STUDENTS AS PRODUCERS: TEACHING PRODUCTION AND COSTS WITH A "GLOVE" MAKING ACTIVITY

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MOTIVATION

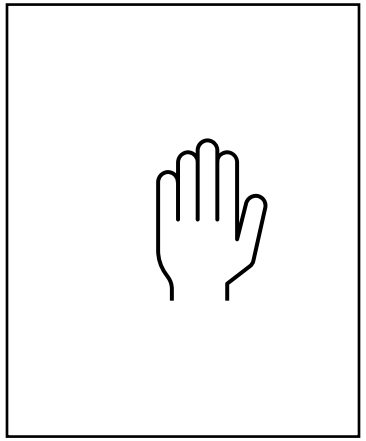
- "Chalk and Talk" is primary method of instruction (Asarta, Chambers, and Harter 2021)
  - Belief that it is most effective (Goffe and Kauper 2014)
  - Cost-effective (Goffe and Kauper 2014)
- Various studies show active learning techniques improve student learning outcomes
- Use of active learning techniques, such as games, experiments, or simulations, has decreased over time (Asarta, Chambers, and Harter 2021)

ACTIVITY: STUDENTS BECOME "GLOVE" PRODUCERS

- Engage in production process—transforming inputs to output
  - Fixed vs. Variable inputs
  - Diminishing marginal product
- Produce "glove" by tracing their hand on a piece of paper

(all credit for "glove" idea goes to Amanda Hughey!)

- Instructor only needs to provide paper



ACTIVITY: SET-UP

- Minimum of 30 minutes for activity
- Groups of approx. 6 students; important that groups are the same size
- Each group is a "firm" and group members are workers
- Production occurs in successive, timed rounds (30 seconds) ; size of groups will determine how many rounds of production
  - In each round, additional worker is added
  - All workers should be engaged

INPUTS

Fixed vs. Variable

- Time (30 sec)
- "Capital" → 2 writing utensils per group
- "Land" → restrict desk space

- Labor → add 1 worker each round

ACTIVITY: PRODUCTION

- Distribute worksheet to each group
- Answer questions 1-2
- Fill in top row of production function table

"Glove" Production and Diminishing Marginal Product

Suppose you are a firm that produces gloves. Your goal is to produce as many gloves as possible given your resources of land (desk area), capital (2 writing utensils), and labor (you are the workers).

You are going to produce gloves in successive rounds. In the first round, you are only permitted to have 1 worker. In each successive round, you can add one additional worker. You will have 30 seconds in each round to make the maximum number of gloves possible given your inputs.

Before you begin, answer the following questions:

1. What is the output your firm is producing?

2. What are your firm's inputs?

   a. Which of the inputs are fixed?

   b. Which of the inputs are variable?

Fill in the following table with each successive round of glove production that takes place.

Units of Labor	Total Output (Total Product)	Marginal Product (MP)	Average Product (AP)
0		———	———
1			
2			
3			
4			
5			
6			

ACTIVITY: PRODUCTION

- Begin rounds of production
- Round 1: one worker per group makes gloves for 30 seconds
  - At conclusion of round, fill in 2nd row of table
- Round 2: original worker + 1 additional worker make gloves for 30 seconds
  - At conclusion of round, fill in 3rd row of table
- Continue rounds for as many students in group

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ACTIVITY: TIPS FOR IMPLEMENTATION

- Prior to round 3, remind students that capital is restricted to 2 writing utensils per group even though there will be 3 workers
- Remind students that all workers need to be engaged in production
- Prior to start of each round, give 1-2 minutes for groups to prepare

ACTIVITY: FOLLOW-UP/DISCUSSION

- Follow-up questions can be answered within each group or via a class discussion

3. What does it mean to have diminishing marginal product in production of a good/service?

4. Does your glove production exhibit diminishing marginal product? Provide a 1-2 sentence explanation.

5. With this glove production, are you operating in the short run or the long run? Briefly justify your answer.

COSTS OF PRODUCTION

- Costs of production typically are covered directly after covering the topic of production
- Can use the glove production activity to help in teaching costs of production
- Can illustrate both short run and long run costs in the context of this simulation with provided worksheets
- Will need to teach students cost relationships prior to using the cost materials as well as difference between the short run and the long run

COSTS: SHORT RUN COSTS

- Assigns cost to each input:
  - $10/worker
  - $5/writing utensil
  - $5/desk area
- Production data given for sake of illustrating important relationships & for graphing purposes

Short Run Costs & Production **Name**_____

Consider the glove producing activity from class where you combined labor (you, the workers) with capital (2 writing utensils) and land (specified desk area). Labor was the variable input, and the capital and land were the fixed inputs.

Suppose labor costs $10/person, capital $5/writing utensil, and land $5/desk, and assume production as specified below. Fill in the empty cells in the table.

Labor	Output (Q)	Marginal Product (MP)	Total Variable Cost (TVC)	Total Fixed Cost (TFC)	Total Cost (TC)	Marginal Cost (MC)	Average Total Cost (ATC)	Average Variable Cost (AVC)	Average Fixed Cost (AFC)
0	0	---				---	---	---	---
1	10								
2	25								
3	30								
4	32								

Complete each of the following statements with increases(s) or decrease(s):

1. As production expands (i.e., as Q increases), marginal product (MP) _____ then _____.
2. As production expands (i.e., as Q increases), marginal cost (MC) _____ then _____.
3. As production expands (i.e., as Q increases), ATC and AVC both _____ then _____.
4. As production expands (i.e., as Q increases), AFC continually _____.

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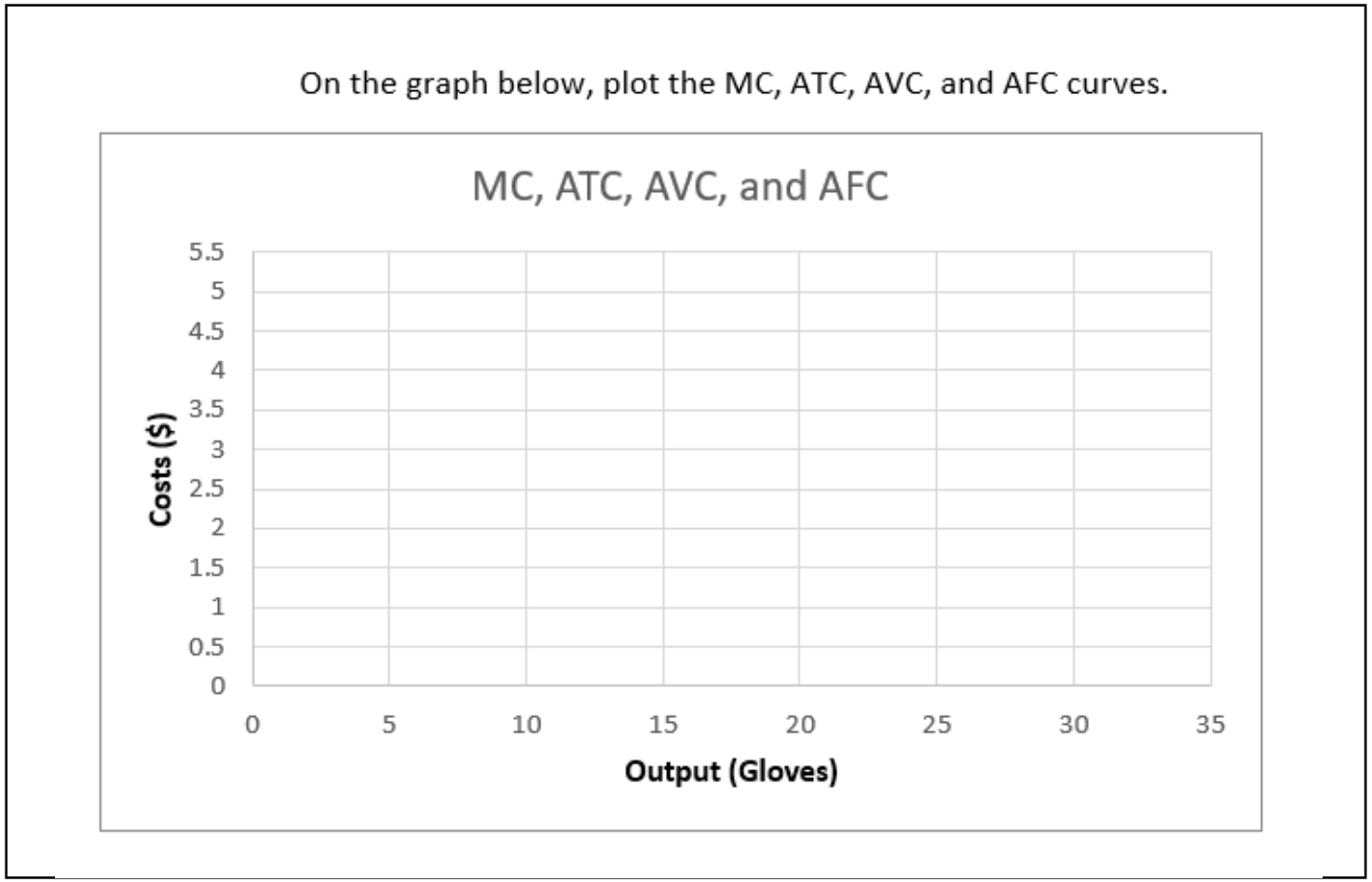


COSTS: LONG RUN COSTS

- Provides new hypothetical production and cost data after a change to fixed inputs
  - 3 writing utensils
  - 2 desk areas
- Also provides original ATC curve (ATC_1) and new ATC curve (ATC_2)

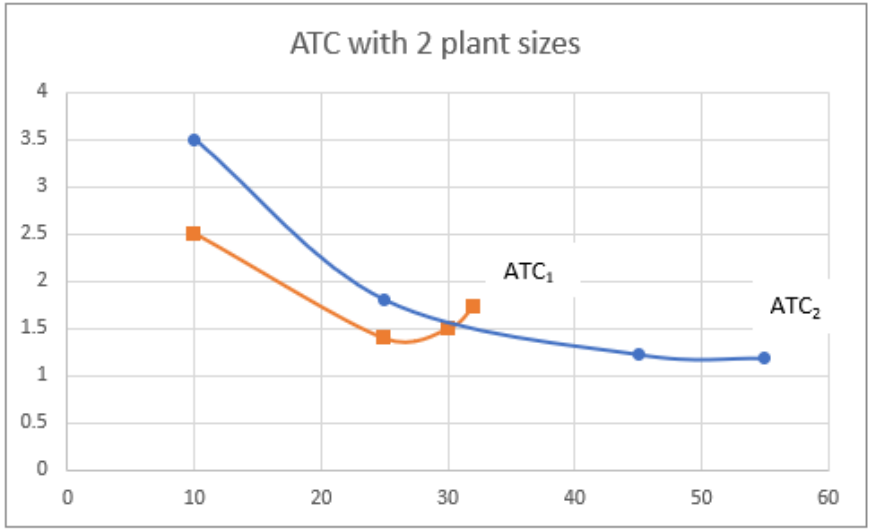
Long Run Costs & Production **Name**_____

In the long run, firms can make decisions on "scale" (change the fixed inputs of capital and labor). Suppose that the glove production plant size is changed to allow for ***3*** writing utensils (change to capital goods), and ***2*** desk areas (change to land input).

Suppose costs of inputs do not change, so labor costs $10/person, capital $5/writing utensil, and land $5/desk, and assume new production as specified below.

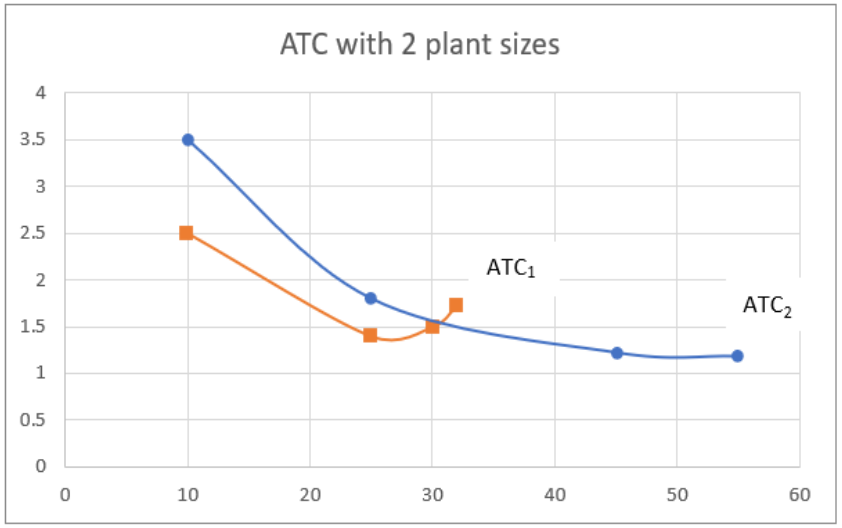
Labor	Output (Q)	Marginal Product (MP)	Total Variable Cost (TVC)	Total Fixed Cost (TFC)	Total Cost (TC)	Marginal Cost (MC)	Average Total Cost (ATC)	Average Variable Cost (AVC)
0	0	---	$0	$25	$25	---	---	---
1	10	10	10	25	35	$1	$3.5	$1
2	25	15	20	25	45	0.67	1.8	0.8
3	45	20	30	25	55	0.5	1.22	0.67
4	55	10	40	25	65	1	1.18	0.73

Consider the new ATC (ATC_2) with the expanded plant capacity and the original ATC (ATC_1) curves below:



COSTS: LONG RUN COSTS

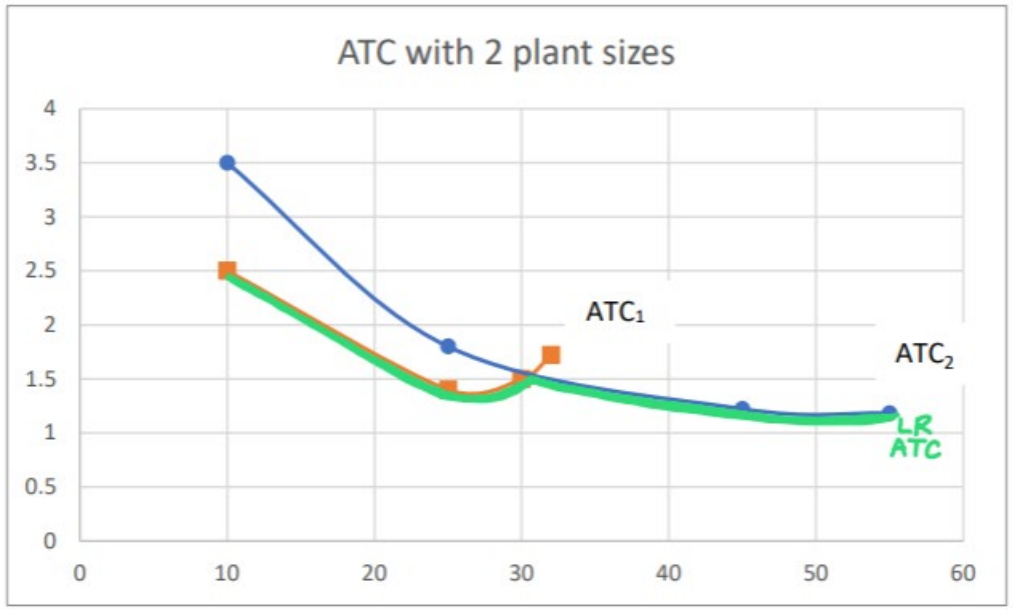
- Questions are designed to get students to choose which "scale" or "plant capacity" should be used to minimize costs for any chosen output level
- Ultimately, should help students grasp how a long run ATC curve is derived

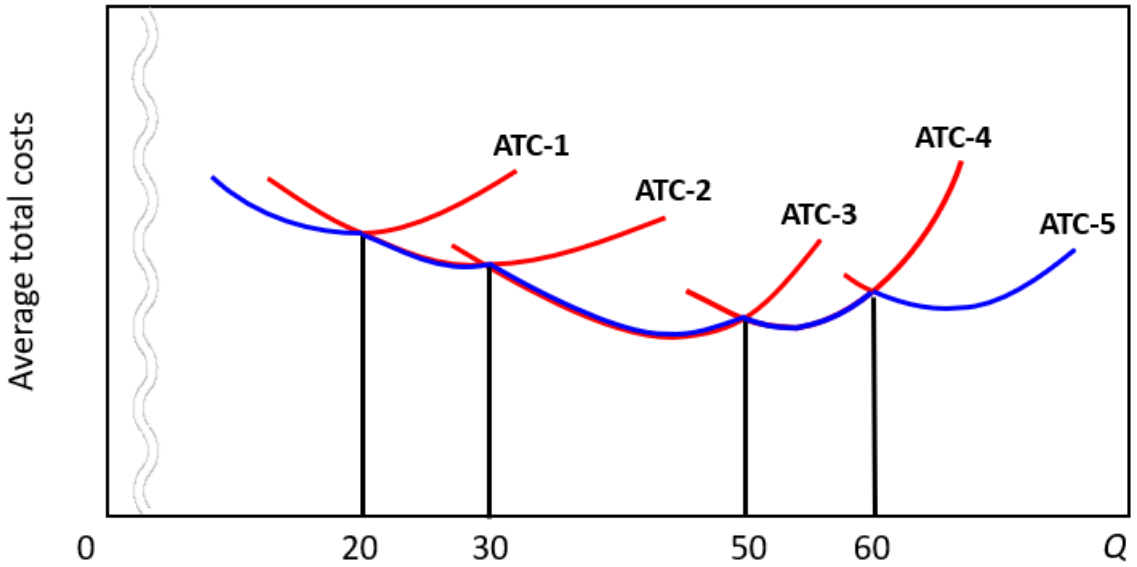


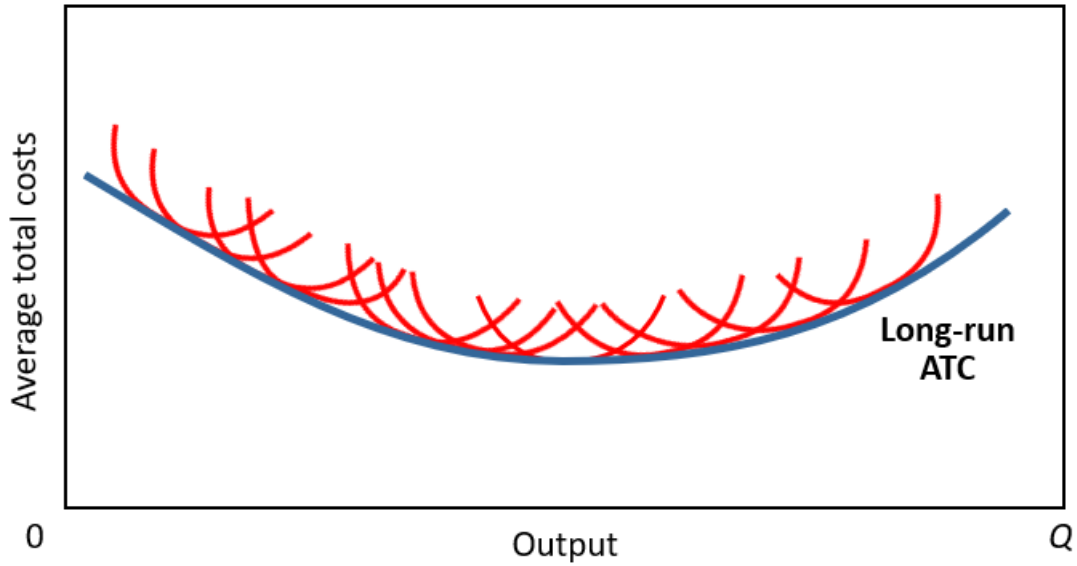
1. If this firm wanted to produce 32 gloves at the lowest average cost per unit, should the firm operate at its original plant capacity or its new plant capacity?
2. If this firm wanted to produce 20 gloves at the lowest average cost per unit, should the firm operate at its original plant capacity or its new plant capacity?
3. To produce at the lowest average cost per unit, at what quantity should the firm switch from the original plant capacity to the new plant capacity?
4. Add the long run ATC curve on the graph above.
5. If this firm increased production from 10 to 50 gloves, does this firm experience economies of scale?

COSTS: LONG RUN COSTS

- Easier to conceptualize than simply being shown standard textbook derivations of LR ATC







McConnell, Brue, & Flynn. *Microeconomics*. McGraw Hill Education.

CONCLUSION

- Easily implementable activity
- Flexible and could adjust/enhance it to fit your needs (e.g., changing group sizes, time, technology discussion, require gloves to have a design, adding in more “capital” via scissors, etc.)
- All (editable) documents can be found here