Production, Costs, and Industry Structure

Antitrust
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Thoughts on POE Ch. 7

- This chapter is more mathy than we need. What we really care about *conceptual understanding*.
- Even then, if you pack away 100% of the material here, you're overlearning the econ for purposes of this course.
- BUT this chapter is very helpful because ...
- It shows you how to think like a business manager, which is helpful for antitrust analysis.
- It gives us some reasons to see why horizontal combinations (including mergers, oligopoly, and even monopoly) can be efficient (i.e., "good").
  - And this is very important, because antitrust law (at least in the prevailing Chicago School mode) doesn't want to make things *less* efficient!
- It's foundational for understanding the economics of monopolies and cartels, which comes along in Chapter 9.

Important Big Conceptual Ideas

- The "theory of the firm"
- Accounting profits are different from economic profits
- Sunk costs and the sunk cost fallacy
- Thinking of profits as costs
- Economies of scale
- Law of diminishing marginal product
- Things look different in the short run and long run
- Different industries have different efficient orderings of size and number of firms

The Theory of the Firm

- How firms behave
- Why they decide to do what they do
- What price they should charge
- What level of output they should choose to produce at
- Whether they should enter a line of business
- Whether they should exit a line of business
- Etc. ...

(See POE$^{2d\ ed.}$ p. 156)

Accounting Profits are Different from Economic Profits

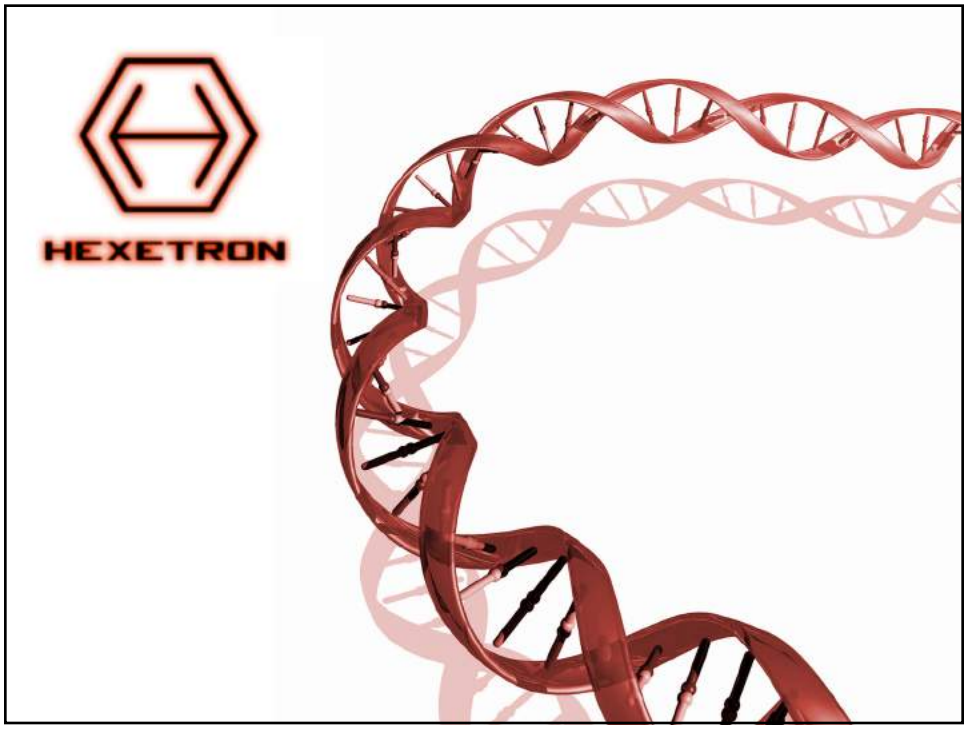
- **Accounting profits are total revenue minus out-of-pocket costs ("explicit costs").**
- **Economic profits are total revenue minus explicit costs and minus opportunity costs ("implicit costs").**
- **If I rent a house to Alice for $1,000 a month, and my mortgage payment, insurance, and maintenance are $950, I made an accounting profit of $50.**
- **But if I could have rented to Betina for $2,000 a month, then the decision to rent to Alice instead of Betina was an economic loss!**

Sunk Costs and the Sunk Costs Fallacy

- **Money you've already spent is a "sunk cost."**
- **Business managers need to make decisions about what to do next — not based on what would have been good to do back in the past.**
- **So business managers must ignore sunk costs.**
- **Fixed costs are, for the most part, sunk costs. (This not necessarily true in the real world, but with this microeconomic theory we are doing, there's generally an assumed equivalence between sunk costs and fixed costs.)**
  (See POE$^{2d\ ed.}$ p. 170.)
- **The Sunk Costs Fallacy is making an irrational decision based on sunk costs.**

Thinking of Profits as Costs

- **What goes into a seller's price?**
- **If a seller is pricing based on cost ("cost-based pricing"), then the seller has to include the cost of supplies, space, utilities, advertising, labor, and some reasonable profit — because there has to be some reason the seller is in this business!**
- **If the seller (i.e., the entrepreneur, corporation, shareholders, etc.) didn't make a profit, they would invest their money and time elsewhere.**
- **We say a perfectly competitive market drives the price down to the cost of production. This includes profit as a cost. There's got to be enough of an incentive that proprietors/companies/entrepreneurs are tying up their money/effort/time in this venture instead of something else.**
  (See POE[2d ed.] p. 165.)



HEXETRON PHARMA

Problem: Glornox

Hexetron Pharmaceuticals has spent $6.1 billion developing a new anti-cancer drug, Glornox, that is effective against RSL cancer. Along the way, three things happened. First, a competing drug, imbabulorbulan, was approved; it works on RSL cancer with similar effectiveness to Glornox. Second, a court invalidated the patent on imbabulorbulan. Third, Hexetron discovered that a topical cream version of Glornox is highly effective against acne. Research reveals the following: With an additional investment of $90 million, Glornox can be sold in the United States for RSL cancer. With an additional investment of $3.8 billion, Glornox can be sold in Europe for RSL cancer. With an additional investment of $6 billion, Glornox can be marketed worldwide for acne. Total USA/RSL revenues would be $88 million. Total Europe/RSL revenues would be $4 billion. Total worldwide acne revenues would be $10 billion. (Revenue figures are after paying costs of production and distribution.) *Is there anyway the development of Glornox can turn out to have been a profitable undertaking? What should Hexetron do now?*

Economies of Scale

- **Economy of scale means that as production output increases, average cost (cost per unit) goes down.** (See POE[2d ed.] 174.)
- **This happens sometimes in the real world, and sometimes it doesn't.**
- **A good example of economy of scale is semiconductor chip manufacturing over the long run.**

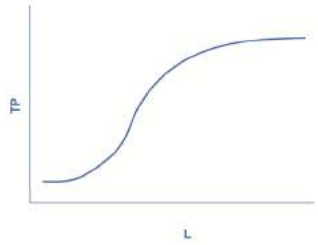
Law of Diminishing Marginal Product

- **As you add more workers, or more machines, or more land — more of any kind of human or physical capital — then marginal production initially increases, but it tends to increase by less and less, and at some point the effect becomes negligible and may even be negative.**
  (See POE[2d ed.] 162.)

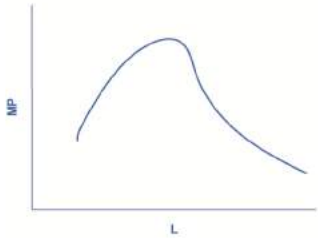
Short Run Production Function for Trees

- The top graph shows the short run total product for trees.
- As the number of lumberjacks increase, the output also increases, until 5 lumberjacks are reached.
- The bottom graph shows that as workers are added, the MP increases at first, but sooner or later additional workers will have decreasing marginal product.

General Case of Total Product and Marginal Product Curves.

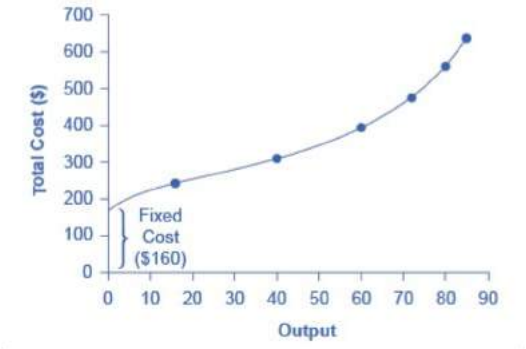


General case of total product curve.



General case of marginal product curve.

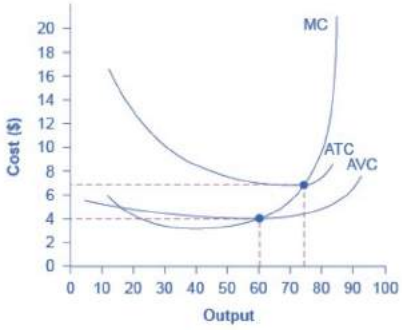
How Output Affects Total Costs



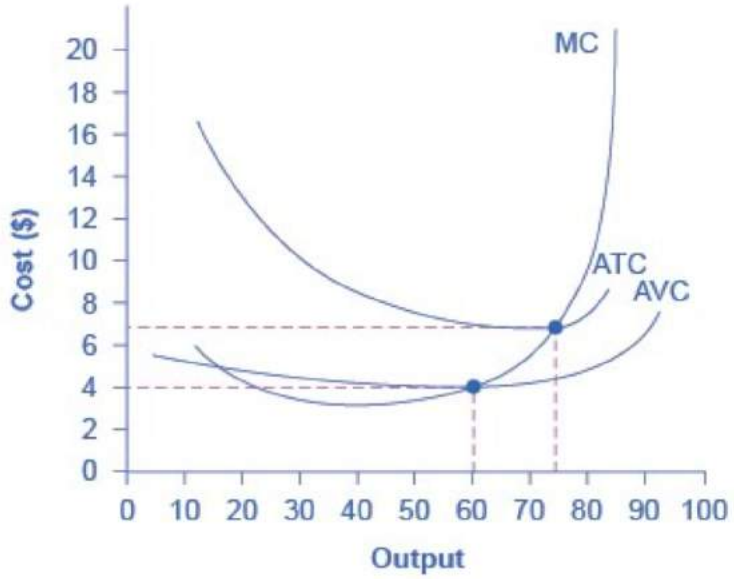
- At zero production, the fixed costs of $160 are still present.
- As production increases, variable costs are added to fixed costs, and the total cost is the sum of the two.

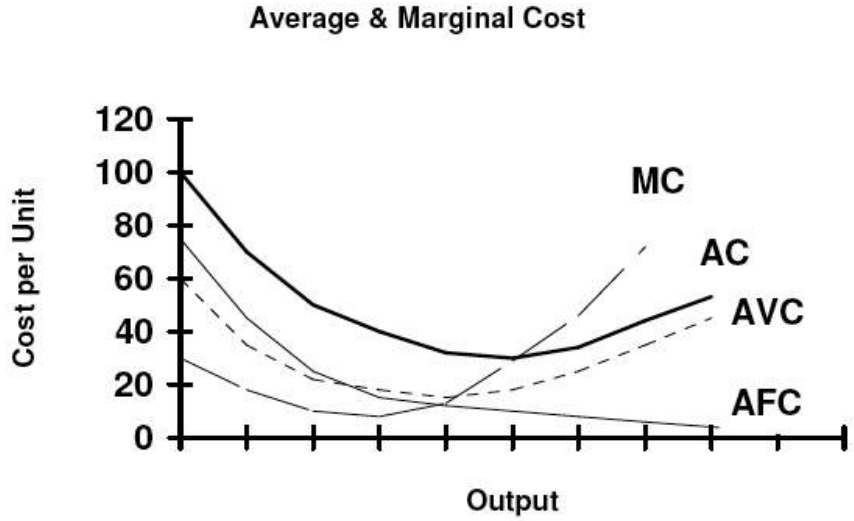
Cost curves

- Average total cost (ATC)
  - Typically U-shaped
- Average variable cost (AVC)
  - Lies below the average total cost curve and
  - Typically U-shaped or upward-sloping.
- Marginal cost (MC)



Cost curves





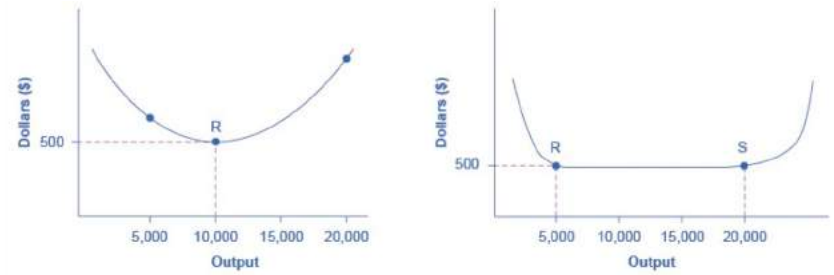
Things Look Different in the Short Run and Long Run

- Over the long run, all costs are variable.
- This is really what defines the "long run"—it's that time in the future when anything can be changed (long-term contracts, land, new factories, etc.).
- The U-shape of the marginal cost curve and the average total cost curve is a short-run thing. In part, it's about the decreasing marginal gain from more labor when capital assets are fixed.
- In the long term, capital assets can be increased with labor, so in the long run, average costs can continue to decrease.

Different industries have different efficient orderings of size and number of firms

- If the bottom of the LRAC curve for firms is between 5,000 and 20,000 units, that means firms that produce in that range are the most efficient.
- If the total market is very large in comparison (>1M units), then many firms is efficient.
- If the total market is ~50K units, then a few firms is efficient.
- If the total market is between 5K and 20K, then one firm can produce more efficiently.
- (See POE$^{2d\ ed.}$ p. 179.)

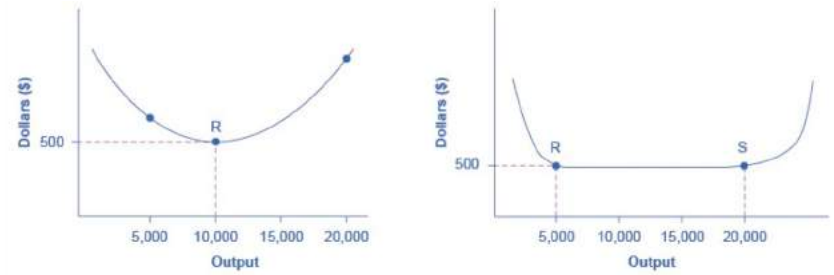
The LRAC Curve and the Size and Number of Firms (1/2)



For graph (a):

- Low-cost firms will produce at output level R.
- When the LRAC curve has a clear minimum point, then any firm producing a different quantity will have higher costs.
- In this case, a firm producing at a quantity of 10,000 will produce at a lower average cost than a firm producing 5,000 or 20,000 units.

The LRAC Curve and the Size and Number of Firms (2/2)



For graph (b):

- Low-cost firms will produce between output levels R and S.
- When the LRAC curve has a flat bottom, then firms producing at any quantity along this flat bottom can compete.
- In this case, any firm producing a quantity between 5,000 and 20,000 can compete effectively,
- Firms producing less than 5,000 or more than 20,000 would face higher average costs and be unable to compete.

Review Problems for Ch. 7

Similar to self-check questions ...

Review Problems

Petrochemical company Jarkex has a single plant that makes polyvinyl chloride. Here's what happened last year. It had $1.1 billion in sales revenues. It spent $200 million on capital; $100 million on labor; $300 million on electricity, marketing, and transportation; and $400 million on feedstock (raw materials). If it had leased the whole plant to Octan last year to make to vinyl acetate, Jarkex would have had revenues of $500 million with no expenses.

1. What was the company's accounting profit?

2. What was the company's economic profit?

Similar to self-check questions ...

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1. What was the company's accounting profit?

$100 million

2. What was the company's economic profit?

(−$400 million) *That is, a loss of $400M.*

Similar to self-check questions ...

Review Problems

A lawn mowing service can mow 8 lawns per day using one lawn mower. With a second lawn mower, it could mow 11 lawns per day.

3. What is the marginal product of the second lawn mower?

Similar to self-check questions ...

Review Problems

A lawn mowing service can mow 8 lawns per day using one lawn mower. With a second lawn mower, it could mow 11 lawns per day.

3. What is the marginal product of the second lawn mower?

3 lawns per day

Similar to self-check questions ...

Review Problems

Hexetron Marine Systems has three ways of producing one yacht screw. Method 1 requires 30 worker hours and 6 robot hours. Method 2 requires 20 worker hours and 12 robot hours. Method 3 requires 10 worker hours and 20 robot hours. (Robots are leased by the hour.)

4. If workers cost $35/hr and robots cost $50/hr, what are the costs of each method? Which is most cost effective?

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4. If workers cost $35/hr and robots cost $50/hr, what are the costs of each method? Which is most cost effective?

Method 1: $1,350

Method 2: $1,300

Method 3: $1,350

Method 2 is the most cost effective.

method	work hrs		wage/hr		labor cost	robot hours		lease/hr		robot cost	total cost
1	30	x	$35	=	$1,050	6	x	$50	=	$300	$1,350
2	20	x	$35	=	$700	12	x	$50	=	$600	$1,300
3	10	x	$35	=	$350	20	x	$50	=	$1,000	$1,350

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Hexetron Marine Systems has three ways of producing one yacht screw. Method 1 requires 30 worker hours and 6 robot hours. Method 2 requires 20 worker hours and 12 robot hours. Method 3 requires 10 worker hours and 20 robot hours. (Robots are leased by the hour.)

5. If workers cost $50/hr and robots cost $40/hr, what are the costs of each method? Which is most cost effective?

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5. If workers cost $50/hr and robots cost $40/hr, what are the costs of each method? Which is most cost effective?

Method 1: $1,740

Method 2: $1,480

Method 3: $1,300

Method 3 is the most cost effective.

method	work hrs		wage/hr		labor cost	robot hours		lease/hr		robot cost	total cost
1	30	x	$50	=	$1,500	6	x	$40	=	$240	$1,740
2	20	x	$50	=	$1,000	12	x	$40	=	$480	$1,480
3	10	x	$50	=	$500	20	x	$40	=	$800	$1,300

Similar to self-check questions ...

Review Problems

There are four firms worldwide that do design and production of custom high-end tiger enclosures for large zoos. The long-run average cost curve for any given firm is such that the lowest point on the curve is three high-end custom enclosures produced each year for $15 million each. Not so long ago, zoo patrons were crazy about tigers. So lots of zoos were making new tiger enclosures. Now all the parents take their kids to the science museum because everyone is obsessed with STEM. The zoo patrons that are left are mostly into elephants. Demand for high-end tiger enclosures has shrunk to three per year worldwide.

6. What do you think will happen to the high-end custom tiger enclosure design and production industry? Will the four firms survive?

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6. What do you think will happen to the high-end custom tiger enclosure design and production industry? Will the four firms survive?

The industry will likely shrink to one firm.

A little beyond the self-check questions ...

Stretch Problem

There are four firms worldwide that do design and production of custom high-end tiger enclosures for large zoos. The long-run average cost curve for any given firm is such that the lowest point on the curve is three high-end custom enclosures produced each year for $15 million each. Not so long ago, zoo patrons were crazy about tigers. So lots of zoos were making new tiger enclosures. Now all the parents take their kids to the science museum because everyone is obsessed with STEM. The zoo patrons that are left are mostly into elephants. Demand for high-end tiger enclosures has shrunk to three per year worldwide.

7. If the industry does shrink to one firm, and if the reserve price of zoos is $20 million for a new tiger enclosure, what do you think will happen to the price?

A little beyond the self-check questions ...

Stretch Problem

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7. If the industry does shrink to one firm, and if the reserve price of zoos is $20 million for a new tiger enclosure, what do you think will happen to the price?

The price will go up to $20 million each.

A little beyond the self-check questions ...

Problem

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8. What is a story you can tell for why there are increasing economies of scale going up to three enclosures designed and produced per year per firm?

A little beyond the self-check questions ...

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[Answers will vary.]

A little beyond the self-check questions ...

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9. What is a story you can tell for why there would be decreasing economies of scale going beyond three enclosures designed and produced per year per firm?

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