

Microeconomics

**Chapter 6:  
Sellers and  
Incentives**

Acemoglu Laibson List

Modified by Joseph Tao-yi Wang

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Chapter Outline

- 6.1. Sellers in a **Perfectly Competitive Market**
- 6.2. The **Seller's Problem**
- 6.3. From Seller's Problem to **Supply Curve**
- 6.4. **Producer Surplus**
- 6.5. From the Short Run to the **Long Run**
- 6.6. From the Firm to the Market:  
**Long Run Competitive Equilibrium**

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Key Ideas

1. The seller's problem has three parts:
  1. **production**,
  2. **costs**, and
  3. **revenues**.
2. An optimizing seller makes decisions **at the margin**.
3. The **supply curve** reflects a willingness to sell a good or service at various price levels.

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Key Ideas

4. **Producer surplus** is the difference between the market price and the marginal cost curve.
5. Sellers **enter and exit** markets based on profit opportunities.

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Evidence-Based Economics Example

▶ How would an ethanol subsidy affect ethanol producers?



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Sellers in a Perfectly Competitive Market

▶ Conditions of a perfectly competitive market:

1. No buyer or seller in the market is big enough to influence the market price.
2. Sellers in the market produce identical goods.
3. There is free entry and exit in the market.

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## Sellers in a Perfectly Competitive Market

1. No buyer or seller is big enough to influence the market price
  - ▶ What it means:
    - ▶ There are so many consumers and producers that no one individual can change the market price with his/her behavior.
  - ▶ Example:
    - ▶ A seller who wants to withhold product in an attempt to drive up the market price will be unable to do so, because one seller is a small part of the market.

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## Sellers in a Perfectly Competitive Market

2. Sellers in the market produce identical goods
  - ▶ What it means:
    - ▶ An individual seller can't influence the market price by selling a unique product.
  - ▶ Example:
    - ▶ If all the products are the same, a seller can't charge a higher price for his/her product since there are many other producers selling exactly the same thing.

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## Sellers in a Perfectly Competitive Market

3. There is free entry and exit in the market
  - ▶ What it means:
    - ▶ Sellers can respond to potential profits in a market by entering, or by leaving markets that are no longer profitable—both of which have implications on market price.
  - ▶ Example:
    - ▶ If many firms leave a market, the supply curve will shift (that's one of the determinants) and market price will increase.

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## The Seller's Problem

Goal of the Seller: Maximize Profit

- ▶ To achieve this goal, sellers must solve 3 problems:
  1. How to make the product
  2. What is the cost of making the product?
  3. How much can the seller get for the product in the market?

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

1. How to make the product—turning inputs into outputs



How do you make a cake?

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

- ▶ What's the "run"?
- ▶ **Short run (SR)**: Period of time when some of the firm's inputs **cannot** be changed
  - ▶ Ex. In the short run, you can't buy another oven
- ▶ **Long run (LR)**: Period of time when all of the firm's inputs can be changed
  - ▶ Ex. In the long run, you can buy another oven, even build another kitchen

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

Details of Production		
(1) Output Per Day	(2) # Employed	(3) Marginal Product
0	0	
100	1	100
207	2	107
321	3	114
444	4	123
558	5	114
654	6	100
762	7	98
854	8	92
939	9	86
1019	10	80
1092	11	73
1161	12	69
1225	13	64
1284	14	59
1338	15	55
1390	16	51
1438	17	48
.	.	.
.	.	.
.	.	.
1934	38	10
1834	39	-100

Exhibit 6.1 Production Data for The Wisconsin Cheeseman

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

Details of Production		
(1) Output Per Day	(2) # Employed	(3) Marginal Product
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939	9	86
1019	10	80
1092	11	73
1161	12	69
1225	13	64
1284	14	59
1338	15	55
1390	16	51
1438	17	48
.	.	.
.	.	.
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1934	38	10
1834	39	-100

Exhibit 6.1 Production Data for The Wisconsin Cheeseman

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

▶ What's important about this production table?

1. Marginal product increases with the first workers  
= specialization
- ▶ Workers are more efficient when they specialize in production and work together to produce a good.
- ▶ Marginal product increases through Worker 4.

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

▶ What's important about this production table?

2. Eventually, marginal product falls  
= law of diminishing returns
- ▶ At some point, each additional worker contributes less output than the worker before.
- ▶ Why? Production can lead to bottlenecks because capital is fixed—workers are waiting for machinery to become open, etc.
- ▶ Point of diminishing returns is at 4 workers.

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

▶ What's important about this production table?

3. Marginal product can be negative.
- ▶ Why? Capital is fixed in the short run. If more and more workers keep getting added, they will get in each other's way and actually cause output to fall.
- ▶ Marginal product becomes negative with the 39th worker.

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## The Seller's Problem - Making the Goods: How Inputs are Turned into Outputs

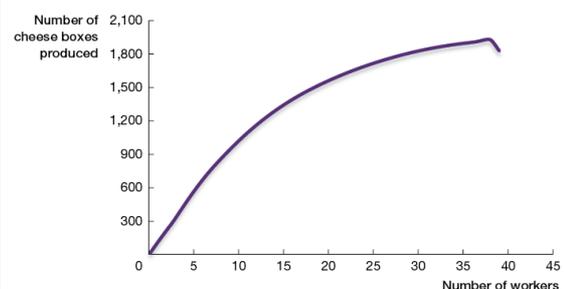


Exhibit 6.2 The Short-Run Production Function for The Cheeseman

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

- 2. What is the cost of making the product?
- If a firm is using inputs, it must be incurring costs—costs of production.
- Costs are associated with the factors of production and the "run."

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

- Short-run:
  - Total Cost = Variable Cost + Fixed Cost
- Variable Cost
  - The cost associated with the variable factors of production. Variable costs change as the level of output changes.
- Fixed Cost
  - The cost associated with the fixed factors of production. Fixed costs do not change as output changes.

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

- One other kind of cost:
- Opportunity (or implicit) costs

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

Cost of Production									
(1) Output Per Day	(2) # Em pl	(3) MP (Marginal Product)	(4) VC (Variable Cost)	(5) FC (Fixed Cost)	(6) TC (Total Cost) =(4)+(5)	(7) ATC (Average Total Cost) =(6)/(1)	(8) AFC (Average Fixed Cost) =(5)/(1)	(9) AVC (Average Variable Cost) =(4)/(1)	(10) MC (Marginal Cost) = change in (6) change in (1)
0	0		\$0	\$200	\$200				
100	1	100	\$72	\$200	\$272	\$2.72	\$2.00	\$0.72	\$0.72
207	2	107	\$144	\$200	\$344	\$1.66	\$0.97	\$0.70	\$0.67
321	3	114	\$216	\$200	\$416	\$1.29	\$0.62	\$0.67	\$0.63
444	4	123	\$288	\$200	\$488	\$1.10	\$0.45	\$0.65	\$0.59
558	5	114	\$360	\$200	\$560	\$1.00	\$0.36	\$0.65	\$0.63
664	6	106	\$432	\$200	\$632	\$0.95	\$0.30	\$0.65	\$0.68
762	7	99	\$504	\$200	\$704	\$0.92	\$0.26	\$0.66	\$0.73
854	8	92	\$576	\$200	\$776	\$0.91	\$0.23	\$0.67	\$0.79

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

Exhibit 6.4 Marginal Cost, Average Total Cost, and Average Variable Cost Curves for The Wisconsin Cheeseman

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### The Seller's Problem: Introduce Cost Curves

#### The Cost of Doing Business

- ▶ Test Your Understanding:
  - ▶ A friend owns a hotel that gets a lot of seasonal business. The average total cost per day of running the hotel is \$75.
  - ▶ She tells you that during the off-season (when there are a lot of empty rooms), she had someone offer her \$70 for a room.
  - ▶ She indignantly tells you she turned the offer down since it was less than her average cost. Was that a good decision?

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### The Seller's Problem: Revenue Curves

#### The Rewards of Doing Business

- ▶ We have answered the questions of
  - ▶ How to make the product; and
  - ▶ How much it would cost to make the product.
- ▶ But we still haven't answered—
  - ▶ How much of the product to make?
- ▶ What additional information is needed?

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### The Seller's Problem: Revenue Curves

#### The Rewards of Doing Business

3. How much can the seller get for the product in the market?
  - ▶ Revenue
    - ▶ The amount of money the firm brings in from the sale of its product
  - ▶ Total revenue = Price × Quantity Sold

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### The Seller's Problem: Revenue Curves

#### The Rewards of Doing Business

- ▶ Total revenue = Price × Quantity Sold
- ▶ What does the firm have control over?

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### The Seller's Problem: Revenue Curves

#### The Rewards of Doing Business

Exhibit 6.5 Supply and Demand: The Market versus The Wisconsin Cheeseman

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## The Seller's Problem: Revenue Curves

### The Rewards of Doing Business

- ▶ If price is \$1.13, what is total revenue if 1 is sold?
- ▶ Two?
- ▶ Three?
- ▶ How much more revenue is gained by selling three than selling two?
  - ▶ **marginal revenue = price**

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## The Seller's Problem: Putting It All Together

### Using 3 Components to Do the Best You Can

- ✓ How to make product
- ✓ How much product costs to make
- ✓ How much product can be sold for
- ? How much of product to make?

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## The Seller's Problem: Putting It All Together

### Using 3 Components to Do the Best You Can

- ▶ Profit

$$= \text{Total Revenues} - \text{Total Costs}$$

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## The Seller's Problem: Putting It All Together

### Using 3 Components to Do the Best You Can

- ▶ Work for \$70K or open bookstore?
- ▶ Choose to open bookstore:
  - ▶ Accountant says you made a profit of \$80K
  - ▶ Economist says you made a profit of \$10K
- ▶ Who's right?

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## The Seller's Problem: Putting It All Together

### Using 3 Components to Do the Best You Can

- ▶ What kind of profit?
- ▶ Accounting profit
  - ▶ Total revenue – Total costs (explicit only)
- ▶ Economic profit
  - ▶ Total revenue – Total costs (explicit + implicit)

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## The Seller's Problem: Putting It All Together

### Using 3 Components to Do the Best You Can

(1) Output/Day	(2) # Employed	(5) FC	(6) TC	(7) ATC	(9) AVC	(10) MC
0	0	\$200	\$200			
100	1	\$200	\$272	\$2.72	\$0.72	\$0.72
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854	8	\$200	\$776	\$0.91	\$0.67	\$0.79
939	9	\$200	\$848	\$0.90	\$0.69	\$0.84
1019	10	\$200	\$920	\$0.90	\$0.71	\$0.91
1092	11	\$200	\$992	\$0.91	\$0.73	\$0.98
1161	12	\$200	\$1,064	\$0.92	\$0.74	\$1.05
1225	13	\$200	\$1,136	\$0.93	\$0.76	\$1.13
1284	14	\$200	\$1,208	\$0.94	\$0.79	\$1.21
1339	15	\$200	\$1,280	\$0.96	\$0.81	\$1.31
1390	16	\$200	\$1,352	\$0.97	\$0.83	\$1.40

## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

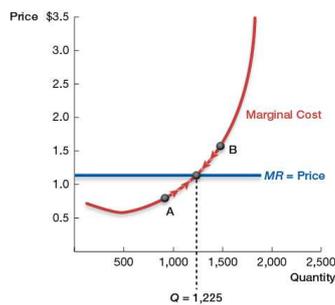


Exhibit 6.6 Movement of Production Toward Equilibrium

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## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

Profit Margin vs. Marginal Profit  
A \$50,000 Civic?



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## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

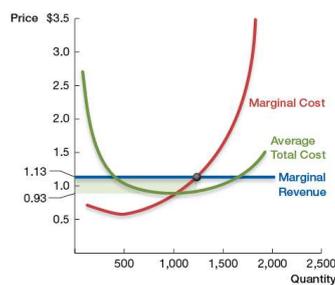


Exhibit 6.7 Visualizing The Wisconsin Cheeseman's Profits With MC, MR, and ATC

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## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

- ▶ Profits = Total Revenues – Total Costs
- ▶ Total Revenue =  $P \times Q$
- ▶ Total Cost =  $ATC \times Q$
- ▶ Profit =  $(P \times Q) - (ATC \times Q)$   
=  $(P - ATC) \times Q$

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## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

- ▶ We know
- ▶  $P = \$1.13$
- ▶  $Q = 1,225$
- ▶  $ATC = \$0.93$
- ▶ So, Profit =  $(\$1.13 - 0.93) \times 1,225$   
= \$245

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## The Seller's Problem: Putting It All Together Using 3 Components to Do the Best You Can

- ▶ Is that profit enough?
- ▶ Remember that "profit" in economics includes:
  - ▶ Explicit costs and implicit (opportunity costs)

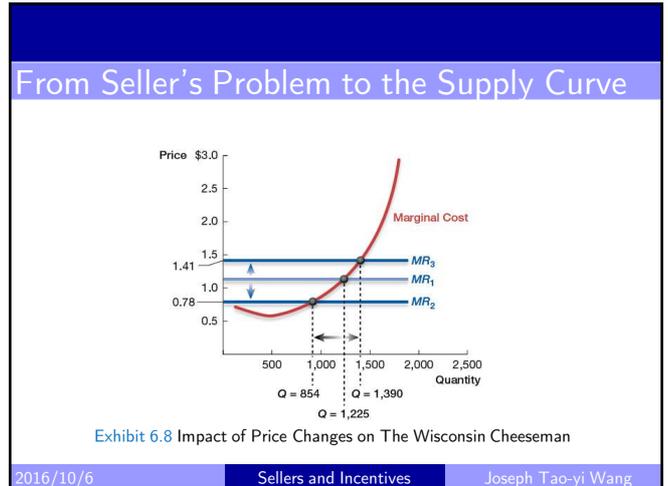
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### From Seller's Problem to the Supply Curve

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### From Seller's Problem to the Supply Curve

- ▶  $MC = \text{Supply}$
- ▶ But is that always the case?
- ▶ Is it true for all prices?

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### From Seller's Problem to the Supply Curve

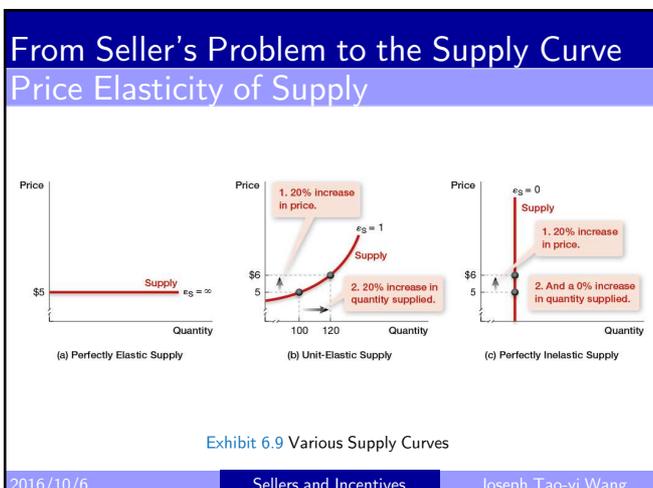
#### Price Elasticity of Supply

- ▶ We know that when the market price increases, firms choose to produce more—
- ▶ how much more?

= **price elasticity of supply**

How responsive producers are to changes in the market price

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### From Seller's Problem to the Supply Curve

#### Price Elasticity of Supply

- ▶ Elasticity of supply will be greater:
  1. The more inventory the firm has
  2. The more easily the firm can hire workers
  3. The longer the time horizon

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## From Seller's Problem to the Supply Curve Shut Down

- ▶ Work for \$70K or open bookstore?
- ▶ Is an accounting profit of \$80K enough?
- ▶ \$70K?
- ▶ \$60K?

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## From Seller's Problem to the Supply Curve Shut Down

- ▶ Two options:
  1. Stay open
    - ▶ What costs do you pay?
      - ▶ Fixed + Variable
  1. Close
    - ▶ What costs do you pay?
      - ▶ Fixed Only

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## From Seller's Problem to the Supply Curve Shut Down

- ▶ A profit of \$245 was enough...
- ▶ How about \$100?
- ▶ 5?
- ▶ 0?

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## From Seller's Problem to the Supply Curve Shutdown

- ▶ Shutdown
  - ▶ The decision to stop producing in the short run—occurs if price falls below AVC

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## From Seller's Problem to the Supply Curve Shutdown

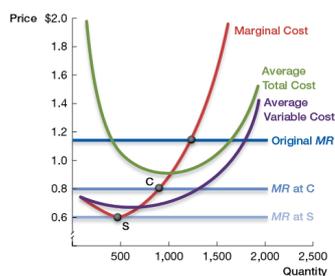


Exhibit 6.10 The Wisconsin Cheeseman's Shutdown Decision

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## From Seller's Problem to the Supply Curve Shutdown

- ▶  $MC = \text{Supply}$
- ▶ But is that always the case?
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## From Seller's Problem to the Supply Curve Shutdown

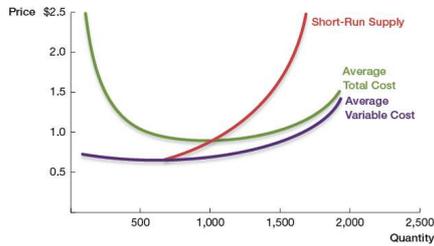


Exhibit 6.11 Short-Run Supply Curve: Portion of the MC Above AVC

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## Producer Surplus

- ▶ Producer surplus
- ▶ The difference between the market price and the marginal cost (or supply) curve.

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## Producer Surplus

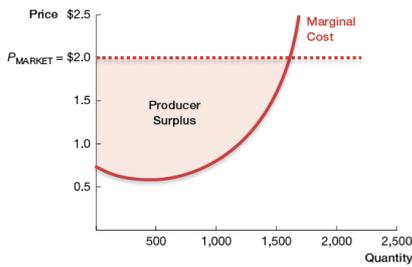


Exhibit 6.12 Measuring Producer Surplus

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## Producer Surplus

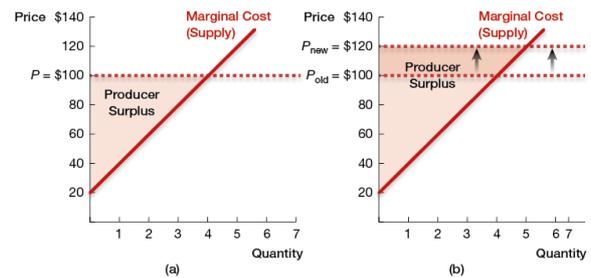


Exhibit 6.13 Producer Surplus for Trucking Services

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## From the Short Run to the Long Run

- ▶ Short run
  - ▶ Some of the factors of production (and therefore, costs) are fixed.
  - ▶ How to change output?
    - ▶ Change labor
- ▶ Long run
  - ▶ All factors (and therefore, costs) are variable.
  - ▶ How to change output?
    - ▶ Change all resources

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## From the Short Run to the Long Run

- ▶ Long run = planning period
- ▶ What is the optimal level of capital?

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From the Short Run to the Long Run

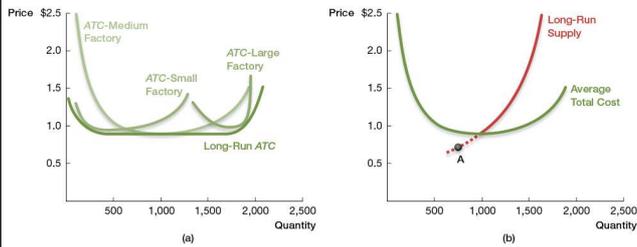


Exhibit 6.14 Short-Run and Long-Run Supply Curves

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From the Short Run to the Long Run

- ▶ Economies of scale
  - ▶ ATC falls as output increases
- ▶ Example: if inputs double, output more than doubles
- ▶ Why?
  - ▶ Large set-up costs
  - ▶ Worker specialization

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From the Short Run to the Long Run

- ▶ Constant returns to scale
  - ▶ ATC does not change as output increases
- ▶ Example: if inputs double, output doubles
- ▶ Why?
  - ▶ Gains from specialization all realized

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From the Short Run to the Long Run

- ▶ Diseconomies of scale
  - ▶ ATC increases as output increases
- ▶ Example: if inputs double, output increases by less than double
- ▶ Why?
  - ▶ Top-heavy—too much management

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From the Short Run to the Long Run  
Long-Run Supply Curve

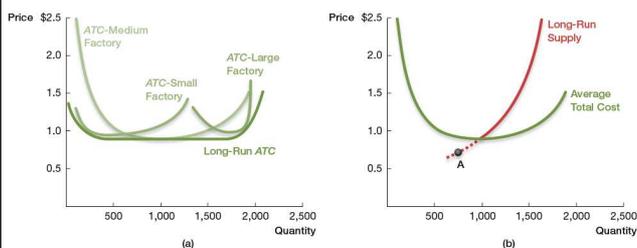


Exhibit 6.14 Short-Run and Long-Run Supply Curves

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From the Firm to the Market:  
Long-Run Competitive Equilibrium

Long run: firms can enter or exit an industry



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From the Firm to the Market: Firm Entry  
Long-Run Competitive Equilibrium

- ▶ Work for \$70K or open bookstore?
- ▶ Choose to open bookstore:
  - ▶ Accountant says you made a profit of \$80K
  - ▶ Economist says you made a profit of \$10K

From the Firm to the Market: Firm Entry  
Long-Run Competitive Equilibrium

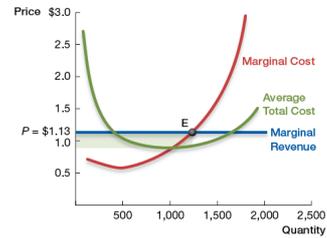


Exhibit 6.15 Steve's Wholesale Cheese Entry Decision

From the Firm to the Market: Firm Entry  
Long-Run Competitive Equilibrium

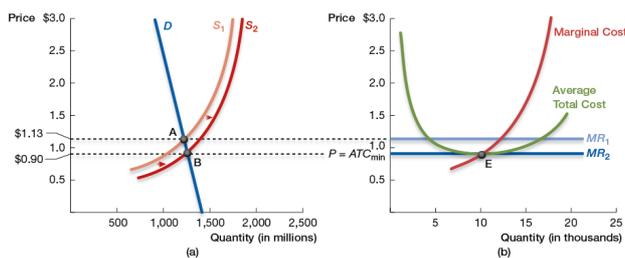


Exhibit 6.16 Firm Entry in the Long Run

From the Firm to the Market: Firm Entry  
Long-Run Competitive Equilibrium

- ▶ Work for \$70K or open bookstore?
- ▶ Choose to open bookstore:
  - ▶ Accountant says you made a profit of \$70K
  - ▶ Economist says you made a profit of \$0

From the Firm to the Market: Firm Exit  
Long-Run Competitive Equilibrium

Starting at this equilibrium, what if...

Amazon offered free shipping on any book order?

What's the effect on you?



From the Firm to the Market: Firm Exit  
Long-Run Competitive Equilibrium

- ▶ Work for \$70K or open bookstore?
- ▶ Choose to open bookstore:
  - ▶ Accountant says you made a profit of \$60K
  - ▶ Economist says you made a profit of -\$10K
- ▶ Your accountant is still happy—are you?

## From the Firm to the Market: Firm Exit Long-Run Competitive Equilibrium

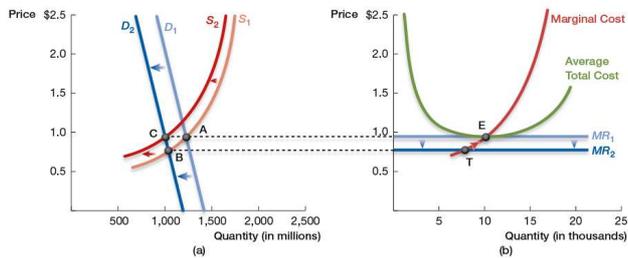


Exhibit 6.17 Firm Exit After Demand Shifts Leftward

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## From Firm to Market: Zero Profits in the LR Long-Run Competitive Equilibrium

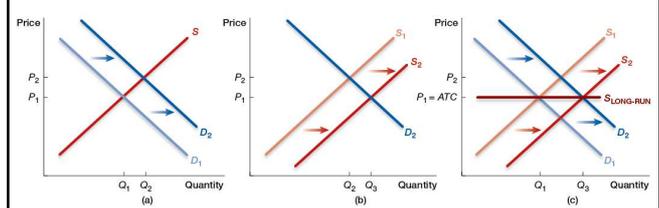


Exhibit 6.18 Why the Long-Run Supply Curve is Horizontal

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## Evidence-Based Economics Example

- ▶ How would an ethanol subsidy affect ethanol producers?



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- ▶ If an industry starts receiving a subsidy, what happens to the short-run profits of that industry?
- ▶ If you are outside of that industry, what are your incentives?
- ▶ Once you act on that incentive, what happens to the market price? Profits?

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## Conclusion

- ▶ Supply is derived from Seller's Problem
- ▶ Producer Surplus is the Profit of the firm
- ▶ In the LR, firms
  - ▶ Adjust (originally fixed) input, Enter/Exit
  - ▶ Earn Zero (Economic) Profits!
- ▶ Homework: ALL Chap.6, Problem 4, 11
- ▶ Challenge Questions (from Past Midterms)
  - ▶ 2010 - Essay B8, C2-3
  - ▶ 2012 - Essay A10, B4 (True/False Q6)
  - ▶ 2013 - Essay B, D15 (True/False Q5, 7)

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