Perfect Competition

An Introduction to Perfect Competition
Short-Run Profit Maximization
Minimizing Short-Run Losses
The Firm and the Industry Short-Run Supply Curves
Perfect Competition in the Long Run
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Terminology: Industry

- ***Industry***
  - **consists of all firms that supply output to a particular market**
- **Firm's decisions depend on the structure of the market**
- ***Market structure* describes the important features of a market**

Market Structure

- **Aspects of market structure**
  - **Number of suppliers**
    - **Many or few**
  - **Product's degree of uniformity**
    - **Do firms in the market supply identical/ different products?**
  - **The ease of entry into the market**
    - **Can new firms enter easily?**
    - **Blocked by natural or artificial barriers?**
    - **Ex:** 水,電, 銀行
  - **Forms of competition among firms**
    - **Compete only through prices**
    - **Advertising**
    - **Product differences**

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Perfectly Competitive Market Structure

- **Characteristics:**
  - **Many buyers and sellers**
    - **Each buys and sells only a tiny fraction of the total amount**
  - **Firms sell a standardized or homogeneous product**
  - **Buyers and sellers are fully informed about the price and availability of all resources and products**
  - **Firms can easily enter or leave the industry**

4

Each Participant is Price Taker

- **Individual participants have no control over the price**
- **Price is determined by market supply and demand**
  - **Each participant is a price taker**
    It must take (accept) the market price
- **Once the market establishes the price, each firm is free to produce whatever quantity that maximizes profit**

5

Contribution of Perfect Competition Model

- **Allows us to make a number of predictions that hold up when compared with the real world**
- **Provides us an important benchmark for evaluating the efficiency of other types of markets**

6

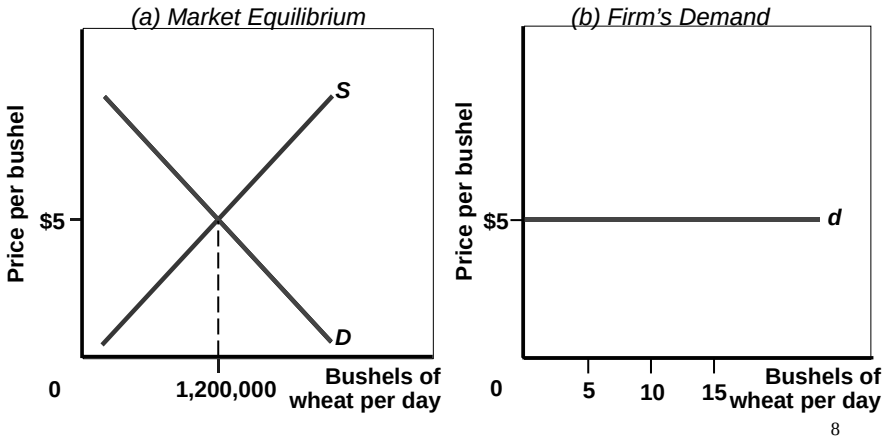
Demand Under Perfect Competition

- **Consider a world market of wheat**
  - **Demander: Firm**
  - **Supplyer: Farmer**
- **Next slide provides the relationship between the industry and the firm in a perfectly competitive industry**

7

Market Equilibrium and the Firm's Demand Curve in Perfect Competition

Once the market price is established (in left figure), any farmer can sell all he or she wants at that market price.



8

The Demand Faced by the Farmer

- **Each farmer is so small relative to the market**
  - **Has no impact on the market price**
  - **Each farmer is a *price taker***
- **All farmers produce an identical product**
  - **Anyone who charges more than the market price will sell no wheat**
- **No farmer would sell at a lower price**
  - **They can sell all they want at the market price**

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Demand

- **The demand curve for an individual farmer is a horizontal line (market price)**
- **Two neighboring wheat farmers are not really rivals**
- **They both can sell as much wheat as they want to at the market price**

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Short-Run Profit Maximization

- **How does the farmer maximize profit?**
- **They have no control over price,**
- **However, each farmer does control the rate of output**
- ***How much should a farmer produce to earn the most profit?***

Maximize Economic Profit

- **Economic Profit = Total revenues –Total opportunity cost**
- **The farmer finds the rate of output that maximizes it.**
- **Total revenue is simply output times the price per unit**
- **Next slide provide the needed information**

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Find the Output that Maximizes Economic Profit

(1) Bushels of Wheat per day (q)	(3) = (1) × p Total Revenue (TR = q × p)	(4) Total Cost (TC)	(6) = (4) + (1) Average Total Cost ATC = TC / q	(7) = (3) - (4) Economic Profit or Loss = TR - TC
0	$0	$15.00		-$15.00
1	5	19.75	$19.75	-14.75
2	10	23.50	11.75	-13.50
3	15	26.50	8.83	-11.50
4	20	29.00	7.25	-9.00
5	25	31.00	6.20	-6.00
6	30	32.50	5.42	-2.50
7	35	33.75	4.82	1.25
8	40	35.25	4.41	4.75
9	45	37.25	4.14	7.75
10	50	40.00	4.00	10.00
11	55	43.25	3.93	11.75
12	*60*	*48.00*	*4.00*	*12.00*
13	65	54.50	4.19	10.50
14	70	64.00	4.57	6.00
15	75	77.50	5.17	-2.50
16	80	96.00	6.00	-16.00

→ Profit maximization

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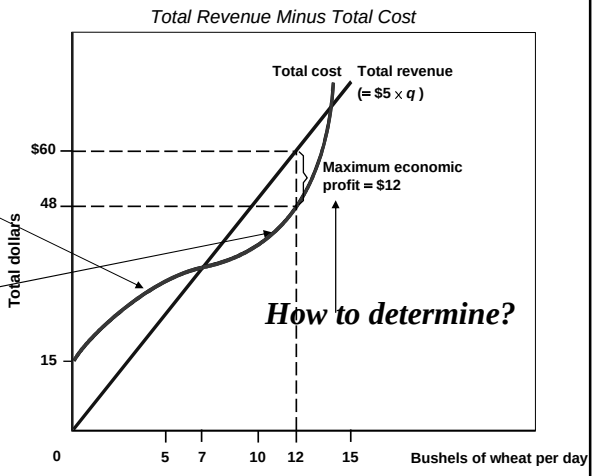
Short-Run Profit Maximization

The total cost curve shows:

Increasing marginal return
Concave curve

Then diminishing marginal returns
Convex curve



Profit Maximization
Marginal Revenue=Marginal Cost

- ***Marginal revenue*** **(MR) is the change in total revenue from selling additional unit of output**
  - **Since the firm in perfect competition is a price taker,**
    - ***MR = P***
- **Marginal cost (MC) is the change in total cost resulting from producing another unit of output**
- **Profit maximization: MR=MC**
  - **See next slide**

MR and MC calculation

(1) Bushels of Wheat per day (q)	(2) Marginal Revenue (Price) (p)	(3) = (1) × (2) Total Revenue (TR = q × p)	(4) Total Cost (TC)	(5) Marginal Cost MC=ΔTC/Δ Q	(6) = (4) + (1) Average Total Cost ATC = TC / q	(7) = (3) - (4) Economic Profit or Loss = TR - TC
0	--	$0	$15.00	--	∞	-$15.00
1	$5	5	19.75	$4.75	$19.75	-14.75
2	5	10	23.50	3.75	11.75	-13.50
3	5	15	26.50	3.00	8.83	-11.50
4	5	20	29.00	2.50	7.25	-9.00
5	5	25	31.00	2.00	6.20	-6.00
6	5	30	32.50	1.50	5.42	-2.50
7	5	35	33.75	1.25	4.82	1.25
8	5	40	35.25	1.50	4.41	4.75
9	5	45	37.25	2.00	4.14	7.75
10	5	50	40.00	2.75	4.00	10.00
11	5	55	43.25	3.25	3.93	11.75
12	*5*	*60*	*48.00*	*4.75*	*4.00*	*12.00*
13	5	65	54.50	6.50	4.19	10.50
14	5	70	64.00	9.50	4.57	6.00
15	5	75	77.50	13.50	5.17	-2.50
16	5	80	96.00	18.50	6.00	-16.00

The firm will increase quantity supplied as long as each additional unit adds more to total revenue than to total cost ➔ MR>MC.

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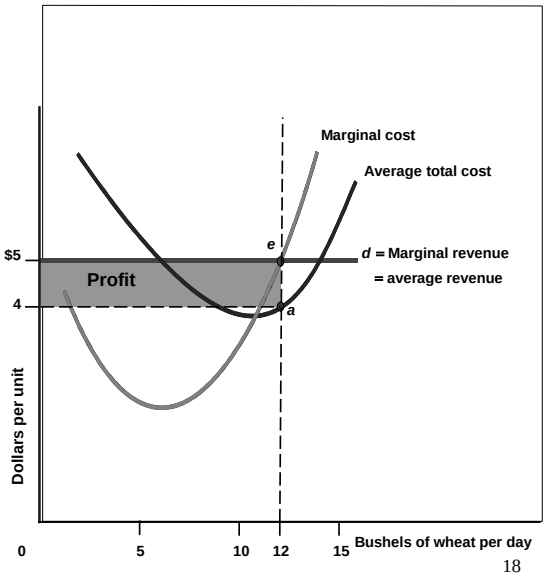
Short-Run Profit Maximization

MR=MC at point *e* where output is 12 bushels per day.

Output <12
MR>MC
➔Increase profit by expanding output.

Output>12
MC>MR
➔ Increase profit by reducing output.

Profit appears in the *blue* shaded rectangle.
Each unit earns:
(price) $5 -average cost $4



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The Flat Demand Curve AR=MR=Market Price

- ***Average revenue, AR, equals total revenue divided by quantity***
  - ***AR = TR / q***
- **Because firm can sell any quantity for the same price per unit,**
  - **MR=AR**
- ***In perfect competition market:***
  - ***Price =MR = AR***

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Minimizing Short-Run Losses

- **The market price might be so low**
  - **No rate of output yield a profit**
- **Faced with losses at all rates of output, the firm has two options**
  - **Continue to produce at a loss**
  - **Temporarily shut down**
    - **It cannot go out of business or produce something else in the short run.**

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Fixed Cost and Minimizing Losses

- **Two types of costs in the short run**
  - **Fixed cost（店租)**
  - **Variable cost（電力)**
- **Shuts down**
  - **Pay fixed costs but not variable cost**
- **If the revenue>variable cost**
  - **Cover a least a portion of its fixed cost**
  - **The firm will continue producing**

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An Example of Minimizing Losses

	(1) Bushels of Wheat per day (q)	(2) Marginal Revenue (Price) (p)	(3) = (1) × (2) Total Revenue (TR = q × p)	(4) Total Cost (TC)	(5) Marginal Cost MC=ΔTC/ΔQ	(6) = (4) + (1) Average Total Cost ATC = TC /q	(7) Average Variable Cost AVC = TVC / q	(8) = (3) - (4) Economic Profit or Loss = TR - TC	
Shut down	0	--	$0	$15.00	--	∞	--	-$15.00	*Fixed cost*
	1	$3	3	19.75	$4.75	$19.75	$4.75	-16.75	
	2	3	6	23.50	3.75	11.75	4.25	-17.50	
	3	3	9	26.50	3.00	8.83	3.83	-17.50	
	4	3	12	29.00	2.50	7.25	3.50	-17.00	
	5	3	15	31.00	2.00	6.20	3.20	-16.00	
	6	3	18	32.50	1.50	5.42	2.92	-14.50	
	7	3	21	33.75	1.25	4.82	2.68	-12.75	
	8	3	24	35.25	1.50	4.41	2.53	-11.25	
	9	3	27	37.25	2.00	4.14	2.47	-10.25	
	10	*3*	*30*	*40.00*	*2.75*	*4.00*	*2.50*	*-10.00*	
	11	3	33	43.25	3.25	3.93	2.57	-10.25	
	12	3	36	48.00	4.75	4.00	2.75	-12.00	
	13	3	39	54.50	6.50	4.19	3.04	-15.50	
	14	3	42	64.00	9.50	4.57	3.50	-22.00	
	15	3	45	77.50	13.50	5.17	4.17	-32.50	
	16	3	48	96.00	18.50	6.00	5.06	-48.00	

The firm's loss is minimized at $10 per day when 10 bushels are produced
➔ The net gain of $5 total cost. (Fixed Cost=15)

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Minimizing Short-Run Losses

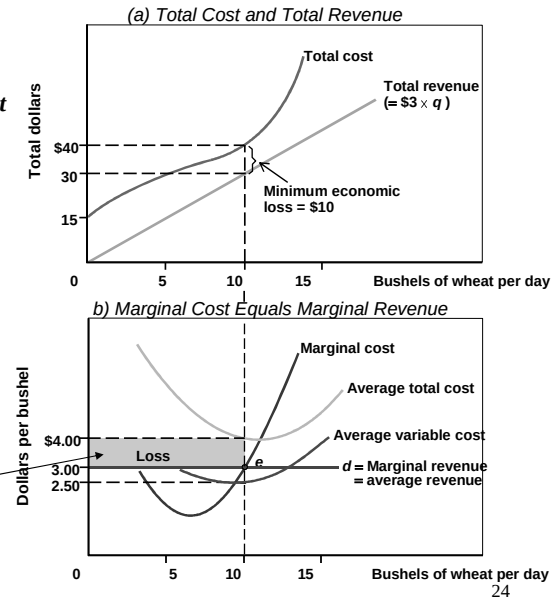
The firm continue to produce:
AVC<AR (price) at the quantity that Makes MR=MC

MR intersects MC at point e, where the output rate is 10.

price of $3>AVC $2.50.

Firm continue to produce

The total economic loss is shown by the shaded area.



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Shutting Down in the Short Run

- **The firm will remain open**
  - **If the loss results from producing < the shutdown loss**
- **The firm will shut down**
  - **if AVC>the market price (at all rates of output)**
  - **See next slide.**

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The firm will Shut down if Price=2

(1) Bushels of Wheat per day (q)	(2) Marginal Revenue (Price) (p)	(3) = (1) × (2) Total Revenue (TR = q × p)	(4) Total Cost (TC)	(5) Marginal Cost MC=ΔTC/ΔQ	(6) = (4) + (1) Average Total Cost ATC = TC /q	(7) Average Variable Cost AVC = TVC / q	(8) = (3) - (4) Economic Profit or Loss = TR - TC
0	--	$0	$15.00	--		--	-$15.00
1	$2	2	19.75	$4.75	$19.75	$4.75	-17.75
2	2	4	23.50	3.75	11.75	4.25	-19.50
3	2	6	26.50	3.00	8.83	3.83	-20.50
4	2	8	29.00	2.50	7.25	3.50	-21.00
5	2	10	31.00	2.00	6.20	3.20	-21.00
6	2	12	32.50	1.50	5.42	2.92	-20.50
7	2	14	33.75	1.25	4.82	2.68	-19.75
8	2	16	35.25	1.50	4.41	2.53	-19.25
9	2	18	37.25	2.00	4.14	2.47	-19.25
10	*2*	*20*	*40.00*	*2.75*	*4.00*	*2.50*	*-20.00*
11	2	22	43.25	3.25	3.93	2.57	-21.25
12	2	24	48.00	4.75	4.00	2.75	-24.00
13	2	26	54.50	6.50	4.19	3.04	-26.50
14	2	28	64.00	9.50	4.57	3.50	-36.00
15	2	30	77.50	13.50	5.17	4.17	-47.50
16	2	32	96.00	18.50	6.00	5.06	-64.00

If price=2, since AVC >Price at all output rates
The firm shuts down.
→ MR=MC at output=9. Loss=2x9-37.25<-15 (shut down)

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Shutting Down in the Short Run

- **Shutting down $\neq$ going out of business**
  - **Pay fixed cost**
- **A firm that shuts down keeps its productive capacity**
  - **The firm resume operation when demand increases enough**
- **If market demand are not expected to increase,**
  - **Decide to leave the market ➔ a long run decision**

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Firm and Industry Short-Run Decision

- **If price > AVC,**
  - **The firm will produce the quantity at MR = MC**
- **If price < AVC**
  - **The firm shut down.**
- **The firm will vary output as the market price changes**
- **Draw a short-run supply curve**
  - **See Exhibit 6**

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Exhibit 6: Summary of Short-Run Output Decisions

At a price p_1, the firm will shut down
Price< AVC

At a price p_2, the firm will be indifferent between producing q_2 and shutting down

Price = AVC.

Point 2 is called the shutdown point.

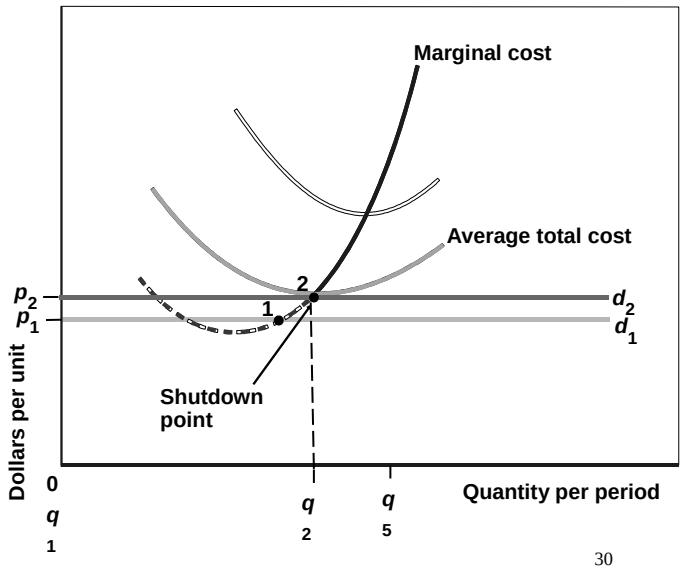

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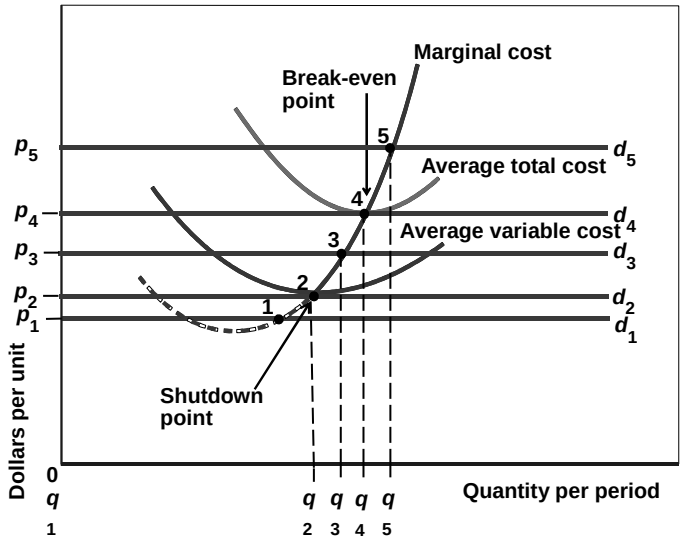
Exhibit 6: Summary of Short-Run Output Decisions

If the price= p_3, Produce q_3 to minimize loss

Price= p_4, Produce q_4 to earn just a normal profit ➔ *the break-even point.*

Price =p_5, Earn a short-run economic profit by producing q_5

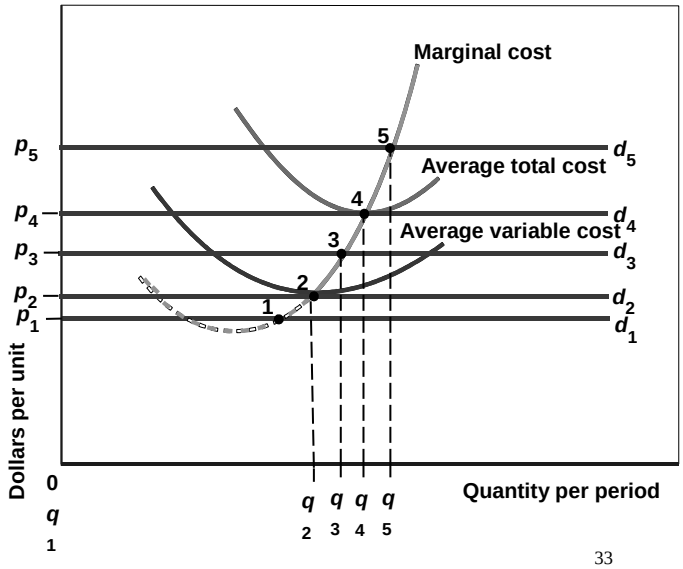


Short-Run Firm Supply Curve

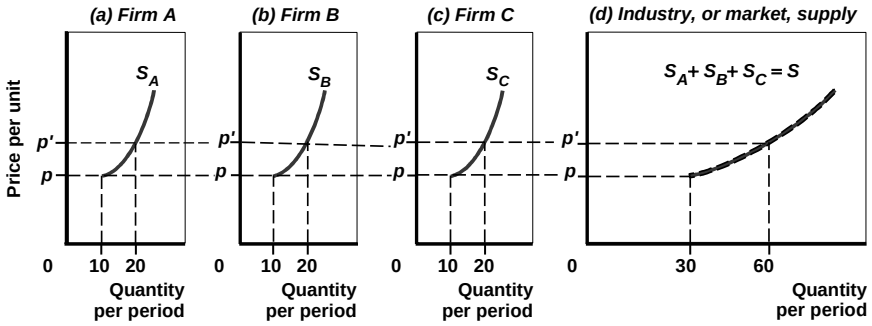
- ***If price >average variable cost,***
  - ***firm will supply the quantity***
    - ***Intersection of MC and MR (also demand curve here)***
- **Portion of the firm's MC curve that intersects and above AVC curve is *short-run firm supply curve***

Illustration of Short-Run Firm Supply Curve

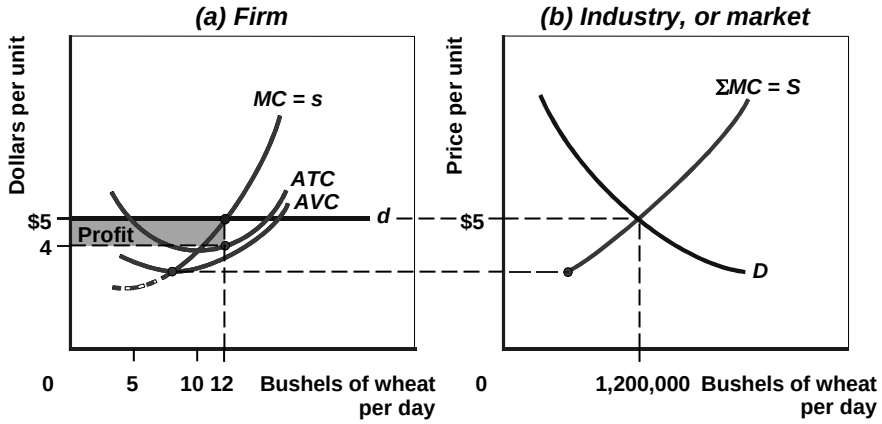
The short-run supply curve is the upward-sloping portion of the marginal cost curve, beginning at point 2.



Aggregating Individual Supply to Form Market Supply



Relationship Between Short-Run Profit Maximization and Market Equilibrium



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In the Short Run vs. In the Long Run

- **In the short run,**
  - **Variable resources can change,**
  - **Other resources are fixed**
- **In the long run,**
  - **Firms have time to enter, exit, or adjust their size**
  - **No distinction between fixed and variable cost because all resources are variable**

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Zero Economic Profit in Long Run

- **Firms in perfect competition earns normal profit in the long run!**
- **Short-run economic profit will**
  - **encourage new firms to enter the market**
  - **prompt existing firms to expand the scale of operations**
- **Economic profit will attract resources from industries where firms earn normal profit or suffer losses**

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Zero Economic Profit in Long Run

- **Expansion in the number and size of firms**
  - **Shift the supply curve rightward**
  - **Driving down the price**
- **New firms will continue to enter a profitable industry and existing firms will continue to increase in size as long as economic profit is greater than zero**

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Zero Economic Profit in Long Run

- **A short-run loss will force**
  - **Firms to leave the industry or**
  - **Reduce the scale of operation**
- **This shift market supply to the left ➔ market price increases until the remaining firms earn a normal profit**
- **See Exhibit 9**

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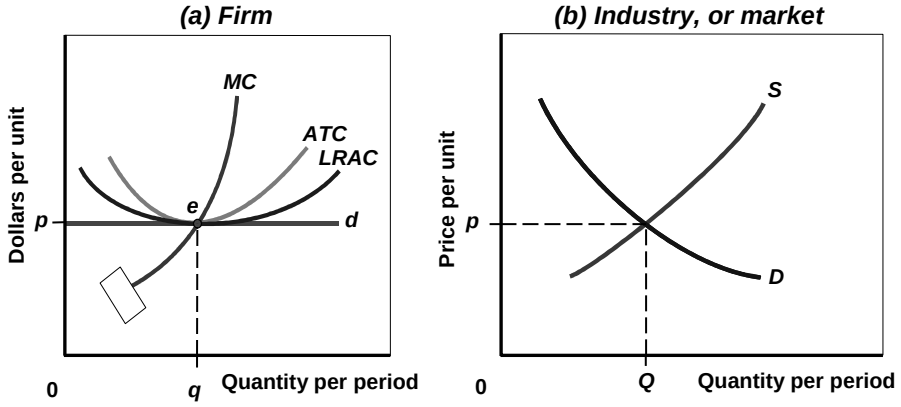
Exhibit 9: Long Run Equilibrium for the Firm and the Industry

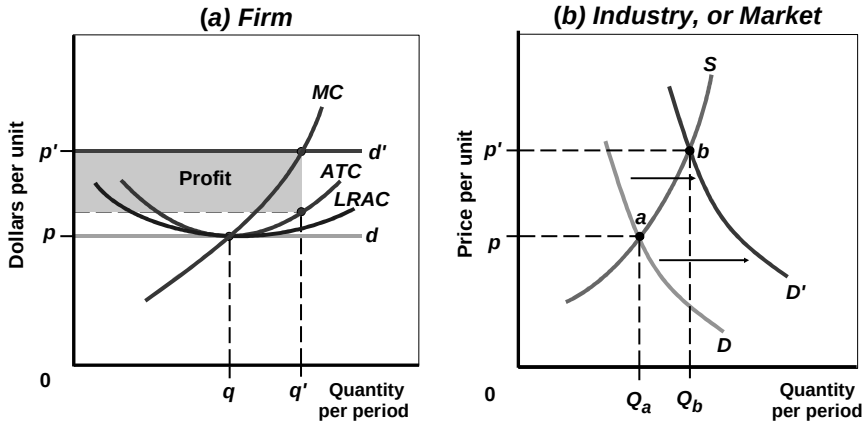


In the long run, at the equilibrium point *e*, marginal cost, short-run average total cost and long-run average cost are all equal. → Economic profit=0

Long-Run Adjustment to a Change in Demand

- **Consider how a firm and an industry respond to an change in market demand**
  - **Suppose that the costs facing each individual firm do not depend on the number of firms in the industry**
- **Exhibit 10→ increase in demand**
- **Exhibit 11→decrease in demand**

Exhibit 10: Short-Run Adjustment to an Increase in Demand



Market demand increases as shown by the shift from D to D'
➔Market price increases in the short run to *p*'.
➔Each firm responds to the higher price
➔The quantity supplied increases to *q*'
➔Total supply increases to Q_b

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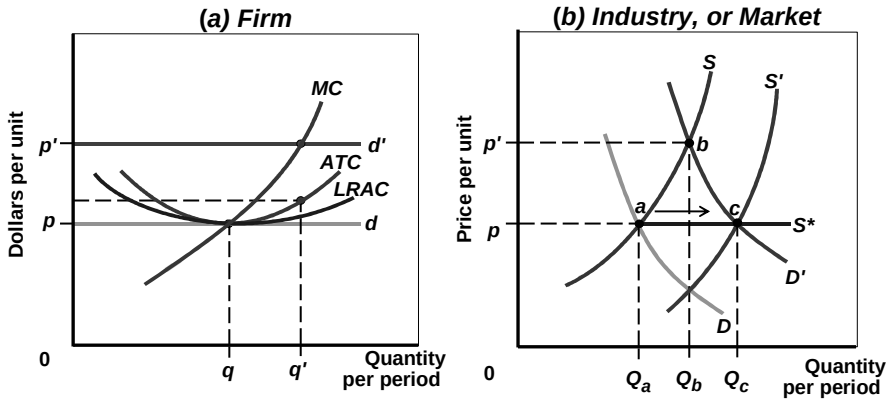
Exhibit 10: Long-Run Adjustment to an Increase in Demand



Economic profit attracts new firms
➔additional supply shifts out the market supply curve (from S to S')
➔Price falls to *p*
➔ Firms again earning a normal profit.

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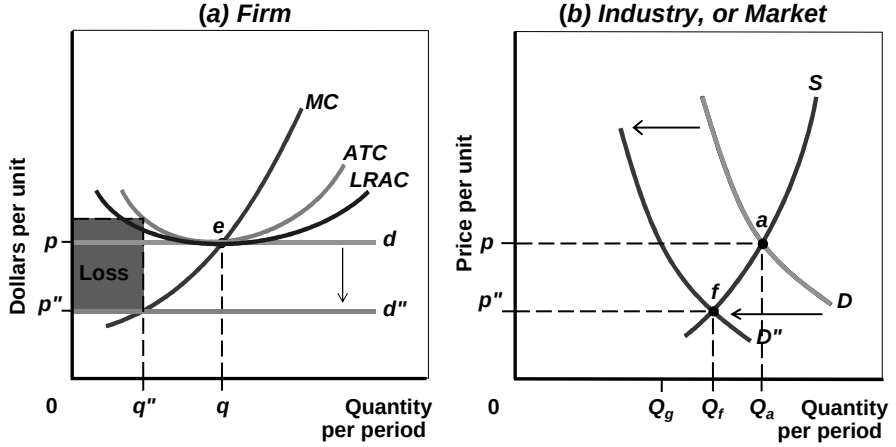
Exhibit 11: Short-Run Adjustment to a Decrease in Demand



Suppose that market demand declines from D to D"
➔Market price falls to *p*"

Each firm cuts its output to *q*",
➔Market output falls to Q_f
➔ Each firm operates at a loss as shown by the *red* shaded area.

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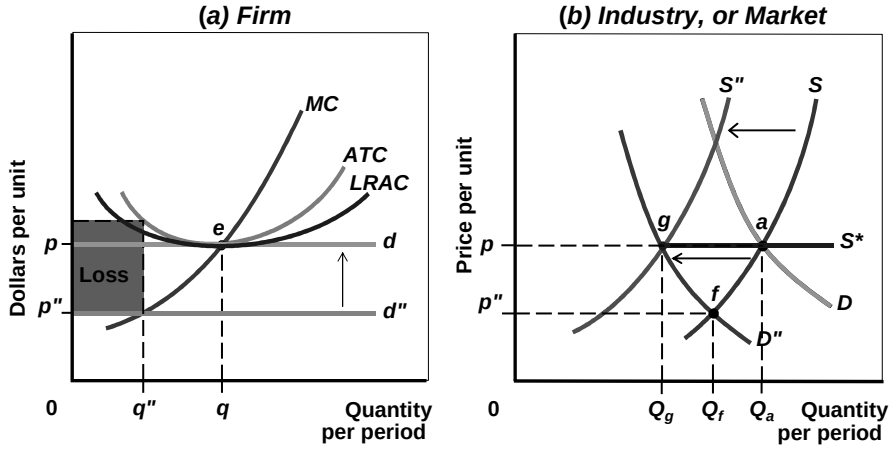
Exhibit 11: Long-Run Adjustment to a Decrease in Demand



In the long run force some firms out of this business
➔Supply will decrease from S to S"
➔Price increases back to *p*. Market output has fallen to Q_g.
➔ Firms are just earning a normal profit.

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Long-Run Equilibrium Points

- **In Exhibits 10 and 11, we began with an initial long-run equilibrium point; by shifting in demand, we found two more long-run equilibrium points**
- **The price remained the same in the long run,**
  - **Industry output increased in Exhibit 10 and decreased in Exhibit 11.**

Construct Long-Run Industry Supply Curve

- **Connecting these long-run equilibrium points yields the long-run industry supply curve, (labeled by S*)**
- **The *long-run industry supply curve* shows the relationship between price and quantity supplied once firms fully adjust to economic profit or loss resulting from a shift in demand**

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Constant-Cost Industry

- **The industry we have studied is *constant cost industry***
  - **Long-run average cost curve does not shift as industry output expands**
- **Under assumption:**
  - **Resource prices and other production costs remain constant as industry output increases or decreases**

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Constant-Cost Industry

- **In a constant-cost industry,**
  - **Production costs are independent of the number of firms**
  - **Long-run average cost curve remains constant as firms enter or leave**
- **Explanation: The industry uses such a small portion of the resources available that increasing industry output does not bid up resource prices**
- **The long-run supply curve for a constant-cost industry is horizontal**

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Increasing-Cost Industry

- **Some industries encounter higher average costs as industry output expands in the long run**
- **Firms in these *increasing-cost industries* find that expanding output bids up the prices of some resources**
  - **→Increases per-unit production costs**
  - **→ Each firm's cost curves shift upward**
- **See Exhibit 12**

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Exhibit 12: In an Equilibrium (for Increasing-Cost Industry)

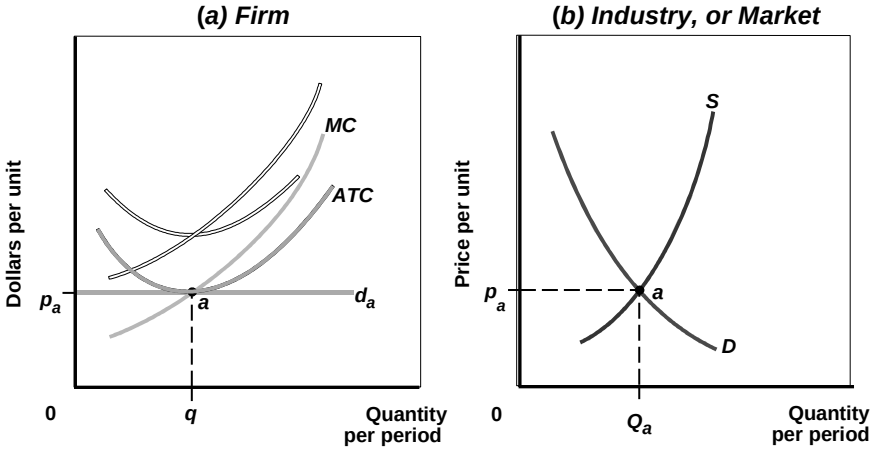

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Exhibit 12: Short Run Adjustment (for An Increasing-Cost Industry)

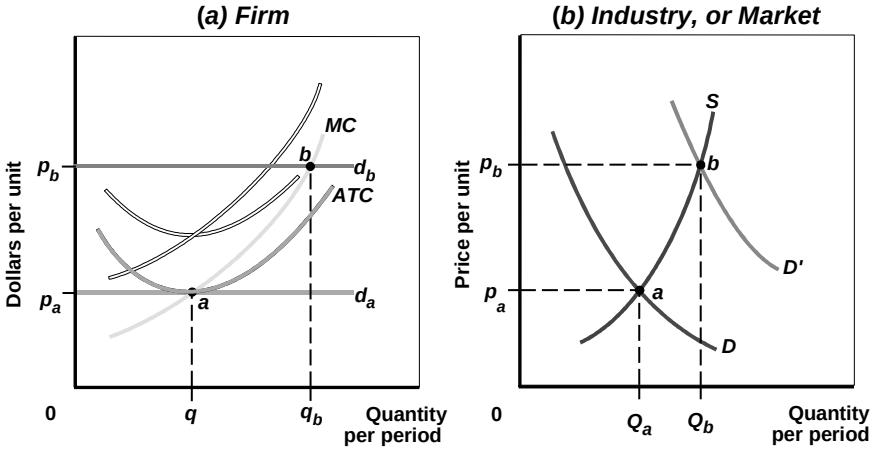

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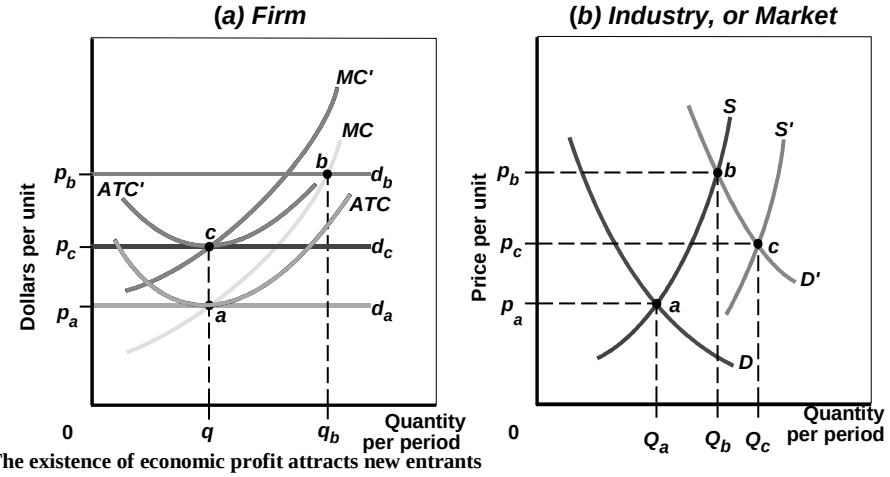
Exhibit 12: Long Run Adjustment (for An Increasing-Cost Industry)



The existence of economic profit attracts new entrants
→Increased demand for resources
→Drives up the costs of production and raises each firm's MC and AC curves.
MC→ MC' ATC →ATC'.
Short-run industry supply curve: from S → S'
→ decline in the market price from *b* to *c*.

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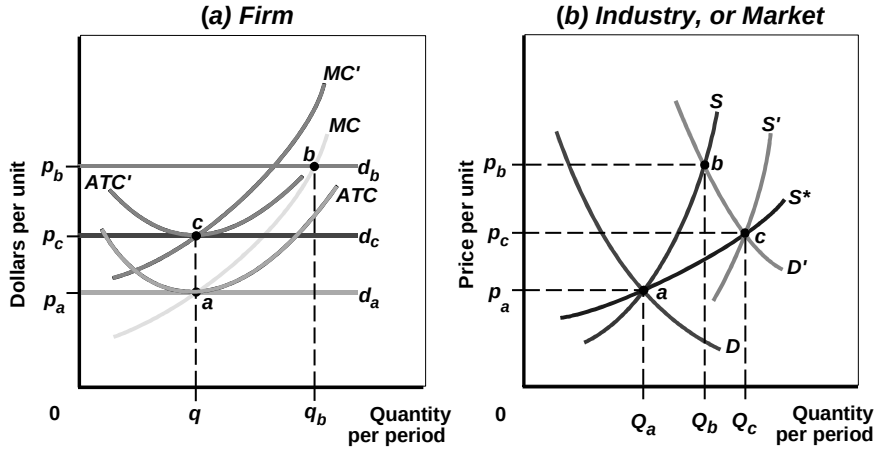
Exhibit 12: Long Run Supply Curve for An Increasing-Cost Industry



The new long-run market equilibrium occurs at point *c*
The upward sloping long-run market supply curve shown as S*

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Summary

- **In constant-cost industries, each firm's costs depend only on**
  - **Scale of its plant**
  - **Rate of output**
- **Firms in increasing-cost industries, costs depend on the number of firms in the market**
  - **Long-run expansion in an increasing-cost industry increases each firm's MC and AC**

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Perfect Competition

An Introduction to Perfect Competition
Short-Run Profit Maximization
Minimizing Short-Run Losses
The Firm and the Industry Short-Run Supply Curves
Perfect Competition in the Long Run
The Long Run Industry Supply Curves
Perfect Competition and Efficiency

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Perfect Competition and Efficiency

- **How does perfect competition stack up as an efficient allocator of resources?(資源有效率的配置)**
- **Two concepts of efficiency are used to judge market performance**
  - ***Productive efficiency* refers to producing output at the least possible cost**
  - ***Allocative efficiency* refers to producing the output that consumers value the most**
  - **Perfect competition guarantees both in the long run**

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Productive Efficiency

- ***Productive efficiency* occurs when**
  - **Firm produces at the minimum point on its long-run average-cost curve**
  - **Market price=AC**
- **The entry, exit, and adjustment of firms**
  - **ensure that each firm produces at the minimum point on its long-run AC curve**
- **Perfect competition produces output at the least possible cost per unit in the long run**

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Allocative Efficiency

- **Productive efficiency does not imply that the allocation of resources is the most efficient**
- **The goods being produced may not be the ones consumers most prefer**
- ***Allocative efficiency* occurs when firms produce the output that is most valued by consumers**

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Perfect Competition Guarantees Allocative Efficiency

- **Demand curve reflects**
  - **the marginal value for consuming last unit ➔ Price is the amount of money that people are willing and able to pay for the final unit they consume**
- **In both the short run and the long run, equilibrium price = MC**
- **MC measures the opportunity cost to produce the last unit sold**

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Allocative Efficiency

- **Marginal Value=Market price=MR=MC= Opportunity cost to produce the last unit of good**
- **There is no way to reallocate resources to increase the total utility consumers reap from production**

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What's So Perfect About Perfect Competition

- **Market exchange benefits both consumers and producers**
  - **Consumers garner a surplus**
    - **The maximum amount they would be willing to pay for each unit of the good exceeds the amount they in fact pay**
  - Producers also derive a surplus,
    - because the amount they receive for their output exceeds the minimum amount they would require to supply that amount
  - **See Exhibit 14**

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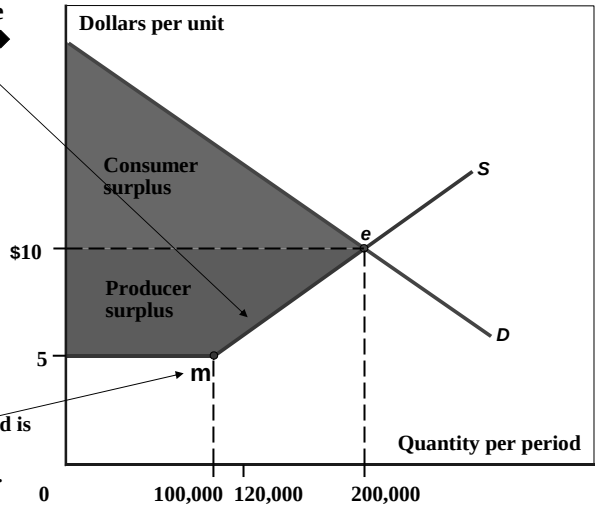
Exhibit 14: Consumer Surplus and Producer Surplus

Short-run market supply curve is the sum of that portion of each firm's MC curve at or above the minimum point of AVC curve ➔ point *m* on the market supply curve S.



At prices below $5, quantity supplied is zero because firms could not cover variable costs and would shut down.

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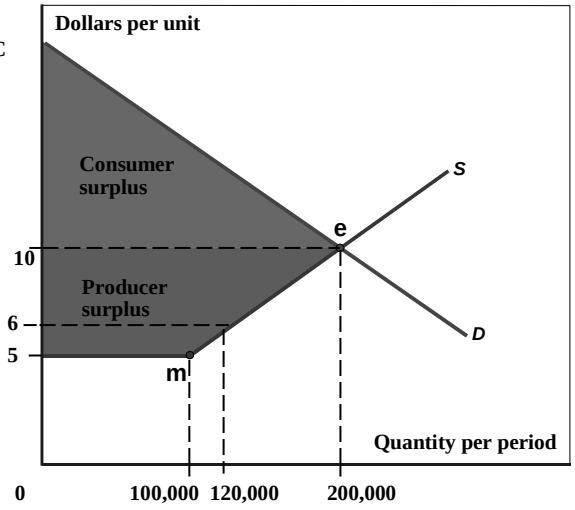
Exhibit 14: Consumer Surplus and Producer Surplus

In the short run, producer surplus =Total Revenue-TVC

Consumer surplus+ producer surplus =gains from voluntary exchange.
Maximize at point e



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Producer Surplus

- **Producer surplus ≠ economic profit**
- **If price >AVC**
  - **→Short-run producer surplus,**
  - **The price could result in a short-run economic loss**
- **Producer surplus ignores fixed cost, because fixed cost is irrelevant to the firm's short-run production decision (Sunk cost)**

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課堂報告

- 請解釋何謂 price taker
- 請解釋當生產者想要使其獲利極大化時,其生產數量會滿足MR=MC
- 請說明生產者in the short run下繼續生產和暫停的條件
- 解釋何謂shutting down point,並說明 short run MC curve 和short run supply curve的關係
- 請介紹P177, Case study: Auction market的大意
- 請解釋何謂constant-cost industry 和 Increasing-cost industry
- 請解釋何謂 consumer surplus

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Homework

- 11. Fill the table & compute short-run supply curve
- 12. Indicate whether a firm should produce, shut-down, or more information is needed to determine in the short run
- 14.Discuss the short run and the long run market adjustment to the consumer's income change.

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