
assuming a
competitive
market.

The firm is a
"price taker" in
the product
market.

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price	(5) Total Revenue, or (2)X(4)	(6) Marginal Revenue Product(MRP), Or $\Delta(5)^*$
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MRP: Increase in total revenue resulting from the use of each additional variable input, in this case, labor.

0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	<input type="text"/>
3	18	5	2	36	10
4	22	4	2	44	<input type="text"/>
5	25	3	2	50	6
6	27	2	2	54	<input type="text"/>
7	28				2

* Δ indicates a "change in."

**Pause presentation to
fill in the boxes!**

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price	(5) Total Revenue, or (2)X(4)	(6) Marginal Revenue Product(MRP), Or $\Delta(5)^*$
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0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
5	25	3	2	50	6
6	27	2	2	54	4
7	28	1	2	56	2

* Δ indicates a "change in."

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price	(5) Total Revenue, or (2)X(4)	(6) Marginal Revenue Product(MRP), Or $\Delta(5)^*$
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The MRP schedule in columns (1) and (6) provides the firm's demand schedule for labor.

0	0	7	\$2	\$ 0	\$14
1	7	6	2	14	12
2	13	5	2	26	10
3	18	4	2	36	8
4	22	3	2	44	6
5	25	2	2	50	4
6	27	1	2	54	2
7	28		2	56	

* Δ indicates a "change in."

The Marginal Productivity Theory of Resource Demand


- To **maximize profits**, the firm should hire additional units of a given resource – labor, land, and capital -- so long as each successive unit adds more to the firm's total revenues than it does to total costs.

Hiring An Extra Worker



- When a firm decides to hire, say, an additional worker, it must evaluate how much that worker will increase the firm's profits.
- It will do so by comparing the extra revenue generated by the extra output produced by the additional worker to the costs of employing that worker.
- Now, we already know what the firm's addition to total revenues is.
- **Question:** What is it?

Marginal Resource Cost



- That's right: It's the MRP.
- But what about the addition to cost?
- Here, we can define the marginal resource cost simply as the amount that each additional unit of a factor resource adds to the firm's total resource cost.

Key Definition

The Profit Maximizing Rule

It will be profitable for a firm to hire additional units of a factor resource such as labor up to the point at which that resource's MRP is equal to its MRC.

If $MRP \neq MRC$

1. If the number of workers currently employed by the firm is such that the MRC of the last worker is less than the MRP, the firm can clearly profit by hiring more workers.
2. If the number of workers already hired is such that the MRC of the last worker exceeds the MRP, a firm can increase its profits by laying off some workers.

A Tough Question



- Under the assumption that the labor market is perfectly competitive, what do you think that the MRC will be equal to?

**Pause presentation to
think about the answer**

Answer: MRC=Wage Rate

- The complete rule for profit maximization under perfect competition is this: The MRP will equal the MRC will equal the wage rate.

$$\text{MRP} = \text{MRC} = W$$

(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price	(5) Total Revenue, or (2)X(4)	(6) Marginal Revenue Product(MRP), Or $\Delta(5)^*$
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✦ Question: Suppose the wage rate is \$13.95.
How many workers will the firm hire?

0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
5	25	3	2	50	6
6	27	2	2	54	4
7	28	1	2	56	2

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0	0		\$2	\$ 0	
1	7	7	2	14	\$14 > 13.95
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
5	25	3	2	50	6
6	27	2	2	54	4
7	28	1	2	56	2

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(1) Units of resource	(2) Total Product	(3) Marginal Product (MP), Or $\Delta(2)^*$	(4) Product Price	(5) Total Revenue, or (2)X(4)	(6) Marginal Revenue Product(MRP), Or $\Delta(5)^*$
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★ **Question:** Suppose the wage rate is \$9.95.
How many workers will the firm hire?

Pause presentation to
think about the answer

0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
5	25	3	2	50	6
6	27	2	2	54	4
7	28	1	2	56	2

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0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
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Pause presentation to do this exercise

0	0		\$2	\$ 0	
1	7	7	2	14	\$14
2	13	6	2	26	12
3	18	5	2	36	10
4	22	4	2	44	8
5	25	3	2	50	6
6	27	2	2	54	4
7	28	1	2	56	2

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♦ Under pure competition, product price is constant.

♦ Therefore, diminishing marginal productivity is the *only* reason why the resource demand curve is downward sloping.