Chapter 10 - Perfect Competition

CHAPTER 9 LECTURE - PERFECTLY COMPETITIVE MARKETS

1

The Four Conditions For Perfect Competition

1. **The industry is fragmented. It consists of many buyers and sellers.**
2. **Firms produce undifferentiated products. That is, consumers perceive the products to be identical no matter who produces them.**
3. **Consumers have perfect information about prices all sellers in the market charge.**
4. **The industry is characterized by equal access to resources. All firms—those currently in the industry, as well as prospective entrants—have access to the same technology and inputs. This implies free entry.**

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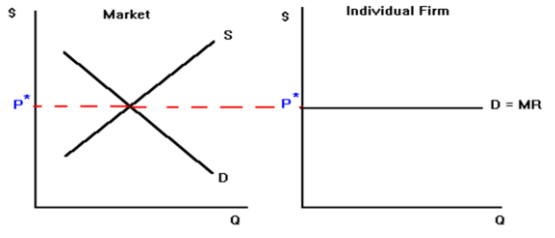
Demand Curve Facing the Firm

Law of one price: Transactions between buyers and sellers occur at a single market price. Because the products of all firms are perceived to be identical and the prices of all sellers are known, a consumer will purchase at the lowest price available in the market. No sales can be made at any higher price. Firm is a PRICE TAKER.



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Profits Review

- ***Economic profit*: the difference between total revenue and total cost, where total cost includes all costs—both explicit and implicit—associated with resources used by the firm.**
- ***Accounting profit* is simply total revenue less all explicit costs incurred.**
  - **does not subtract the implicit costs.**
- **Economists assume that the goal of firms is to maximize economic profit**

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The Short-run Condition For Profit Maximization

- **To maximize profit the firm will choose that level of output for which the difference between total revenue and total cost is largest.**
- ***Marginal revenue:* the change in total revenue that occurs as a result of a one-unit change in sales.**
- ***To maximize profits the firm should produce a level of output for which marginal revenue is equal to marginal cost on the rising portion of the MC curve.***

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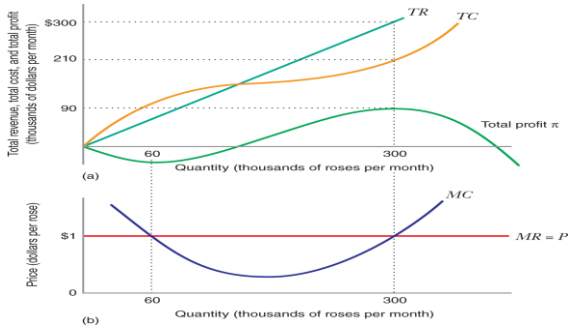
Revenue, Costs, and Economic Profit



Panel (a) shows that the firm's profit π is maximized when Q = 300,000 roses per year. Panel (b) shows that at this point marginal cost is MC = P. Marginal cost also equals price when Q = 60,000 roses per year, but this point is a profit minimum.

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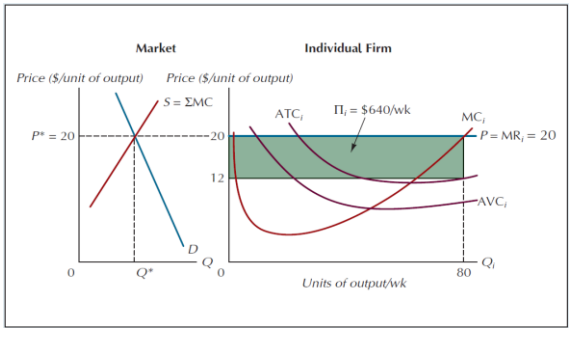
Short-Run Price and Output Determination under Perfect Competition



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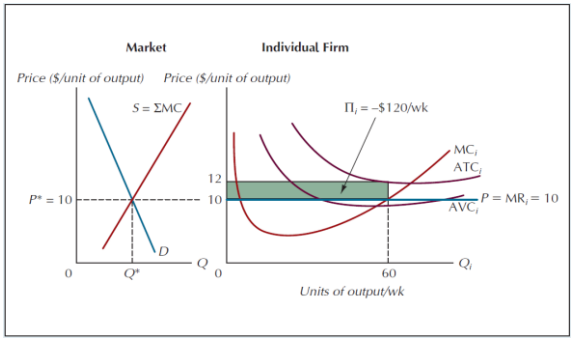
A Short-Run Equilibrium Price that Results in Economic Losses



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Profit Maximization

Note: We are looking at the behavior of one firm so we denote quantity = q. The goal of the firm is to find the level of output (q) which maximizes profit (π)

Max $\pi(q) = Pq - TC(q)$

$\pi = TR - TC$ $\quad \frac{d\pi}{dq} = \frac{dTR}{dq} - \frac{dTC}{dq} = 0$ $\quad MR - MC = 0$ $\quad or\ MR = MC$

You can show that the second order conditions for maximization, $\frac{d^2\pi}{dq^2} < 0$ holds. Show that $\frac{dMC}{dq}$ $must\ be > 0$

If P > MC then profit rises if output is increased.
If P < MC then profit falls if output is increased.

Therefore, since we know P=MR, profit can only be maximized if P = MC

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Sample Problem

Suppose you are the manager of a watch making firm operating in a competitive market.

Your cost of production is given by $TC = 100 + Q^2$, where Q is the level of output and TC is total cost.

a) If the price of watches is $60, how many watches should you produce to maximize profit? What is profit?

$\pi = TR - TC$

$\pi = 60Q - 100 - Q^2$ $\qquad \pi = 60(30) - 100 - (30^2)$

$\frac{d\pi}{dQ} = 60 - 2Q = 0$ $\qquad \pi = 1800 - 100 - 900 = 800$

$Q = 30$

$\frac{d^2\pi}{dQ^2} = -2 < 0\ Maximum$

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The Shutdown Condition

- *Shutdown condition*: if price falls below the minimum of average variable cost, the firm should shut down in the short run.
- The *short-run supply curve* of the perfectly competitive firm is the rising portion of the short-run marginal cost curve that lies above the minimum value of the average variable cost curve
- Be aware of sunk and nonsunk fixed costs, but we will ignore in this analysis.
- Sunk Fixed Costs - a fixed cost that a firm cannot avoid if it temporarily suspends operations and produces zero output. For this reason, sunk fixed costs are often also called unavoidable costs.
- Nonsunk Fixed Costs - a fixed cost that must be incurred if the firm is to produce any output, but it does not have to be incurred if the firm produces no output.

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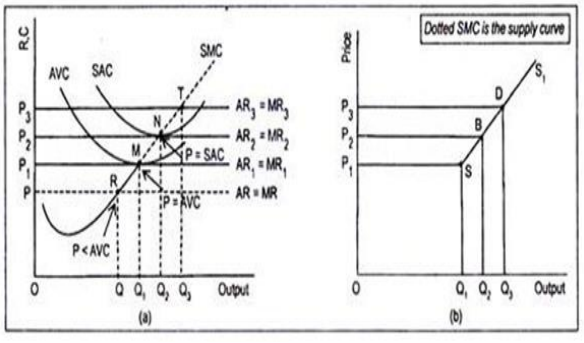
The Short-Run Supply Curve of a Perfectly Competitive Firm



https://www.economicsdiscussion.net/supply/short-run-supply-curve-of-a-competitive-firm-and-industry-with-diagram/16980

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The Firm's Short-Run Supply Decision

- In the short run, we should produce only if loss from producing is less than total fixed costs (TL < TFC)

  TL < TFC or TC – TR < TFC

  Dividing by Q: ATC - AR(or P) < AFC

  Rearranging ATC – AFC < P or P > AVC

Three Profit Maximizing Conditions:

- P = MC
- dMC/dQ > 0 (Marginal Costs are increasing) P > AVC
- These conditions imply a firm's supply curve equals marginal costs above minimum average variable costs & 0 below minimum average variable costs!

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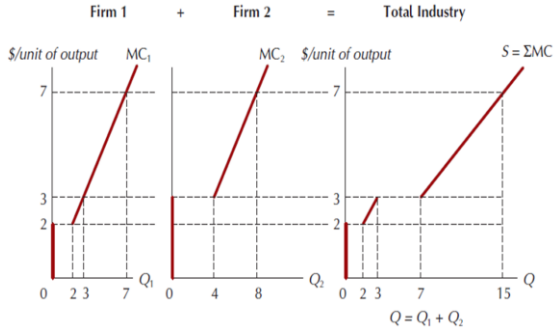
The Short-Run Competitive Industry Supply Curve



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Deriving the Industry Supply Curve

- Each of 1000 identical firms in the competitive peanut butter industry has a short-run marginal cost curve given by
  SRMC = 4 + Q.
- If the demand curve for this industry is $P = 10 - \frac{2Q}{1000}$

what is the equilibrium price and quantity in this industry and how much does each firm produce?

Solution: SR supply = $\sum MC_i = \sum(4 + Q_i)$

Solve for $Q_i = MC_i - 4$ $Q = 1000(MC_i - 4) = 1000\ MC - 4000$

Industry produces where MC = P, so Q = 1000 P - 4000, which means that industry supply is given by

Solving for P: P = 4 + Q/1000. SR equilibrium where Supply = Demand

Q: 4 + Q/1000 = 10 - 2Q/1000 3Q/1000 = 6, Q = 2000, P = 6.

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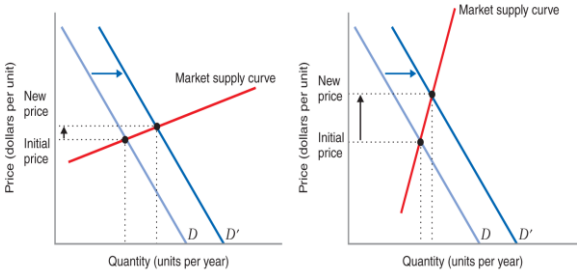
Market Supply Curve



In panel (a), supply is relatively elastic, and a shift in demand has a modest impact on price. In panel (b), supply is relatively inelastic, and the identical shift in demand has a more dramatic impact on the equilibrium price.

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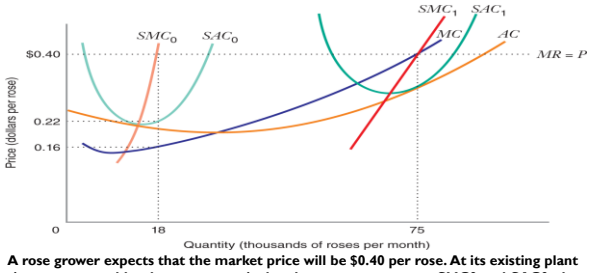
Long-Run Output and Plant Size Adjustment by a Price-Taking Firm



A rose grower expects that the market price will be $0.40 per rose. At its existing plant size, represented by short-run marginal and average cost curves SMC0 and SAC0, the grower's profit-maximizing output is 18,000 roses per month. To maximize profit over the long run, the grower would increase output to 75,000 roses per month, the quantity at which the price P equals the long-run marginal cost MC. To do so, the grower would expand its plant size to the cost-minimizing level represented by curves SMC_1 and SAC_1.

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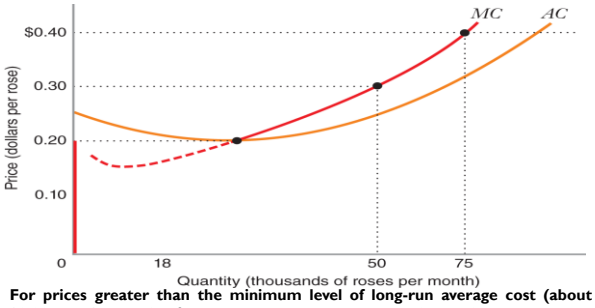
The Firm's Long-Run Supply Curve



For prices greater than the minimum level of long-run average cost (about $0.20 here), the firm's long-run supply curve coincides with its long-run marginal cost curve. For prices below the minimum level of long-run average cost, the firm's supply curve is a vertical spike that coincides with the vertical axis.

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Adjustments In The Long Run

- Positive economic profit creates an incentive for outsiders to enter the industry.
- As additional firms enter the industry, the industry supply curve will shift to the right.
- This adjustment will continue until these two conditions are met:

(1) Price reaches the minimum point on the LAC curve

(2) All firms have moved to the capital stock size that gives rise to a short-run average total cost curve that is tangent to the LAC curve at its minimum point.

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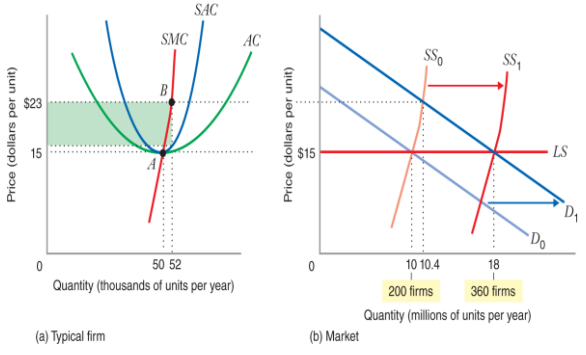
Long-Run Market Supply Curve (Constant Cost Industry)



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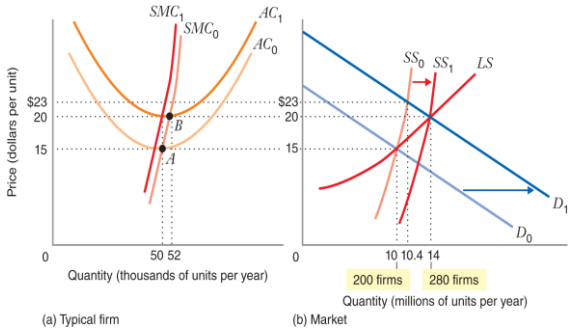
Long-Run Industry Supply Curve in an Increasing-Cost Industry



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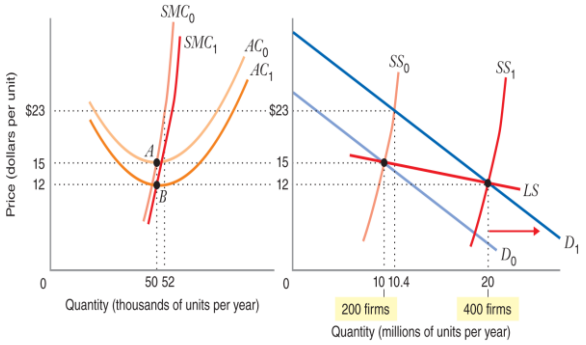
Long-Run Industry Supply Curve in a Decreasing-Cost Industry



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The Invisible Hand

- **Why are competitive markets attractive from the perspective of society as a whole?**
  - **Price is equal to Marginal Cost.**
    - **The last unit of output consumed is worth exactly the same to the buyer as the resources required to produce it.**
  - **Price is equal to the minimum point on the long-run average cost curve.**
    - **There is no less costly way of producing the product.**
  - **All producers earn only a normal rate of profit.**
    - **The public pays not a penny more than what it cost the firms to serve them.**

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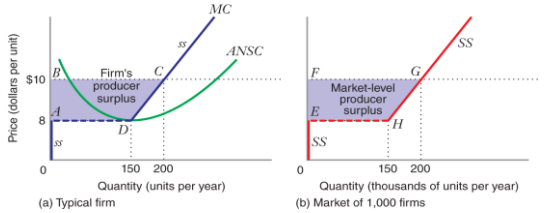
Producer Surplus

- **A competitive market is efficient when it maximizes the net benefits to its participants.**
- ***Producer surplus:* the dollar amount by which a firm benefits by producing a profit-maximizing level of output.**



Panel (a): A typical firm has a supply curve ss. At a price of $10, a firm supplies 200 units, and its producer surplus is area ABCD. This area equals $350. Panel (b): With 1,000 firms in the industry, the market supply curve is SS. At a price of $10, market supply is 200,000 units, and the market-level producer surplus is area EFGH. This area equals $350,000.

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Economic Rent

- Economic rent measures the economic surplus that is attributable to an extraordinarily productive input whose supply is limited.
- Specifically, economic rent is equal to the difference between the maximum amount a firm is willing to pay for the services of the input and the input's reservation value.
- The input's reservation value, in turn, is the return that the input owner could get by deploying the input in its best alternative use outside the industry.

- Let **A** = maximum amount firm is willing to pay for services of input
- Let **B** = return that input owner gets by deploying the input in its best alternative use outside the industry
- Putting the pieces of this definition together, we thus have: economic rent = **A − B**,

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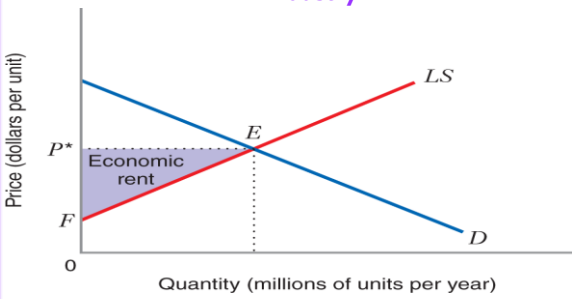
Long-Run Equilibrium in an Increasing-Cost Industry



At a long-run equilibrium price P*, each firm earns zero economic profit. The area between the long-run industry supply curve LS and the equilibrium price, area FP*E, equals the economic rent that goes to the inputs whose supply is scarce.

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Profit Tax

1. Profits tax – tax is fixed proportion of profits

$\pi = TR - TC - t(TR - TC)$ *t* is the tax rate

Solving for the profit maximizing level of q:

$$\frac{d\pi}{dq} = MR - MC - t(MR - MC) = 0$$

$$MR - MC - t(MR - MC) = 0$$

since $(1-t) \neq 0$ $MR - MC = 0$

Firms produce where $MR = MC$

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Lump-Sum Tax

2. Lump-sum tax

$\pi = TR - TC - TAX$ **TAX** is constant amount

Solving for the profit maximizing level of q:

$$\frac{d\pi}{dq} = MR - MC - 0 = 0$$

Firms produce where $MR = MC$

Profits and Lump-sum tax shift average cost up (MC does not change)

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Sales Tax

***3. Sales Tax* – tax per unit of output**

$$\pi = TR - TC - tq$$

$$\frac{d\pi}{dq} = MR - MC - t = 0$$

Firms produce where

$$MR = MC + t$$

Sales Tax shifts average cost and marginal cost up (higher price and lower quantity).

As an exercise you can draw the diagrams showing the effect of the different type of taxes.

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Competition Maximizes Welfare

- **How should we measure society's welfare?**
  - **If we are agree to weighting the well-being of consumers and producers equally, then welfare can be measured**

    W = CS + PS
- **Producing the competitive quantity maximizes welfare.**
- **Put another way, producing less than the competitive level of output lowers total welfare.**
- ***Deadweight loss* (DWL) is the name for the net reduction in welfare from the loss of surplus by one group that is not offset by a gain to another group.**

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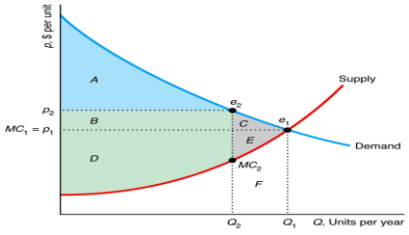
How Competition Maximizes Welfare



	Competitive Output, Q_1 (1)	Smaller Output, Q_2 (2)	Change (2)–(1)
Consumer Surplus, *CS*	$A + B + C$	A	$-B - C = \Delta CS$
Producer Surplus, *PS*	$D + E$	$B + D$	$B - E = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E$	$A + B + D$	$-C - E = \Delta W = DWL$

Reducing output below the competitive level of output lowers total welfare (by area *C+E*, which equals DWL).

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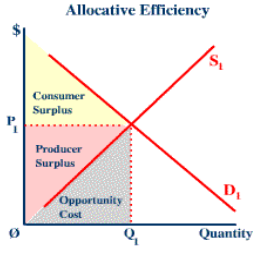
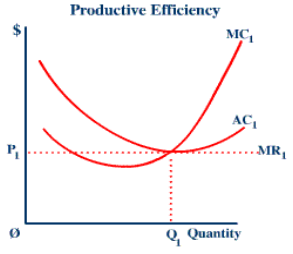


In the diagram above, when the price is P_1, the quantity produced in this industry will be Q_1. With Q_1, resources are allocated efficiently. Both producer and consumer surplus are maximized. Any other allocation would produce a quantity greater than or fewer than Q_1 and would reduce the wealth that comes from producing this product because producer or consumer surplus would be reduced.



In a purely competitive industry, the price a producer will receive in the long run is a price like P_1. This is a price that just touches the lowest point of the average cost curve. This means that there are no pure economic profits and it means that producers are using the fewest resources necessary to produce each good. No resources are being wasted. Production is being done efficiently.

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