
Intermediate Microeconomics

Lecture 6: Perfectly Competitive Firm

Agribusiness Teaching Center
Easter Term 2015

Optimisation

- $\pi = \text{revenue} - \text{cost}$
- $\max \pi$
- $\pi' = 0$
- $MR - MC = 0$

$$MR = MC$$

Perfectly competitive market

Definition

An industry consisting of many firms, each of which has an insubstantial share of the market, constitutes a **perfectly competitive market**.

Characteristics:

- The firms are price-takers
 - No barriers for entry
 - Homogeneous product
 - Perfect factor mobility
 - Perfect information
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Demand in perfectly competitive market

The producer on the market faces the following demand function:

$$D_i(p_i, p_j) = \begin{cases} D(p_i) & \text{if } p_i < p_j \\ \frac{1}{n} D(p_i) & \text{if } p_i = p_j \\ 0 & \text{if } p_i > p_j \end{cases}$$



Competitive firm Supply

Lemma (Output Rule 1)

Produce when the price is above the average variable cost: $p > AVC$

Proof.

Follows from the shutdown condition:

$$-FC > pq - VC - FC$$



Lemma (Output rule 2)

Produce at a level where the price is equal to the marginal cost: $p = MC$

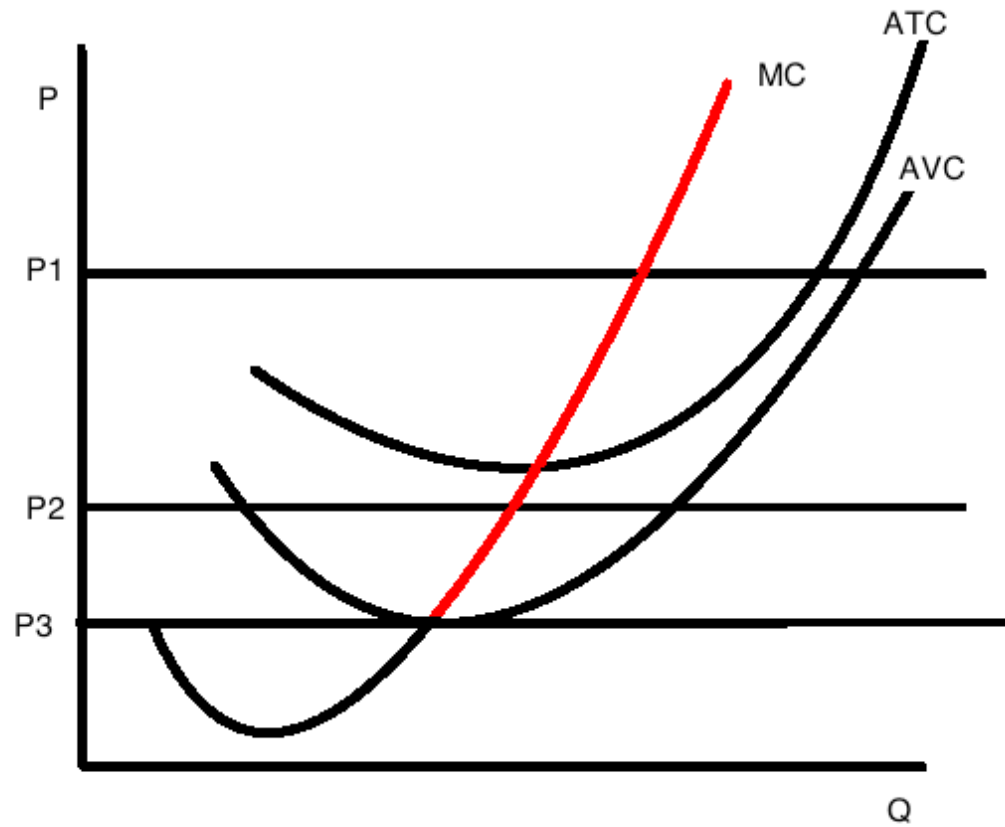
Proof.

Follows from the zero marginal profit condition:

$$\pi' = 0$$



Competitive Firm Supply



Exercise

Coconut Unlimited produces coconuts using only one variable input - labor. It's a perfectly competitive firm. Suppose that the fixed cost associated with production is $F = 50$: Let y denote the total number of coconuts produced. The total variable costs and marginal cost associated with the production of y units of output is

$$\begin{aligned}MC &= 3y^2 - 16y + 21 \\TVC &= y^3 - 8y^2 + 21y\end{aligned}$$

(For your info, the firm has U-shaped average cost curves.)

1. Determine how much the firm will supply (in the short run) as a function of the price level (*i.e.* determine the supply function of this firm).
 2. What is the price below which the firm does not supply any output in the short-run?
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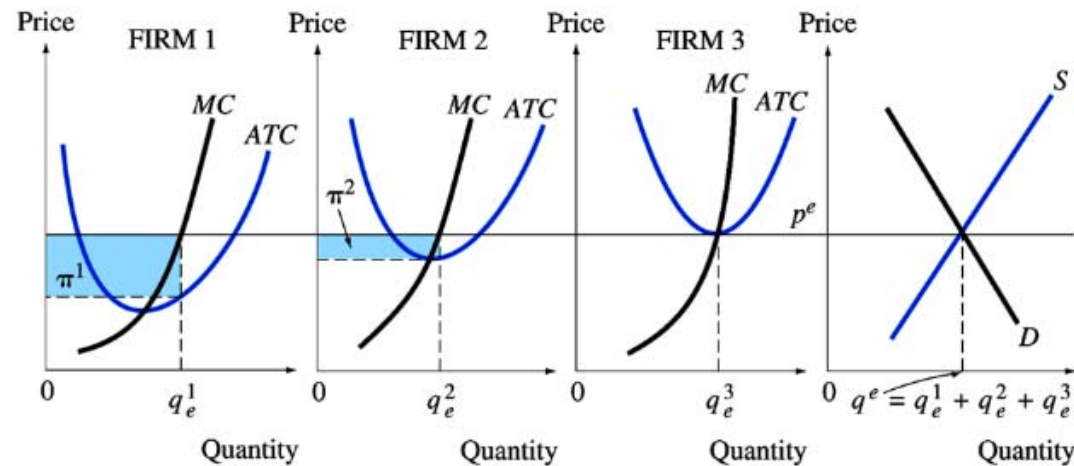
Exercise

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3. Now suppose that the current market price is $p = 21$.
- (a) How much will this firm choose to produce?
 - (b) How much profit it will make?
-

Short-run equilibrium for a Competitive Market



Definition

A price-quantity combination constitutes a short-run equilibrium for a competitive market if it is such that:

- 1 no individual firm wishes to change the amount of own supply
- 2 no individual consumer wishes to change the amount demanded
- 3 the excess demand is zero in the market.

Exercise

There are 3 perfectly competitive firms in an industry. The firms have no fixed costs. Their marginal cost curves are given by:

$$MC_A = 21 + 3q$$

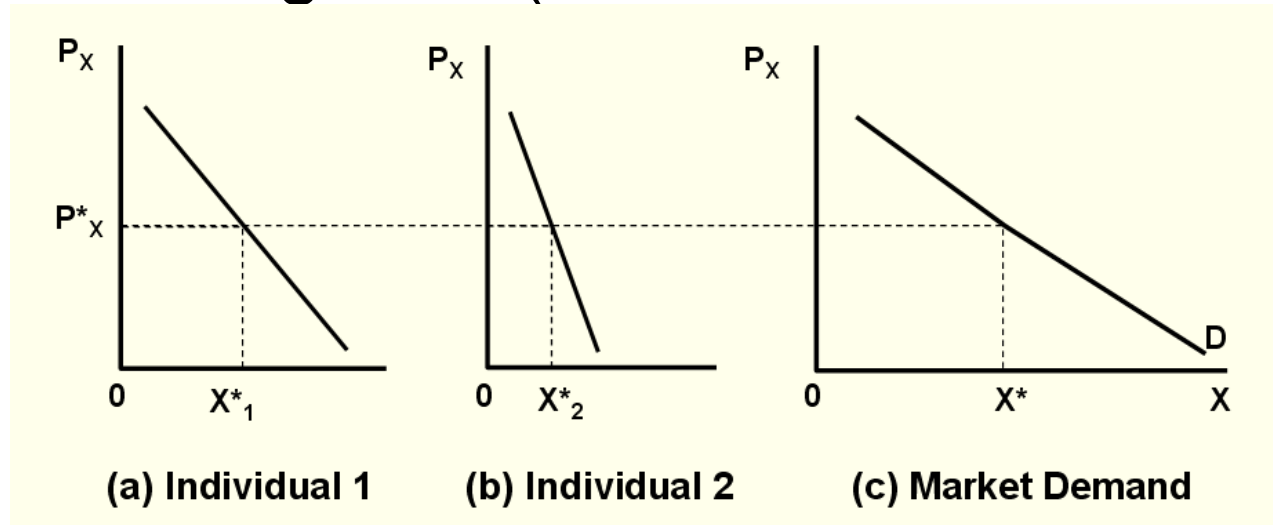
$$MC_B = 30 + 2q$$

$$MC_C = 40 + q$$

Determine the market supply as a function of price.

Market Demand

- Private goods (horizontal summation)



- Non-rival goods and composite goods (vertical summation)

Short-run Profit and Zero Long-run Profit

Fact

In the short-run equilibrium some firms may make (extra-normal, non-zero) profit due to short-run constraints.

Fact

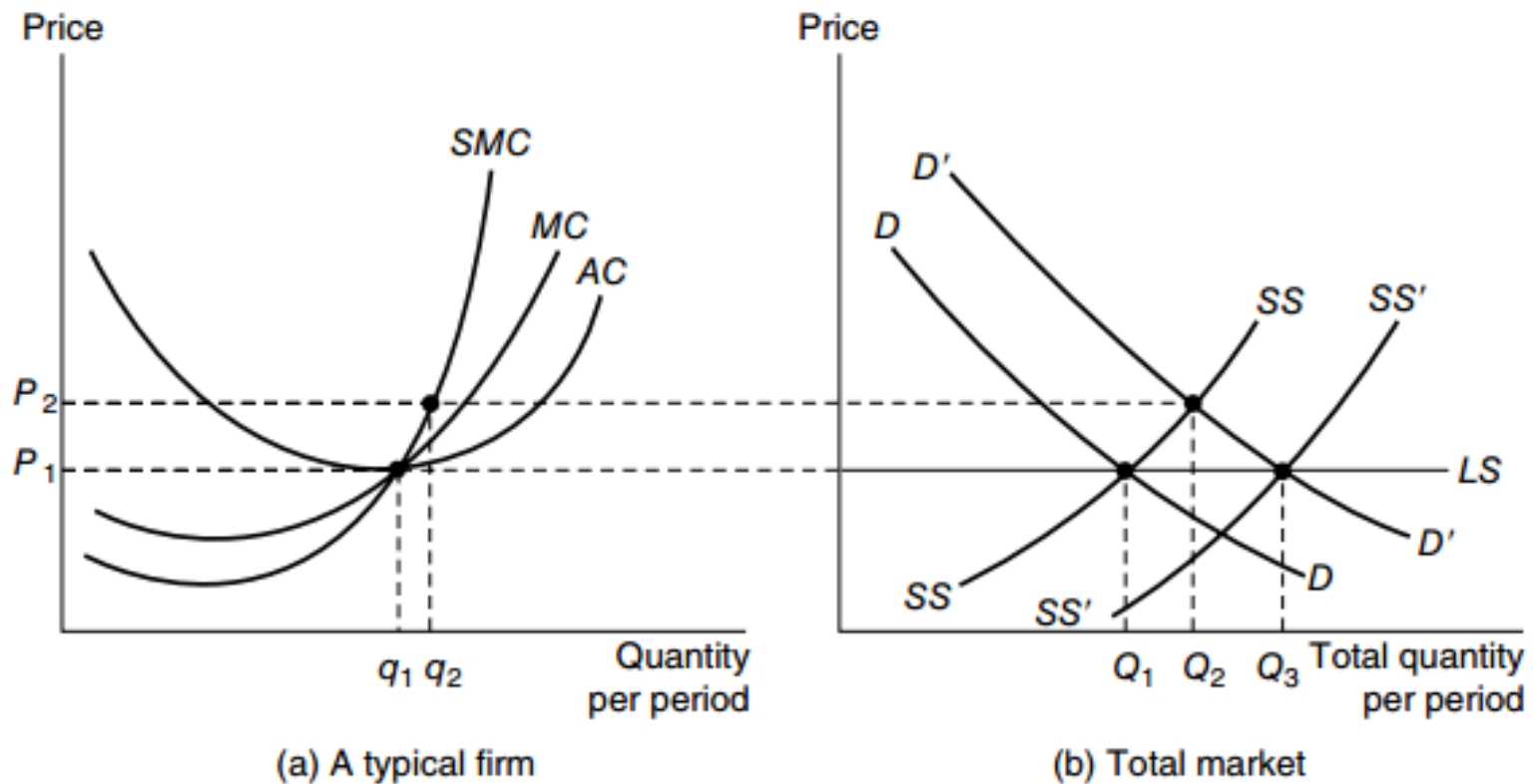
In the long-run due to free entry and exit:

- ① *firm leaves the market if LR profit is negative, $\pi < 0$*
- ② *firm enters the market if LR profit is positive, $\pi > 0$*

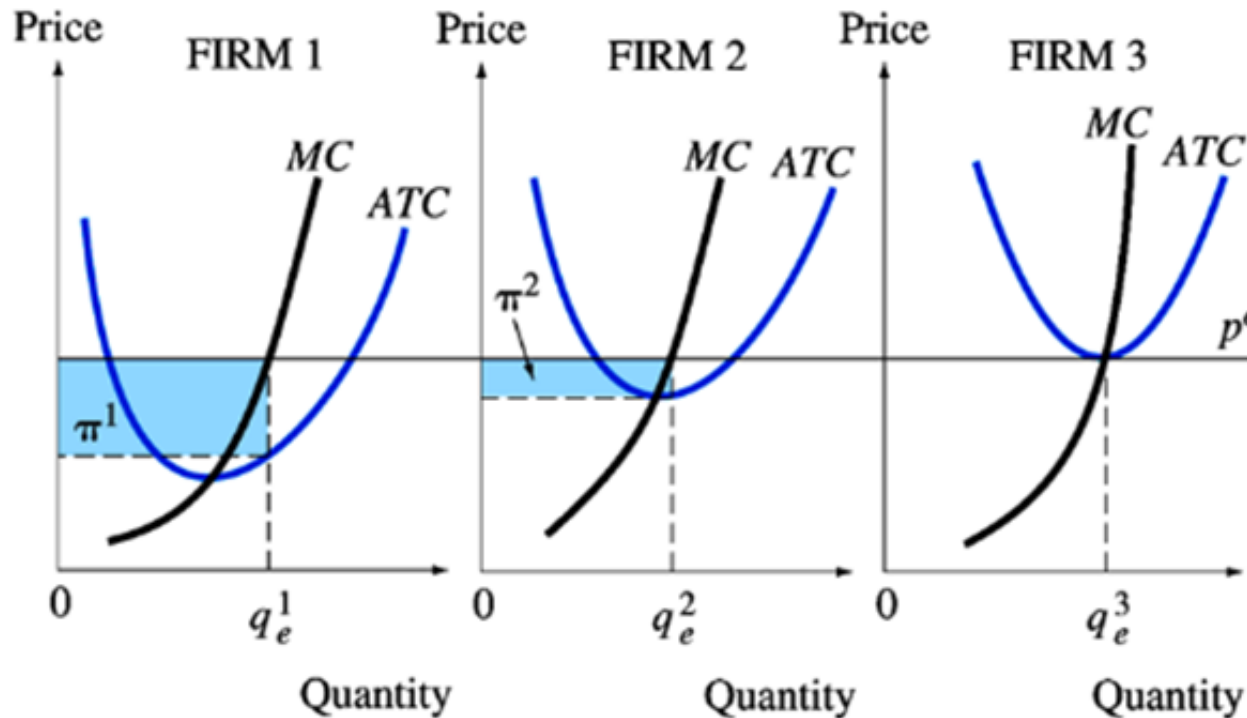
Fact

All firms in the market operating at minimum LR average cost.

Long-run Equilibrium for Perfectly Competitive Market: Constant Cost Case

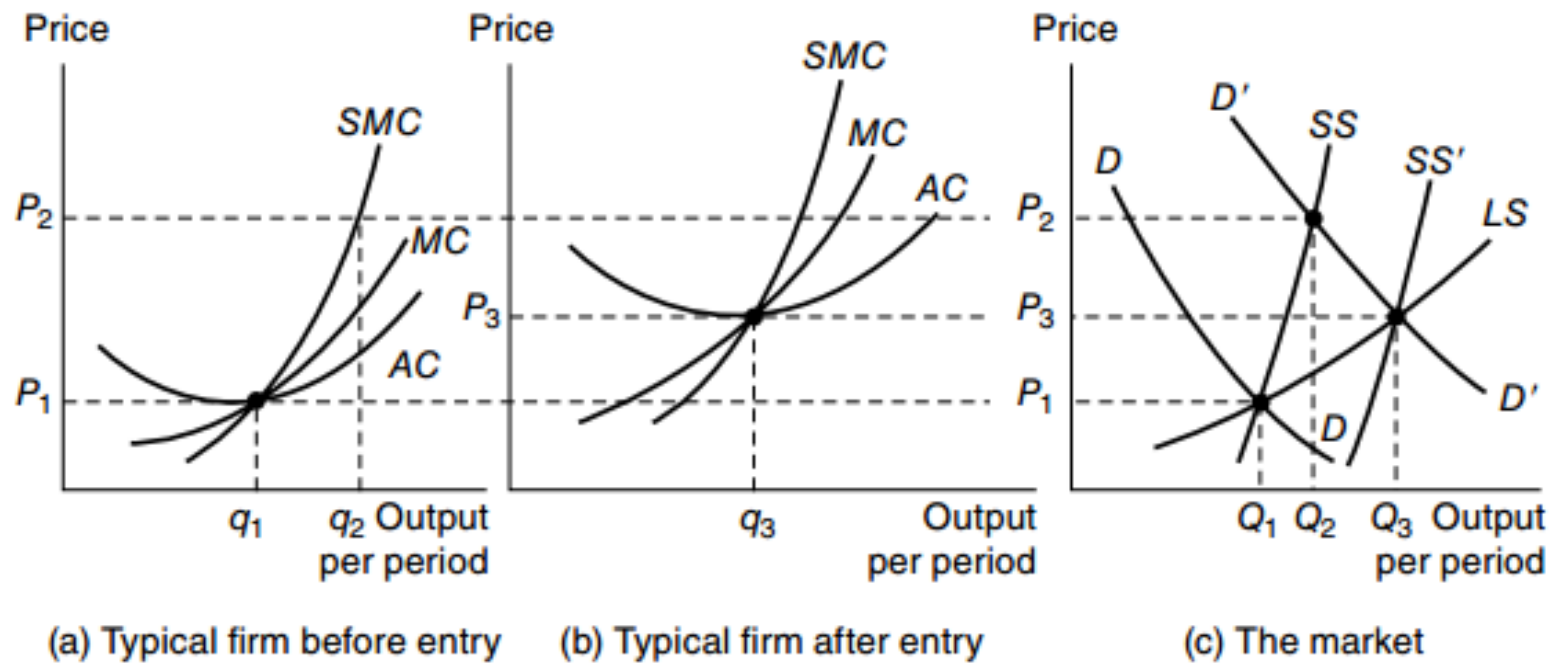


Ricardian Rent: Non-Zero LR Profit

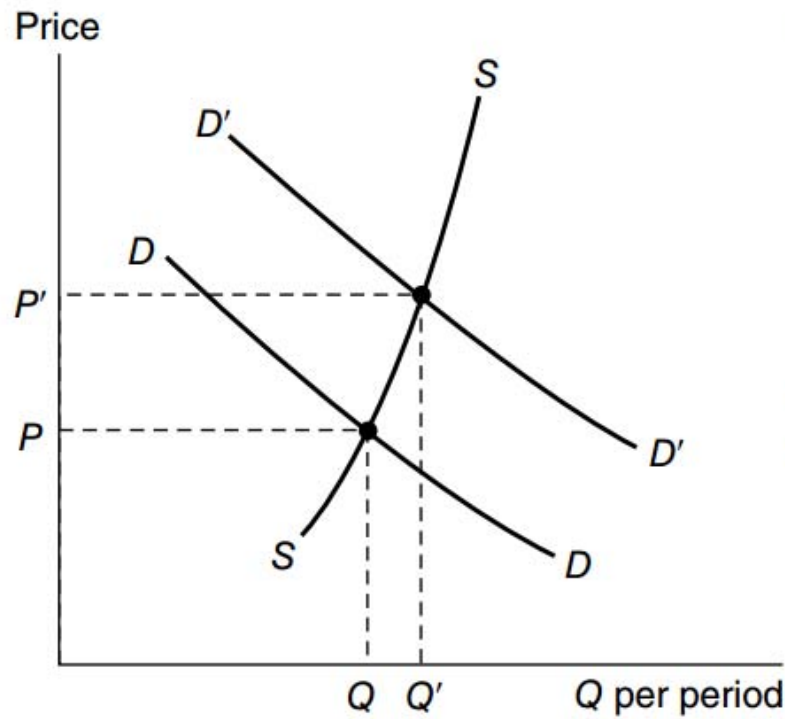


Ricardian rent is long-run profit earned by an owner of a 'low-cost' firm.

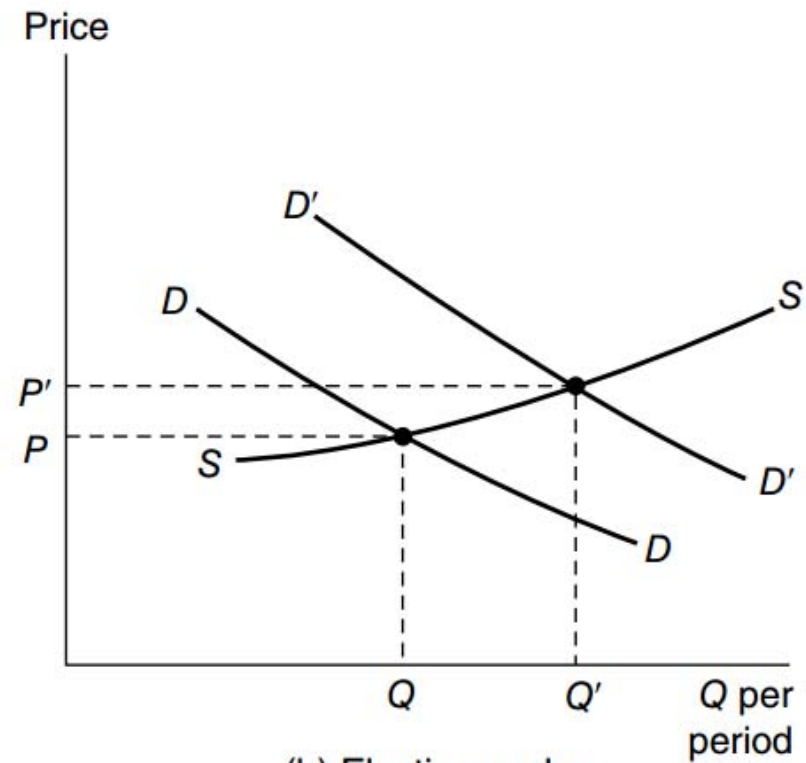
Long-run Equilibrium for Perfectly Competitive Market: Increasing Cost Case



Shape of Supply curve and Demand shift

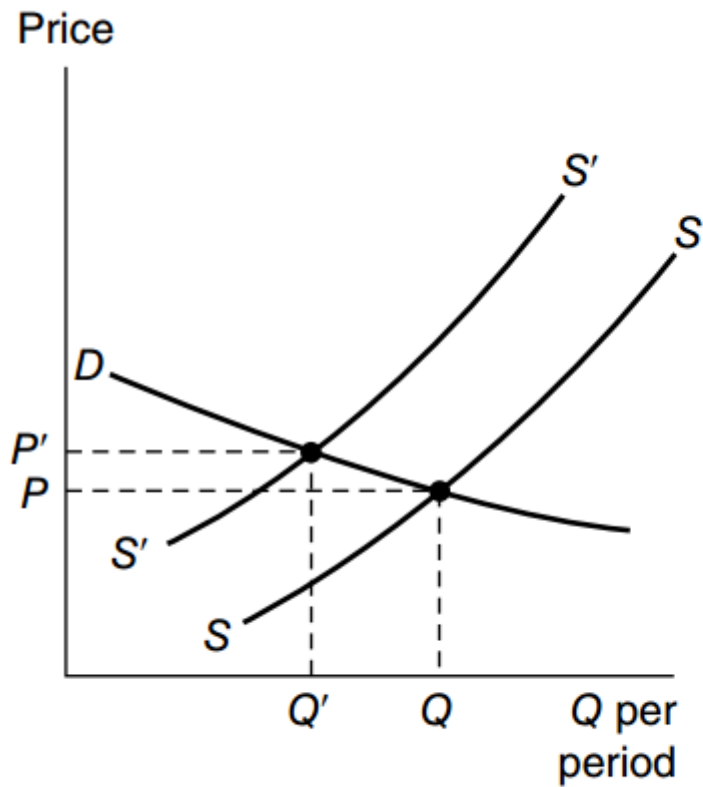


(a) Inelastic supply

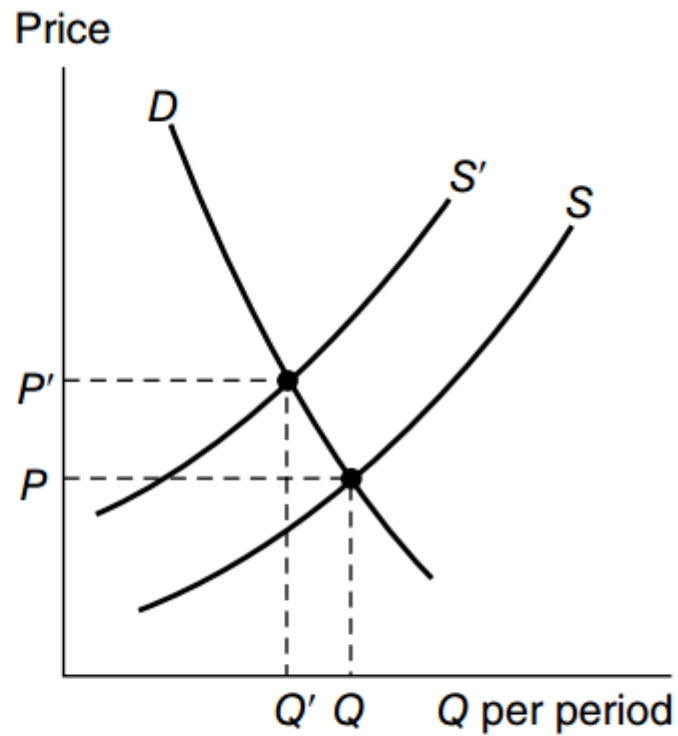


(b) Elastic supply

Shape of Demand curve and Supply shift



(a) Elastic demand

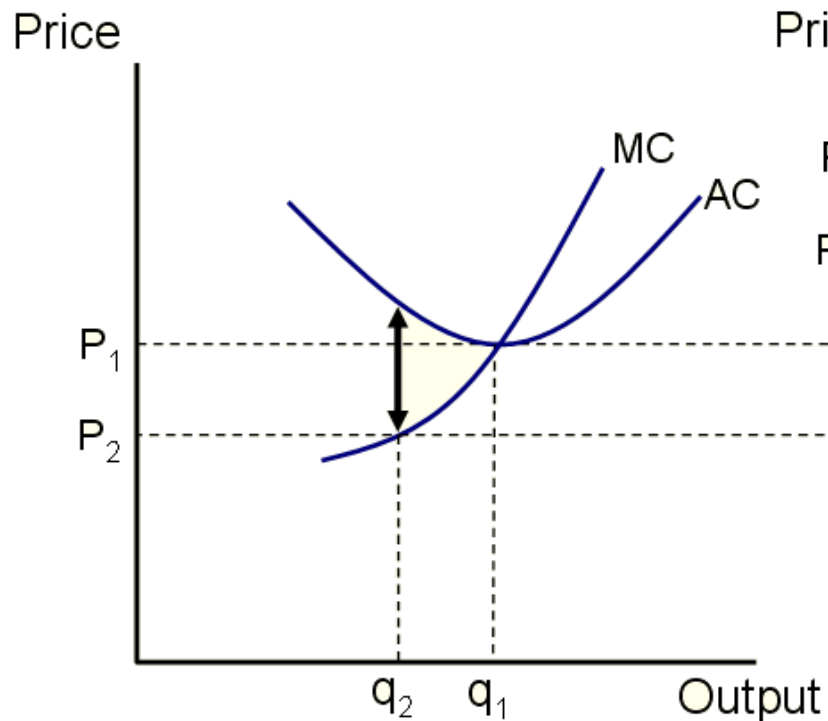


(b) Inelastic demand

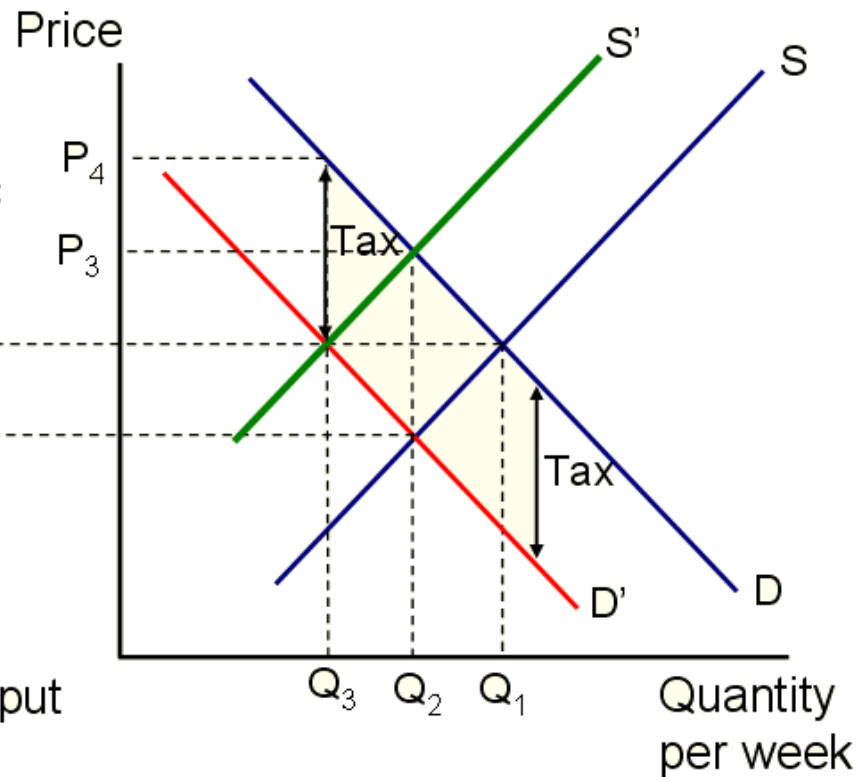
Tax Incidence in LR: Constant Costs

Find LR Supply Curve and who covers the burden?

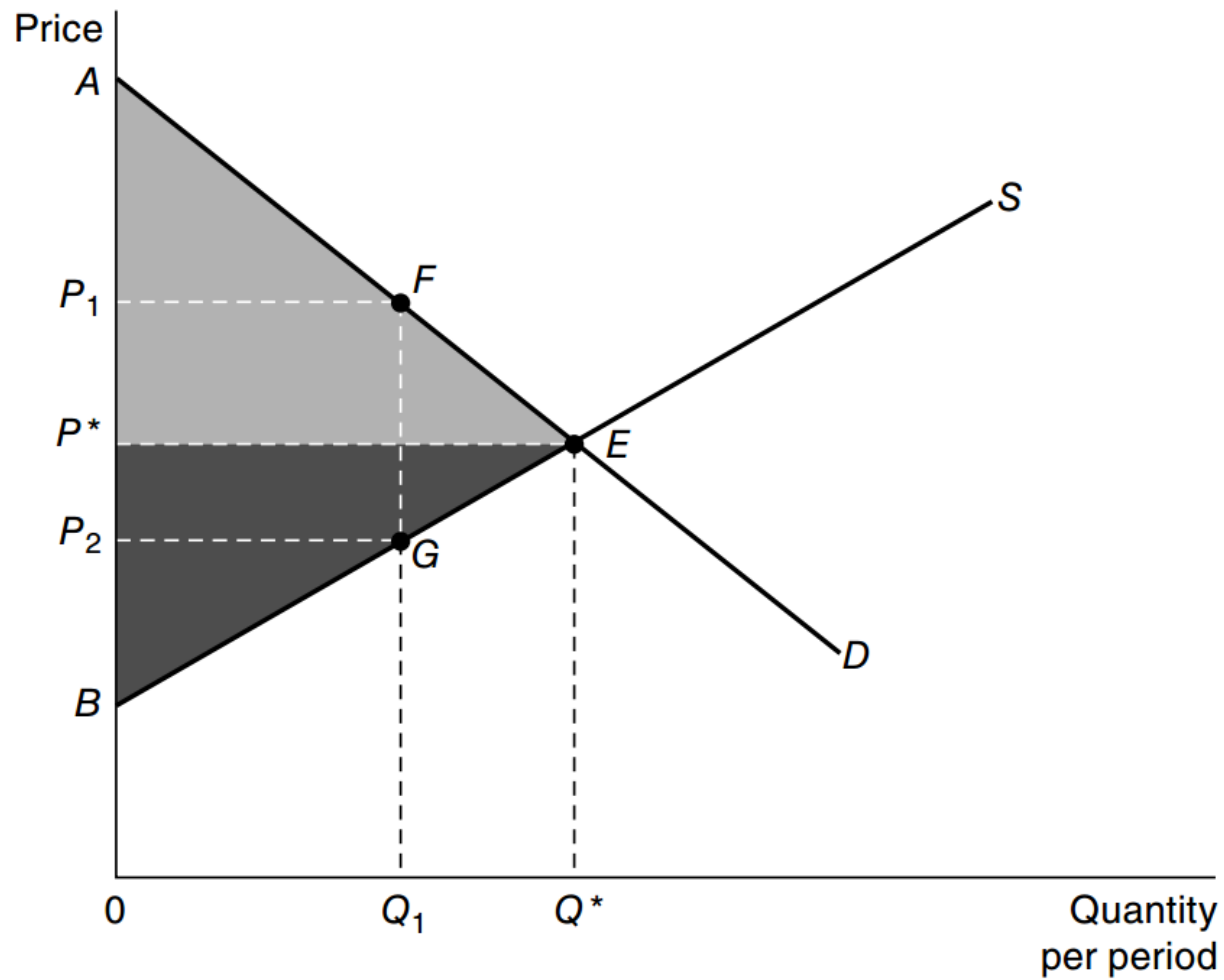
(a) Typical Firm



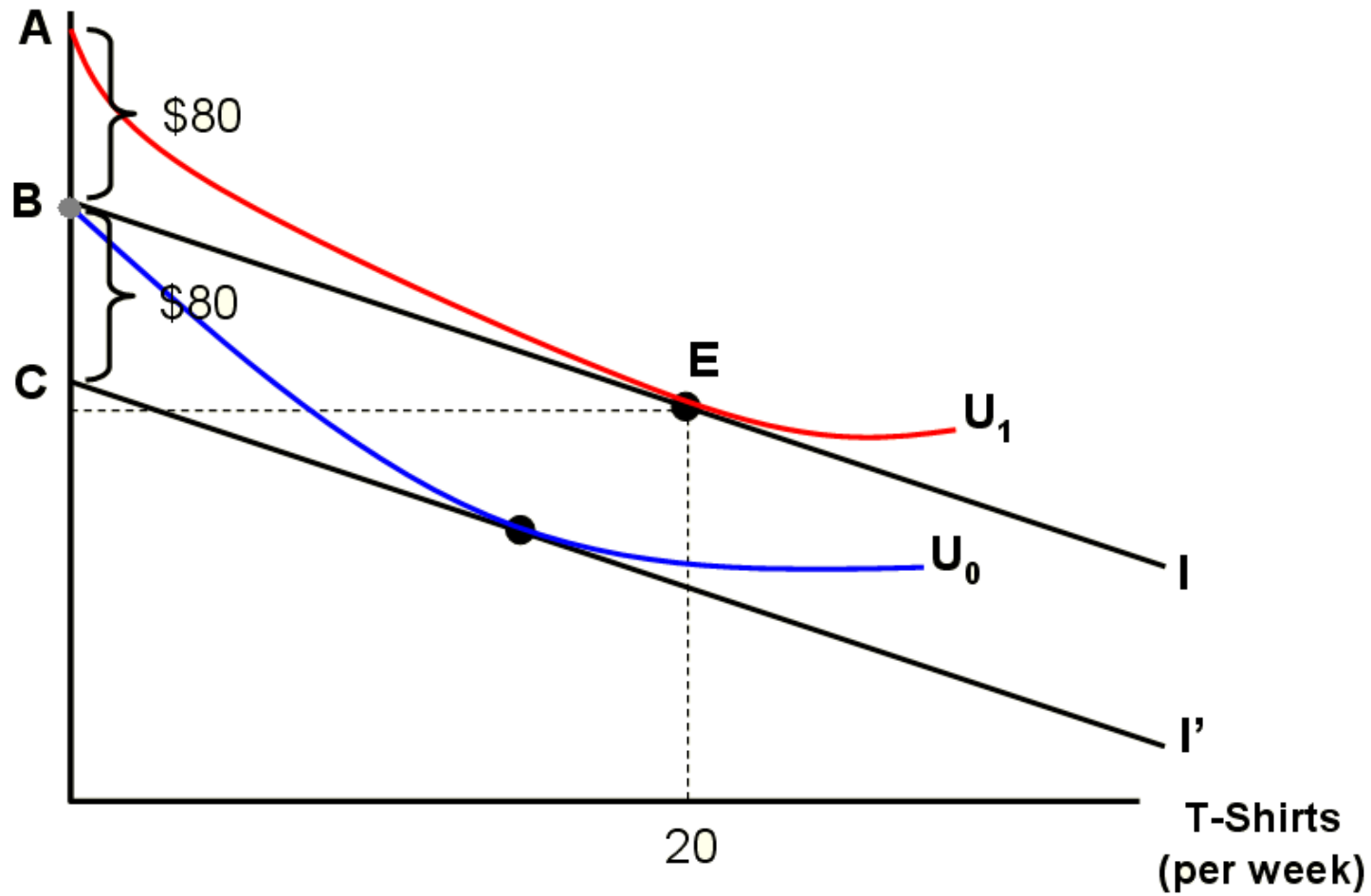
(b) The Market



Consumer and Producer Surplus

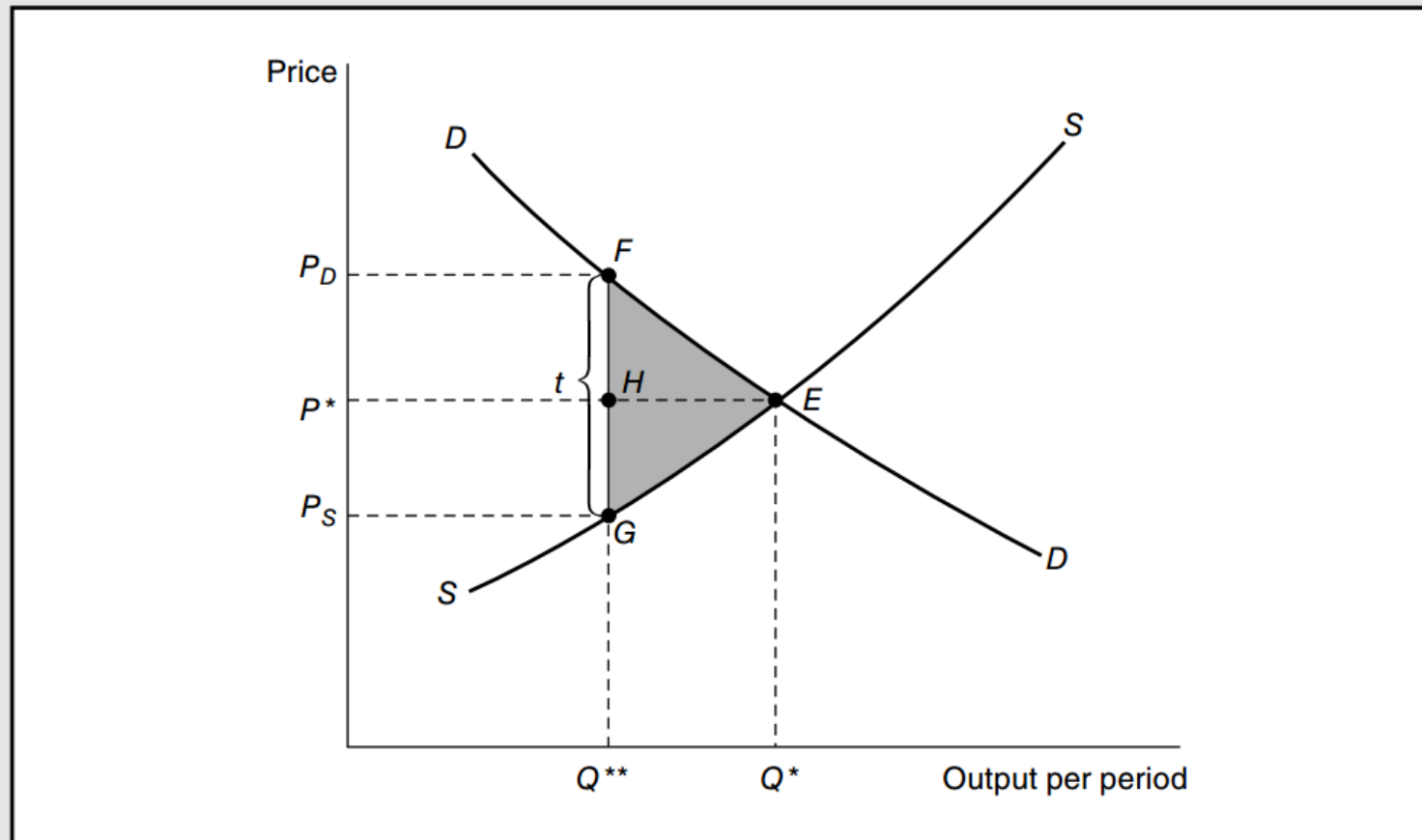


Consumer Surplus



Tax Incidence and Welfare (Deadweight) Loss

Imposition of a specific tax of amount t per unit creates a “wedge” between the price consumers pay (P_D) and what suppliers receive (P_S). The extent to which consumers or producers pay the tax depends on the price elasticities of demand and supply.



Demand Elasticity and Markup

- Revenue:

$$R = p(Q) \cdot q$$

- Marginal revenue:

$$MR = \frac{\partial p}{\partial Q} q + \frac{\partial q}{\partial p} p$$

$$MR = p \left(1 + \frac{\partial p}{\partial Q} \frac{Q}{p} \frac{q}{Q} \right)$$

$$MR = p \left(1 - \frac{s}{|\varepsilon|} \right)$$

$$p = MR \div \left(1 - \frac{s}{|\varepsilon|} \right)$$

- Pricing:

$$p = MC \div \left(1 - \frac{s}{|\varepsilon|} \right)$$

Lerner Index and Market Power

Definition

Lerner Index,

$$L = \frac{p - MC}{p},$$

is a measure of market power: the firm's ability to raise price above marginal cost.

Lemma

Lerner Index:

- *Monopoly:* $L = \frac{1}{|\varepsilon|}$
- *Oligopoly:* $L = \frac{s}{|\varepsilon|}$
- *Competitive firm:* $L = 0$

Exercise

SUPPOSE THE MICROECONOMICS CLASS HAS A GRADUATION PARTY BUT AS A FINAL TEST THE STUDENTS MUST SHOW THEY HAVE LEARNED SOMETHING ABOUT TRADE. THE MEN ARE GIVEN FOOD WHEN THEY WALK IN AND THE WOMEN ARE GIVEN DRINK. SUPPOSE THEY HAVE IDENTICAL PREFERENCES WHERE FOOD AND DRINK PROVIDE

UTILITY:

$$U = F_{\text{OOD}}^a D_{\text{RINKS}}^b$$

- SHOW THE CONTRACT CURVE IN THE EDGEWORTH BOX
- EXPLAIN WHEN EXCHANGE WILL BE POSSIBLE AND SHOW THE CORE

NOW ASSUME THAT THE WOMEN HAVE PREFERENCES REPRESENTED AS:

$$U = \ln(F_{\text{OOD}}; D_{\text{RINKS}})$$

- SHOW THE CONTRACT CURVE AND THE CORE