
Production Cost, Supply, and Price Determination

AEB 2104

Agricultural Economics

<http://www.geocities.com/dsolisw/AEB2104.html>

Introduction

- **Cost** is the value of money that has been used up to produce something
- To produce its product a firm needs to use valuable resources.
- So production cost is affected:
 - by the quantity of resources used; and
 - by the value of the resources

Identification of costs

- Production costs can be divided into 2 groups:
 - **Explicit cost:** is an easy accounted cost, such as wage, rent and materials. It can be transacted in the form of money payment.
 - Operating cost (labor, rental, inputs)
 - Overhead cost (taxes, insurance, etc.)
 - **Implicit cost:** occurs when one foregoes an alternative action but does not make an actual payment.

Implicit cost: examples

- A firm's use of its own capital. This is considered an implicit cost because the capital could have been rented to another firm instead.
- A firm's use of its owner's time and/or labor.
- Economic depreciation: is the change in the market value of capital over a given period

Opportunity cost

- **Opportunity cost** is the value of a product forgone to produce or obtain another product.
- Opportunity cost is a key concept in economics because it implies the choice between desirable, yet mutually exclusive results.
- It has been described as expressing "the basic relationship between scarcity and choice"
- The next best thing that a person can engage in is referred to as the opportunity cost of doing the best thing and ignoring the next best thing to be done

Opportunity cost: examples

- A person who invests \$10,000 in a stock denies himself the interest he could have earned by leaving the \$10,000 dollars in a bank account instead. The opportunity cost of the decision to invest in stock is the value of the interest.
- It can also apply to time; one might use a limited vacation time to travel to a place of cultural enrichment or to do household improvements. Thus the two-week road trip might preclude repairing or painting one's house that year.

Profit

- **Profit** generally is the making of gain in business activity for the benefit of the owners of the business.
- It is defined in two different ways, one for economics and one for accounting.

- Accounting profit:

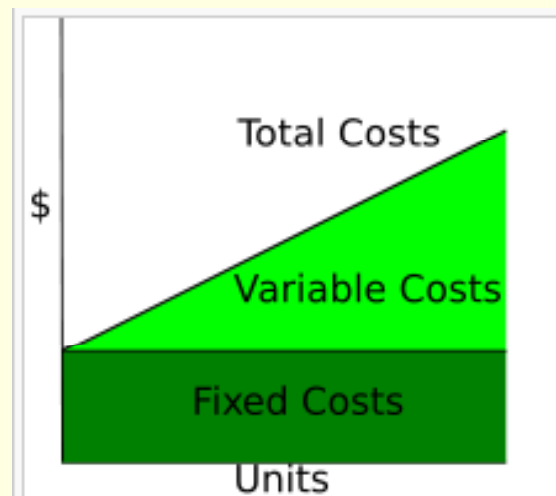
Revenue – Explicit Cost

- Economic profit (pure profit):

Revenue – Explicit Cost – Implicit (Opportunity) Cost

Fixed and variable cost

- **Fixed costs** are business expenses that are not dependent on the level of production or sales. They tend to be time-related, such as salaries or rents being paid per month
- **Variable costs** are expenses that change in proportion to the activity of a business



Length-of-run

- The **short run** is a period of time in which the quantity of at least one input is fixed and the quantities of the other inputs can be varied.
- The **long run** is a period of time in which the quantities of all inputs can be varied
- There is no fixed time that can be marked on the calendar to separate the short run from the long run. The short run and long run distinction varies from one industry to another

EXAMPLE 3
Cost, profit and supply curve

Table 6.1 Production Relationship for TOP-AG, Inc.

Point on Figure 6.1	(1) Daily Labor Use	(2) Daily Output Level	(3) Marginal Physical Product, $\Delta(2) \div \Delta(1)$	(4) Average Physical Product, $(2) \div (1)$
A	10.0	1.0		.10
B	16.0	3.0	.33	.19
C	20.0	4.8	.45	.24
D	22.0	6.5	.85	.30
E	26.0	8.1	.40	.31
F	32.0	9.6	.25	.30
G	40.0	10.8	.15	.27
H	50.0	11.6	.08	.23
I	62.0	12.0	.03	.19
J	76.0	11.7	-.02	.15

Cost of Variable input \$5

Table 6.3 Short-Run Cost Schedule for TOP-AG, Inc., and Selected Cost Concepts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Point on Figure 6.1	Total Output	Total Fixed Cost	Average Fixed Cost, (2) ÷ (1)	Total Variable Cost	Average Variable Cost, (4) ÷ (1)	Total Cost, (2) + (4)	Marginal Cost, $\Delta(6) \div \Delta(1)$	Average Total Cost, (5) + (5)
A	1.0	100.00	100.00	50.00	50.00	150.00		150.00
B	3.0	100.00	33.33	80.00	26.67	180.00	15.00	60.00
C	4.8	100.00	20.83	100.00	20.83	200.00	11.11	41.67
D	6.5	100.00	15.38	110.00	16.92	210.00	5.88	32.31
E	8.1	100.00	12.35	130.00	16.05	230.00	12.50	28.40
F	9.6	100.00	10.42	160.00	16.67	260.00	20.00	27.08
G	10.8	100.00	9.26	200.00	18.52	300.00	33.33	27.78
H	11.6	100.00	8.62	250.00	21.55	350.00	62.50	30.17
I	12.0	100.00	8.33	310.00	25.83	410.00	150.00	34.17
J	11.7	100.00	8.55	380.00	32.48	480.00	n/a	41.03

From TPP curve

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Fixed costs are \$100 no matter the level of production

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**Column (2)
divided by
column (1)**

Table 6.3 Short-Run Cost Schedule for TOP-AG, Inc., and Selected Cost Concepts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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Costs that vary with level of production

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**Column (4)
divided by
column (1)**

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**Column (2)
plus
column (4)**

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Change in column (6) associated with a change in column (1)

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I	12.0	100.00	8.33	310.00	25.83	410.00	150.00	34.17
J	11.7	100.00	8.55	380.00	32.48	480.00	n/a	41.03

Column (6) divided by column (1) or

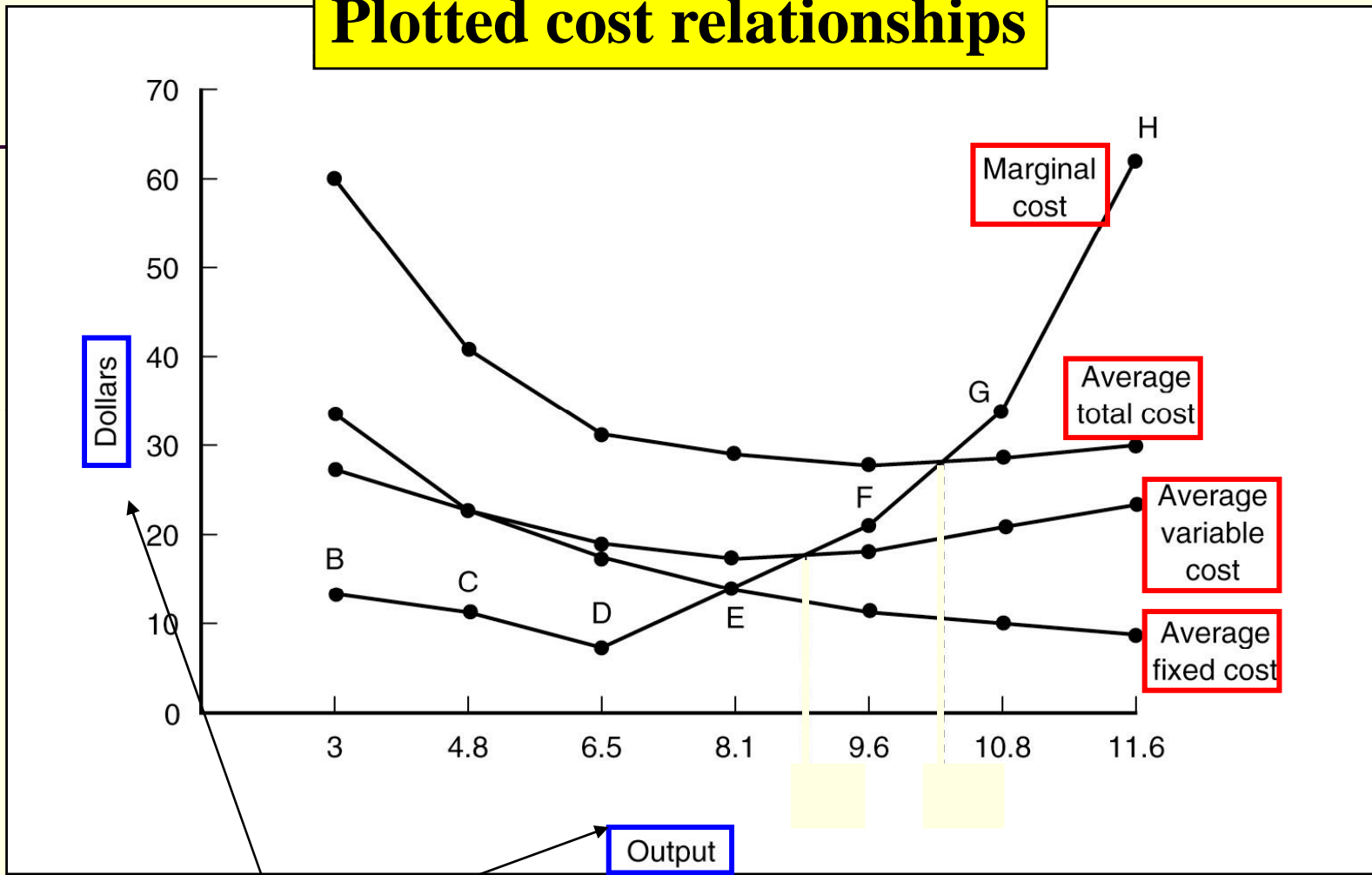
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B	3.0	100.00	33.33	80.00	26.67	180.00	15.00	60.00
C	4.8	100.00	20.83	100.00	20.83	200.00	11.11	41.67
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I	12.0	100.00	8.33	310.00	25.83	410.00	150.00	34.17
J	11.7	100.00	8.55	380.00	32.48	480.00	n/a	41.03

or column (3) plus column (5)

Let's graph the cost series in this table

Plotted cost relationships



Plotting costs for levels of output

Searching for the optimum

- The optimum will be found at the point where the increments in cost are equal to the increments in revenue.

$$\mathbf{MC=MR}$$

- Let's define revenue

**Now let's assume this firm can
sell its product for \$45/unit**

Key Revenue Concepts


Table 6.4 Determination of TOP-AG's Profit-Maximizing Level of Output

Point on Figure 6.1	(1) Total Output	(2) Market Product Price	(3) Total Revenue, (1) × (2)	(4) Total Costs	(5) Economic Profit, (3) – (4)	(6) Marginal Cost, $\Delta(4) \div \Delta(1)$	(7) Marginal Revenue, $\Delta(3) \div \Delta(1)$
A	1.0	\$45.00	\$45.00	\$150.00	–\$105.00		
B	3.0	45.00	135.00	180.00	–45.00	\$15.00	\$45.00
C	4.8	45.00	216.00	200.00	16.00	11.11	45.00
D	6.5	45.00	292.50	210.00	82.50	5.88	45.00
E	8.1	45.00	364.50	230.00	134.50	12.50	45.00
F	9.6	45.00	432.00	260.00	172.00	20.00	45.00
G	10.8	45.00	486.00	300.00	186.00	33.33	45.00
H	11.6	45.00	522.00	350.00	172.00	62.50	45.00
I	12.0	45.00	540.00	410.00	130.00	150.00	45.00
J	11.7	45.00	526.50	480.00	46.50	n/a	n/a

Notice the price in column (2) is identical to marginal revenue in column (7). What about average revenue, or AR? What do you see if you divide total revenue in column (3) by output in column (1)? Yes, \$45. Thus, **$P = MR = AR$** under perfect competition.

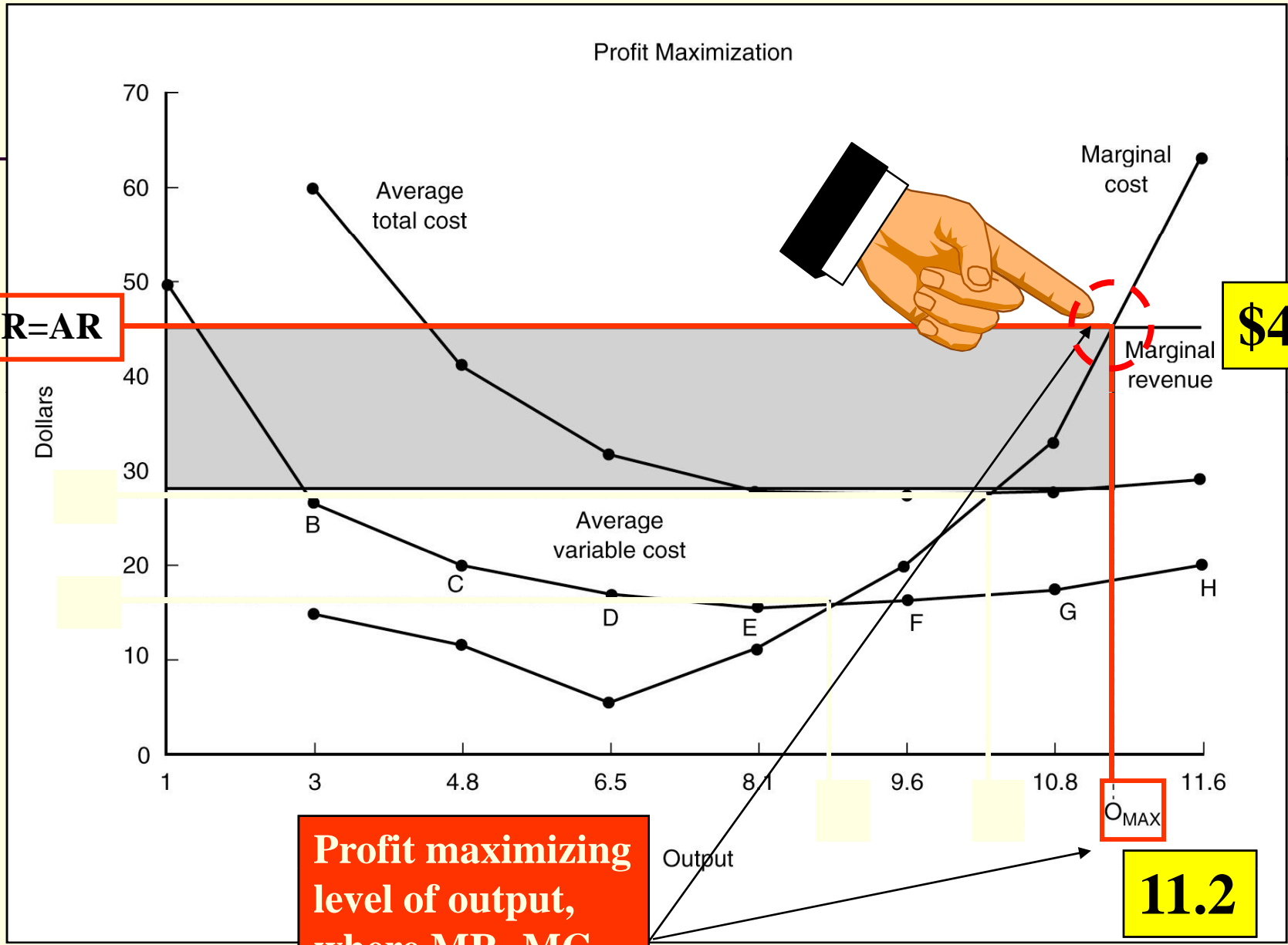
Perfect competition?

- **Perfect competition** describes a market in which no buyer or seller has market power
- **Characteristics:**
 - **Many buyers/Many Sellers**
 - **Homogeneous Products**
 - **Low-Entry/Exit Barriers** – It is relatively easy to enter or exit as a business in a perfectly competitive market.
 - **Perfect Information**
 - **Firms Aim to Maximize Profits**



**Let's see this in
graphical form**

Profit Maximization



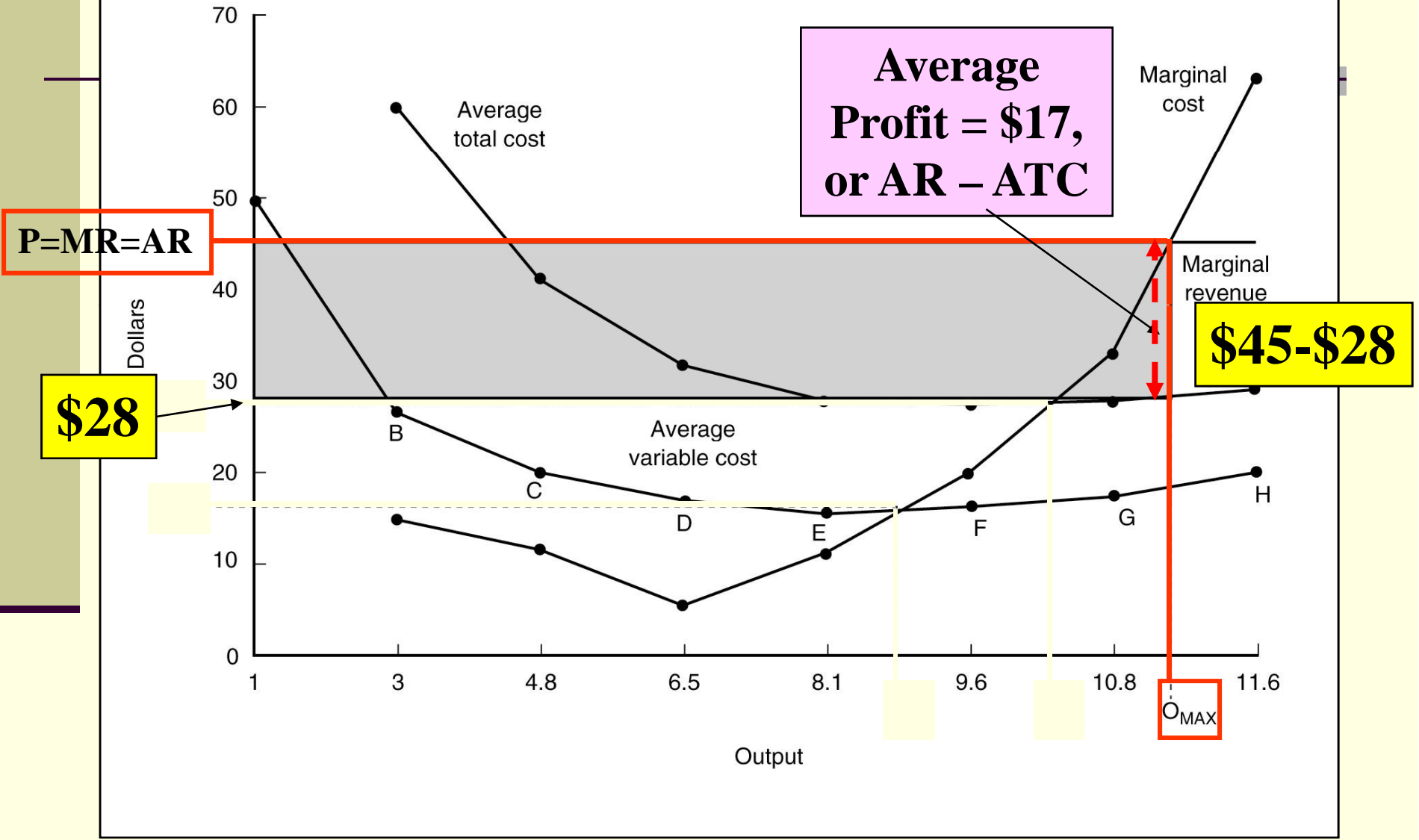
$P=MR=AR$

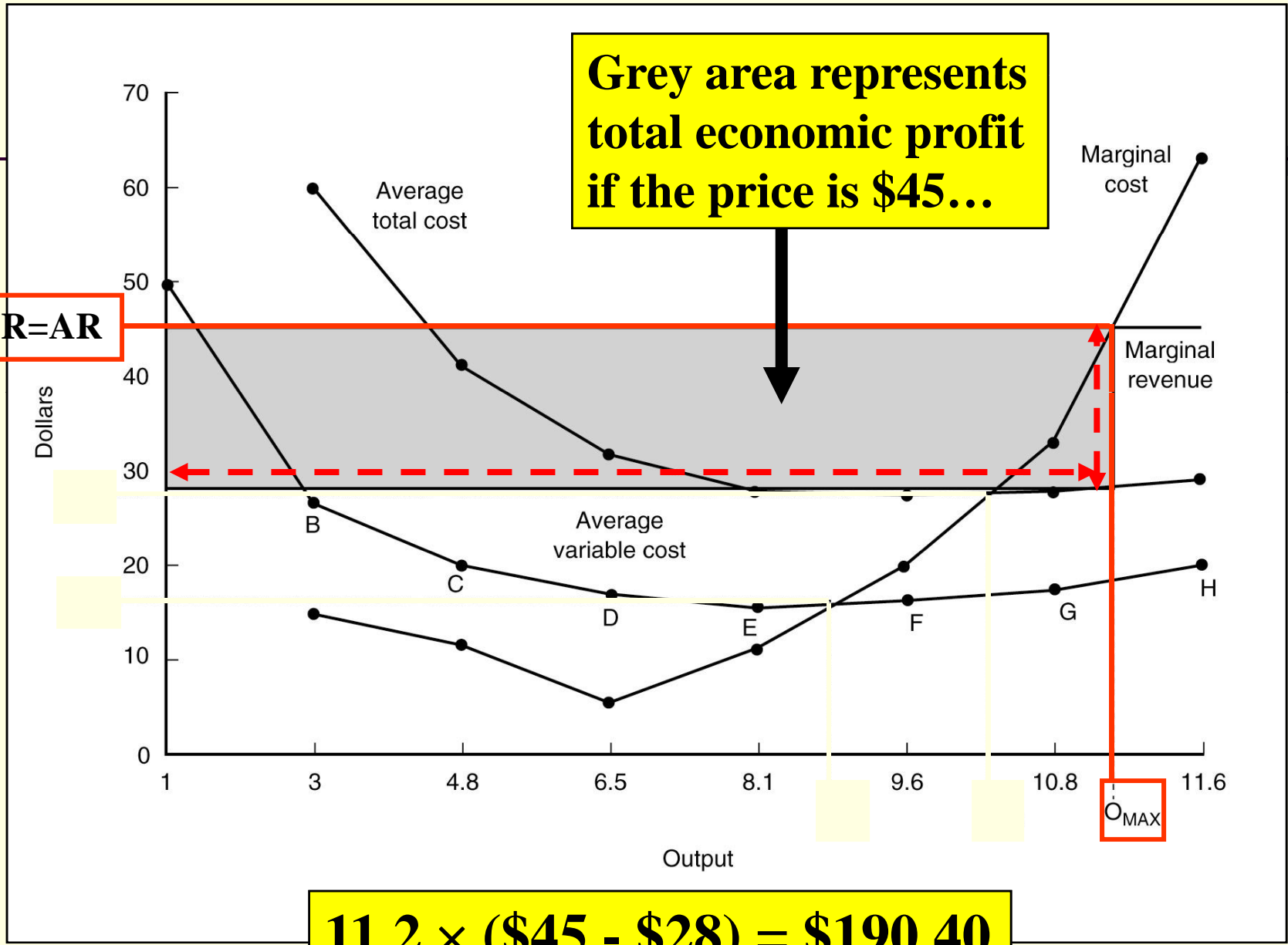
\$45

Profit maximizing level of output, where $MR=MC$

11.2

Profit Maximization



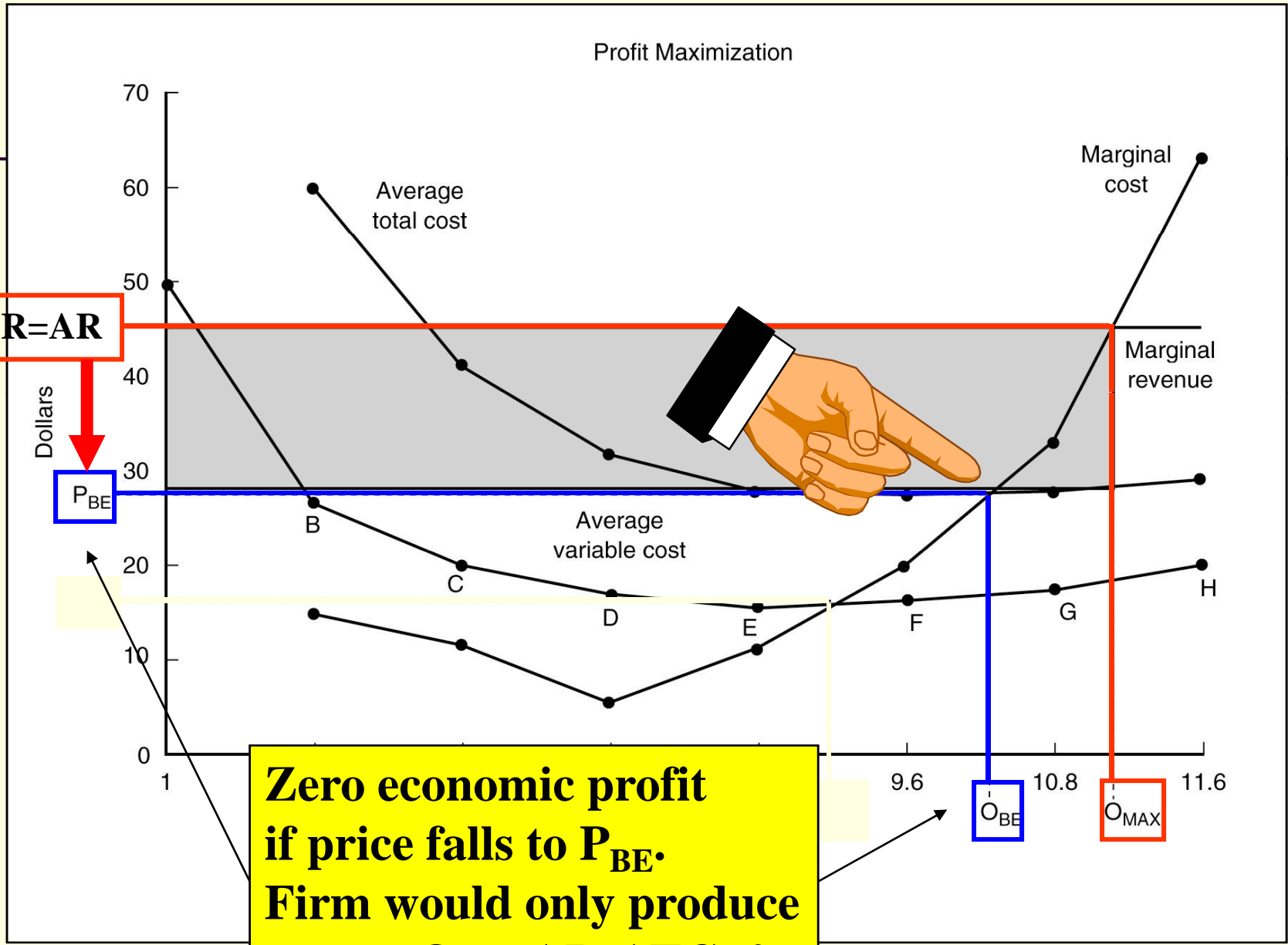


Grey area represents total economic profit if the price is \$45...

P=MR=AR

$11.2 \times (\$45 - \$28) = \$190.40$

Profit Maximization



P=MR=AR

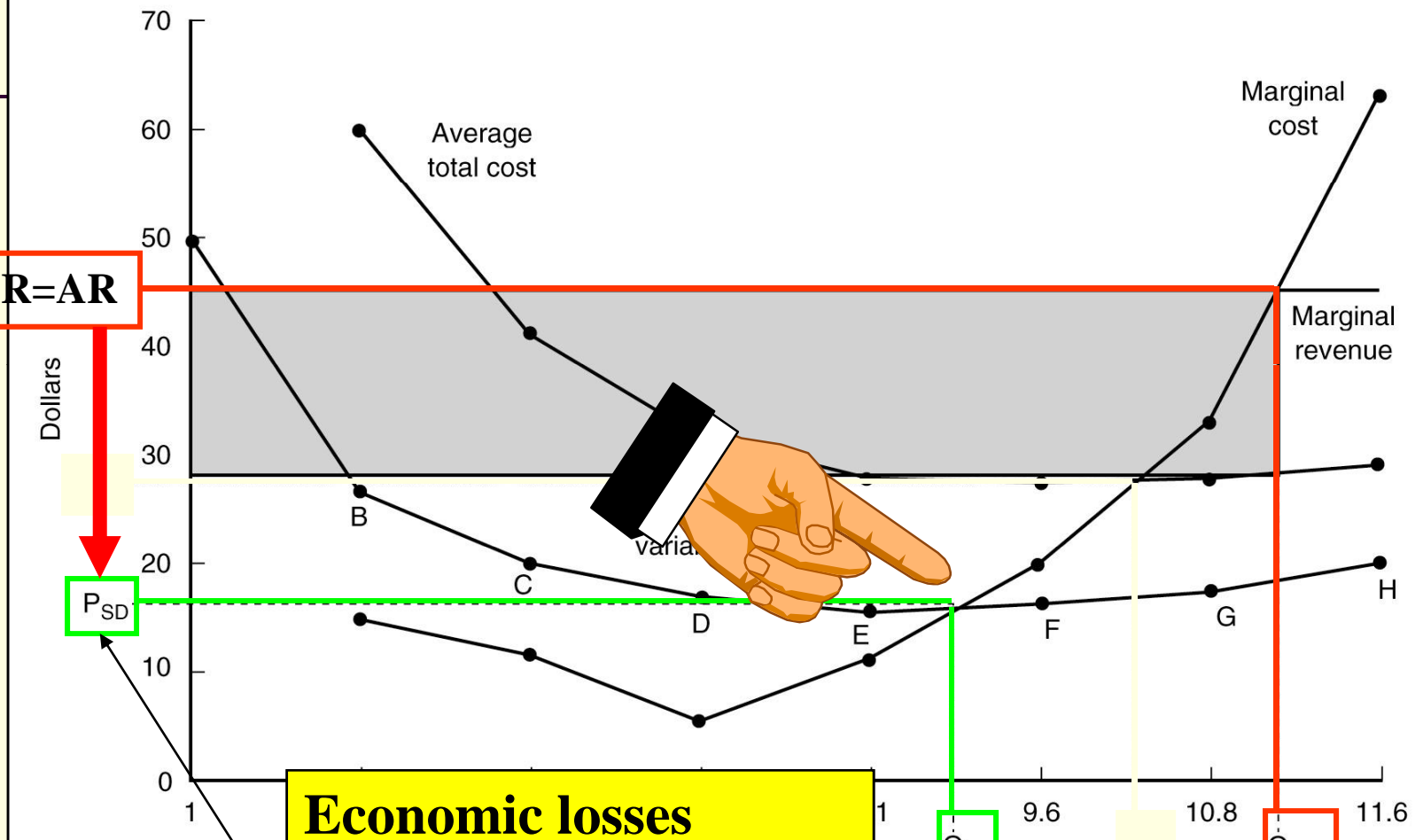
P_{BE}

Zero economic profit if price falls to P_{BE}. Firm would only produce output O_{BE}. AR-ATC=0

O_{BE}

O_{MAX}

Profit Maximization



$P = MR = AR$

Dollars

P_{SD}

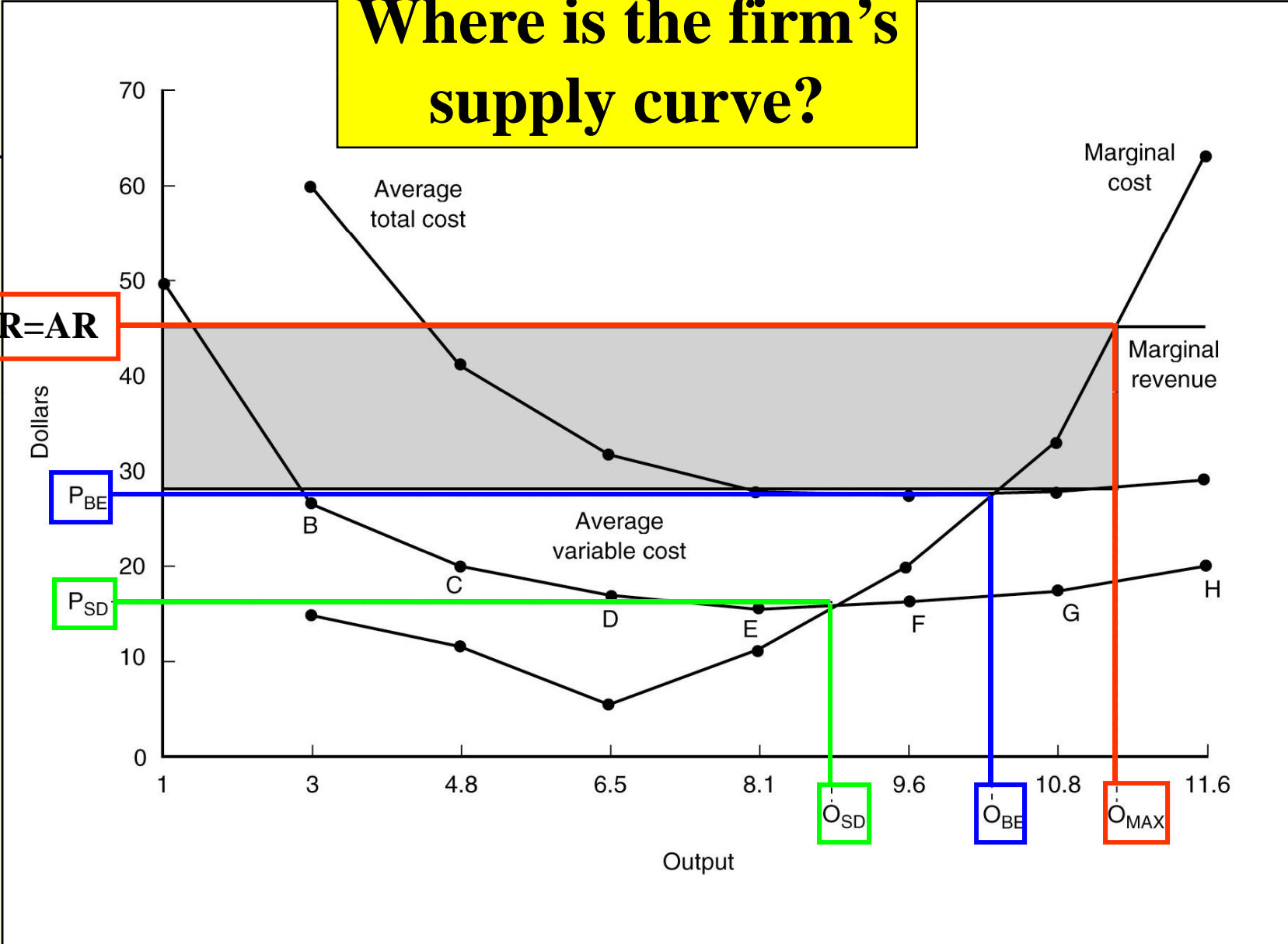
Economic losses if price falls to P_{SD} . Firm would shut down below output O_{SD}

O_{SD}

O_{MAX}

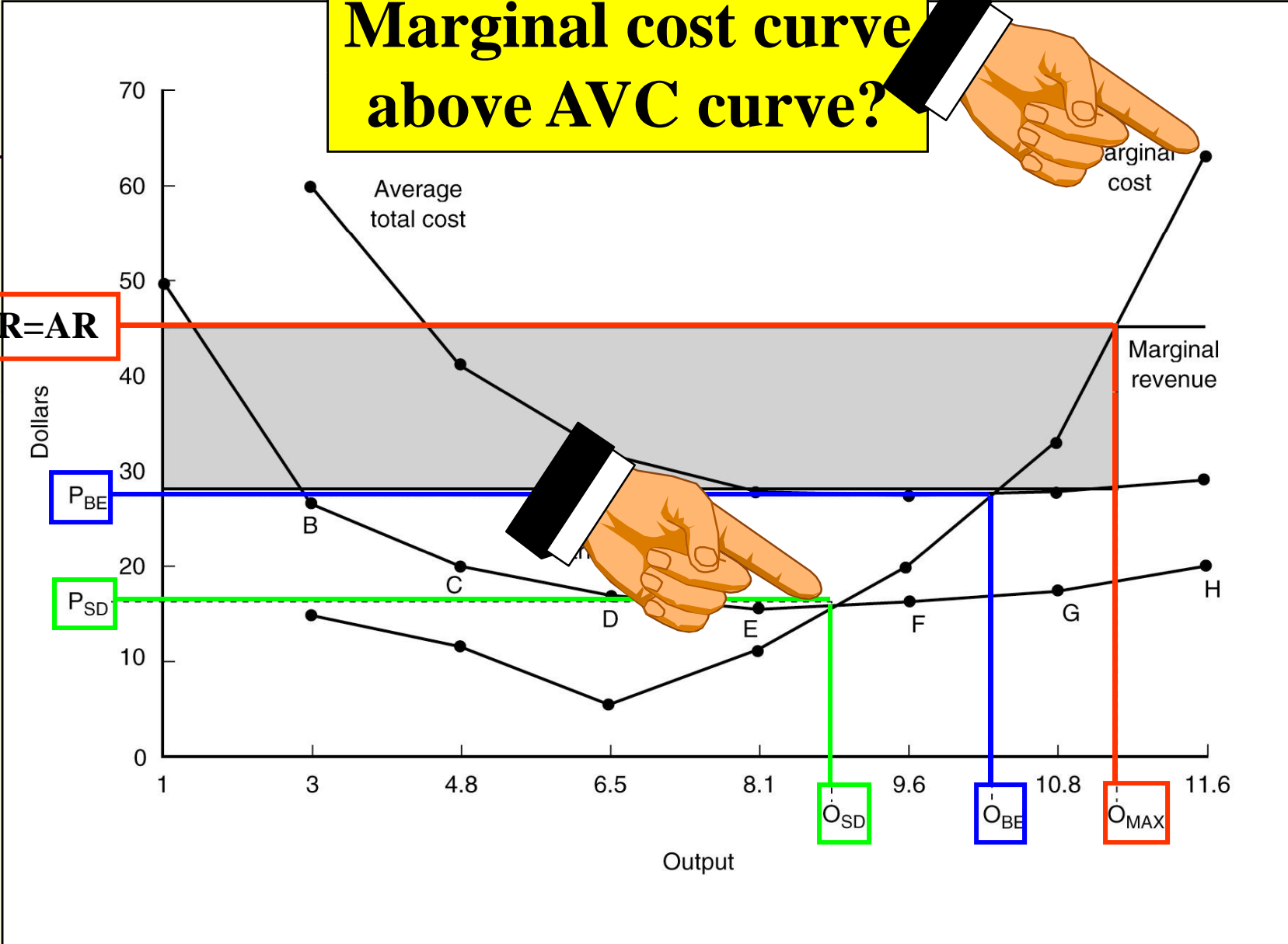
Where is the firm's supply curve?

$P=MR=AR$



Marginal cost curve above AVC curve?

$P=MR=AR$



Market supply

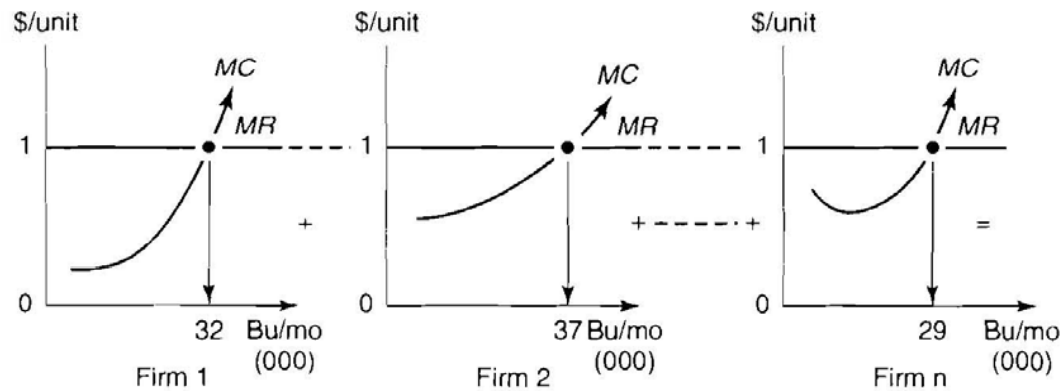
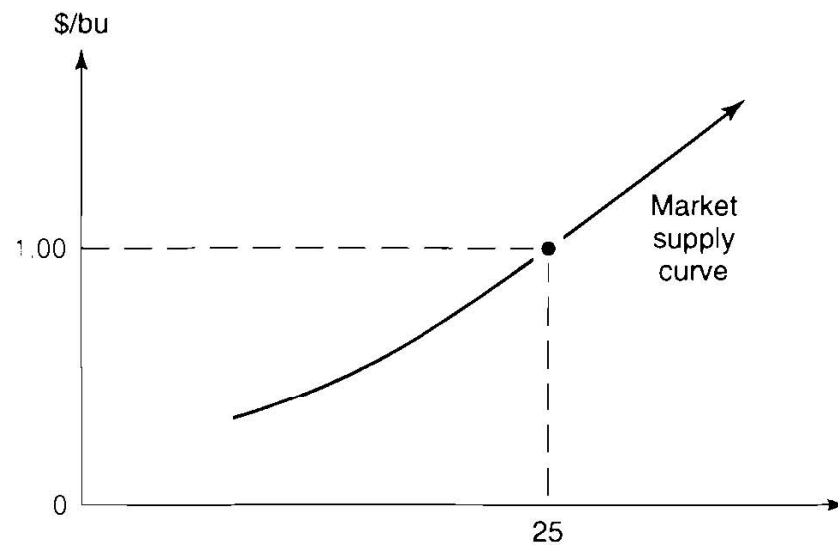


FIGURE 6-7 Supply curves for all firms producing Good A: Firm 1, Firm 2, Firm n .



Change in market supply

- Changes along the supply curve are called ***changes in the quantity supplied***
- A shift in the supply curve is called **change in the supply**
 - Change in technology
 - Change in \$ of other products
 - Climate

Elasticity of supply

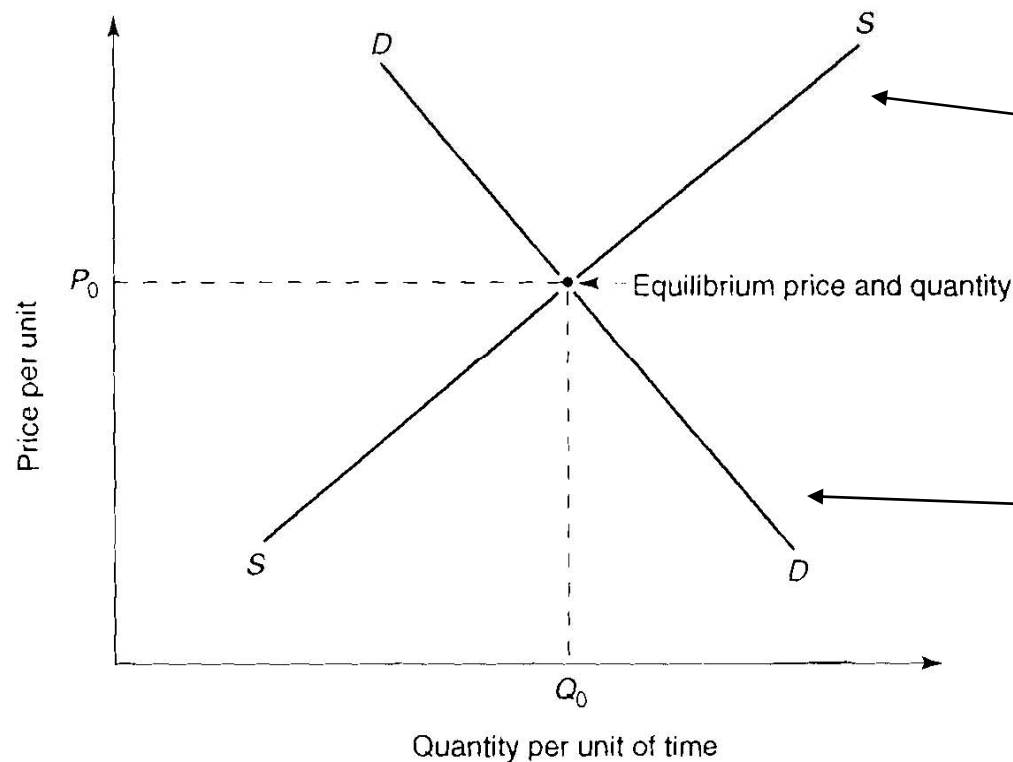
- Price elasticity of supply measure the % change in the quantity supplied to a % change in price:

$$E_s = \frac{(Q_1 - Q_2) / (Q_1 + Q_2)}{(P_1 - P_2) / (P_1 + P_2)}$$

$E_s = 0.4$ for cotton means that the quantity supplied increases in 0.4% with 1% increase in the price of cotton.

Price determination

Equilibrium in the market



Shows the motivation of producer to sell their products

Shows the desire of costumers to purchase the products

FIGURE 6-12 Price determination in a market.

Market disequilibrium: surplus

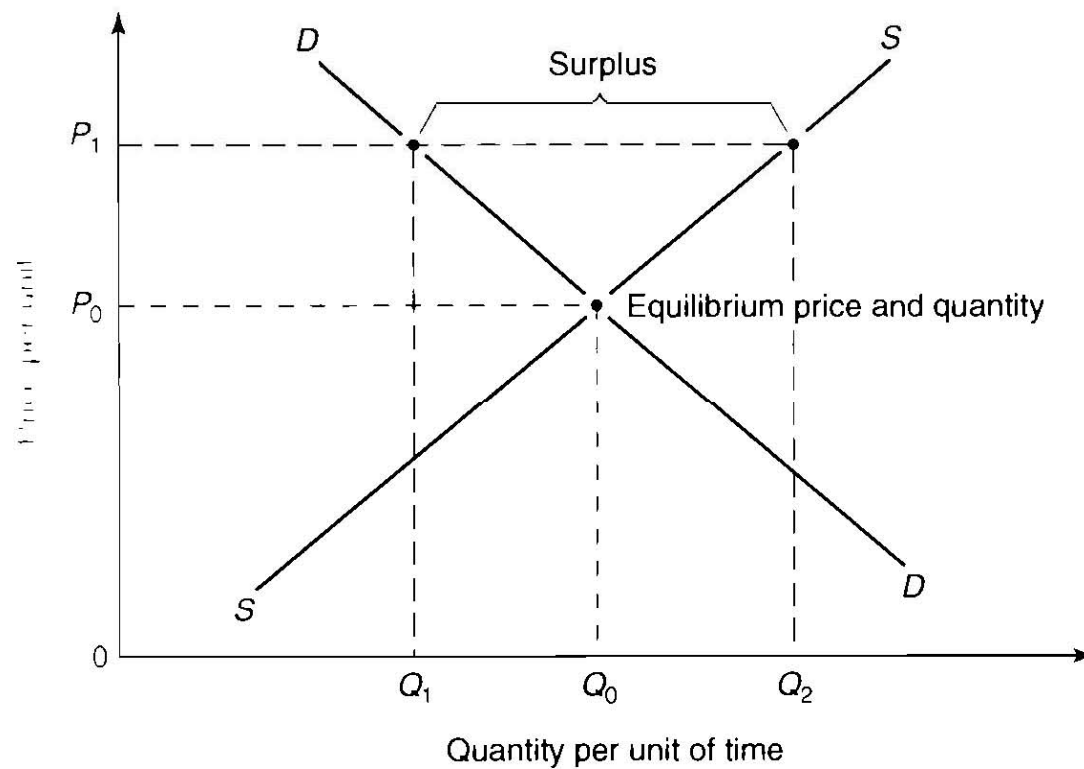


FIGURE 6-13 Disequilibrium in the market: A surplus.

Market disequilibrium: shortage

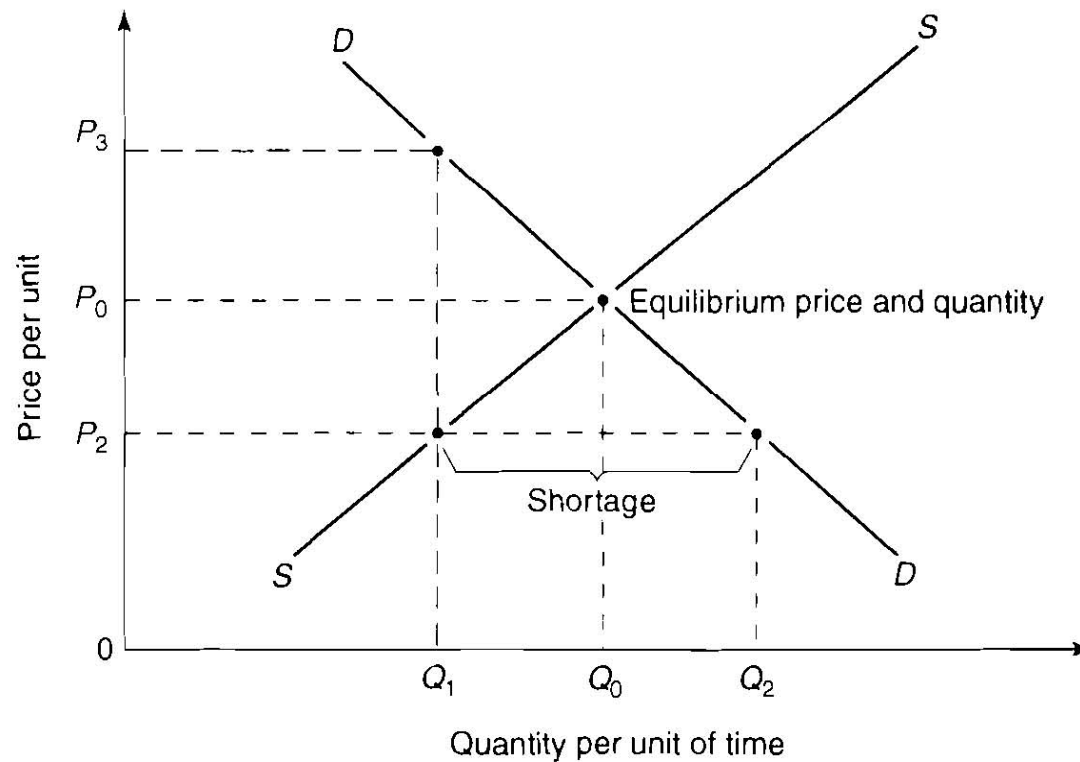


FIGURE 6-14 Disequilibrium in the market: A shortage.