

INTERMEDIATE MICROECONOMICS

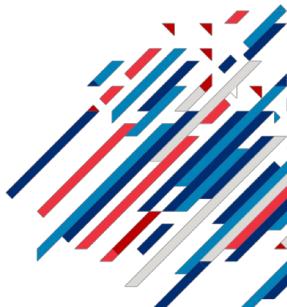
PERFECT COMPETITION

SPRING 2019, PROFESSOR ANH NGUYEN

Introduction



- A market is **competitive** if all agents in that market (all the buyers and the sellers) take prices as given.
- Consider a competitive market:
 - Derive the equilibrium price and quantity both in the short run and in the long run.
 - Represent the social welfare of a market.
 - Understand why the social welfare is maximized in a competitive market.

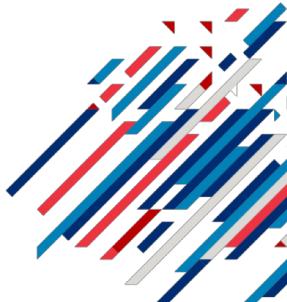


1. Perfect Competition

Perfect Competition



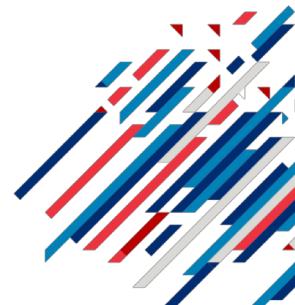
- All agents in a competitive market take prices as given.
- We consider typical features of perfectly competitive markets.
- Reading: pp. 466-495



Market Structure



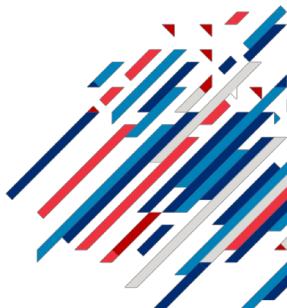
- **Market structure** provides information about how firms operating in the market will behave.
- It is a function of :
 - Number of firms in the market
 - Ease with which firms can enter and leave the market
 - Ability of firms to differentiate their products from those of their rivals



Perfect Competition

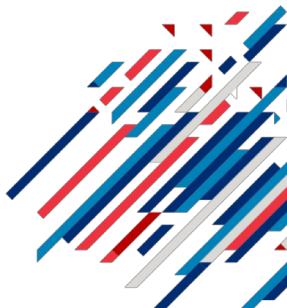


- **Perfect competition** is one type of market structure in which buyers and sellers are price-takers.
 - A firm is unable to sell its output at a price greater than market price.
 - A consumer is unable to purchase at a price less than the market price.



Features of Perfectly Competitive Markets

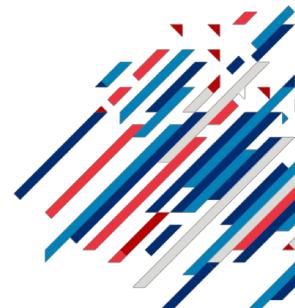
1. There are a *large number of firms*
2. Firms sell *identical* products
3. Buyers and sellers have *full information* about prices charged by all firms
4. *Transaction costs*, the expenses of finding a trading partner and completing the trade, are low
5. Firms can freely enter and exit the market



Examples of Perfectly Competitive Markets

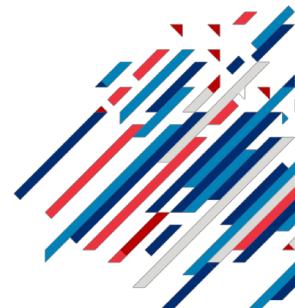


- Agricultural/commodities markets like wheat and soybeans
- Building and construction



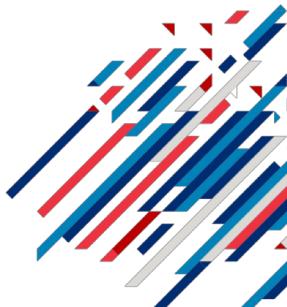
Features of Perfectly Competitive Markets (1): Large Number of Firms

- No single firm's actions can raise or lower the price.
- Individual firm's demand curve is a **horizontal line** at the market price.



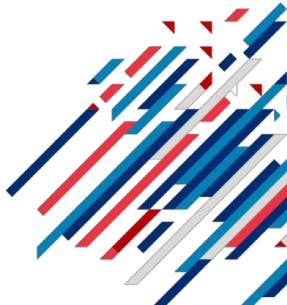
Features of Perfectly Competitive Markets (2): Homogeneous Products

- If all firms are selling identical products, it is difficult for any firm to raise the price above the market price charged by all other firms.



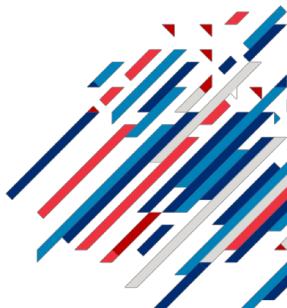
Features of Perfectly Competitive Markets (3): Full Information

- Consumer knowledge of all firms' prices makes it easy for consumers to buy elsewhere if any one firm raised its price above market price.



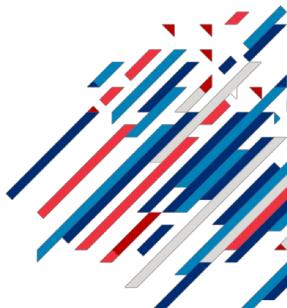
Features of Perfectly Competitive Markets (4): No Transaction Costs

- Buyers and sellers waste little time or money finding each other.
- It is difficult for firms to raise the price above the market price.



Features of Perfectly Competitive Markets (5): Free Entry and Exit

- This leads to large number of firms and promotes price-taking behaviors of firms.

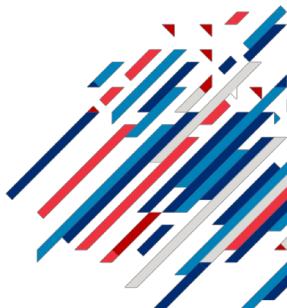


2. Market Supply

Market Supply

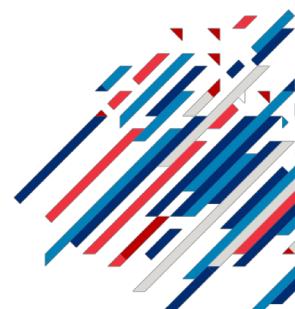
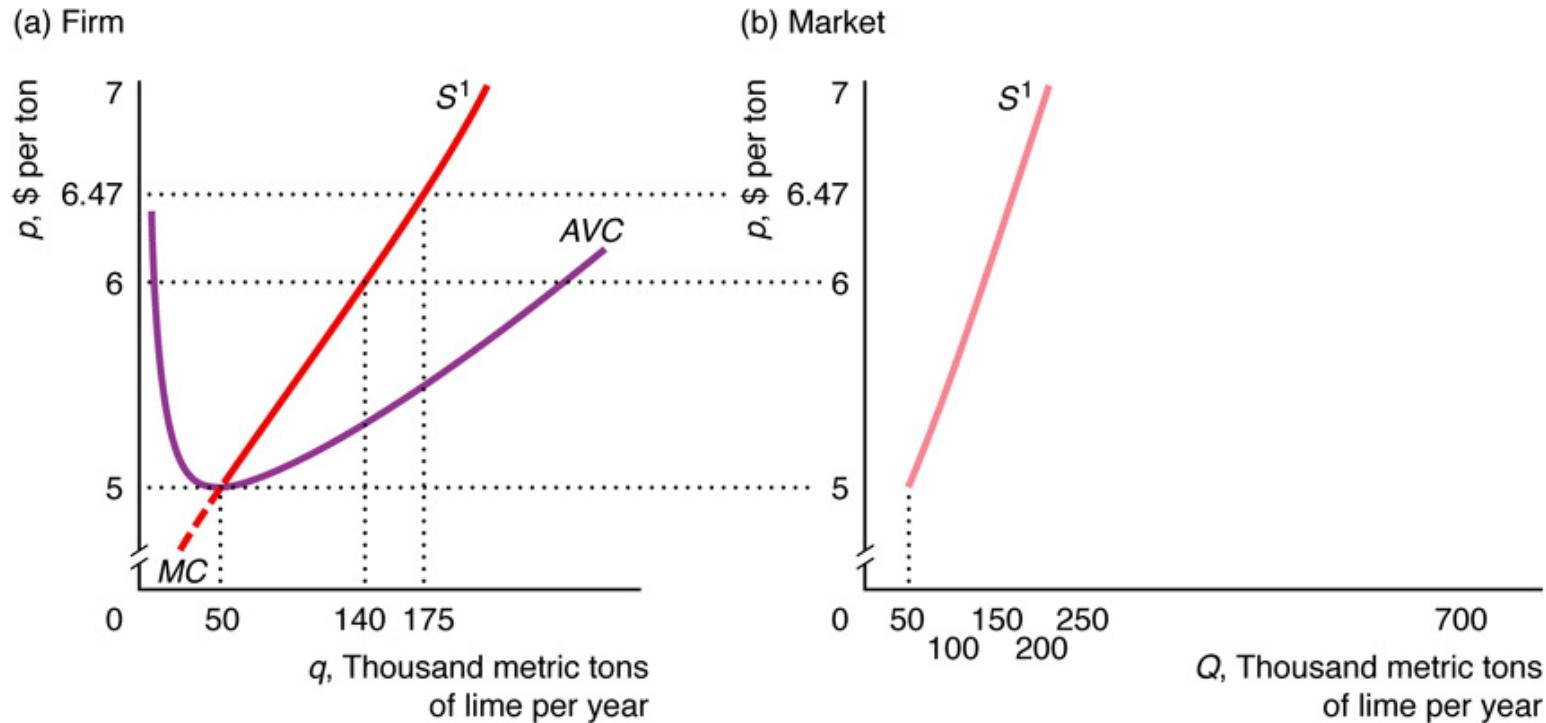


- Derive the short-run market supply.
 - In the short-run, the number of firms is fixed.
 - The short-run market supply curve is the horizontal sum of individual firms' supply curves.
- Derive the long-run market supply.
 - In the long-run, firms freely enter and exit the market.
 - The number of firms varies in the long-run.
- Reading: pp. 466-495



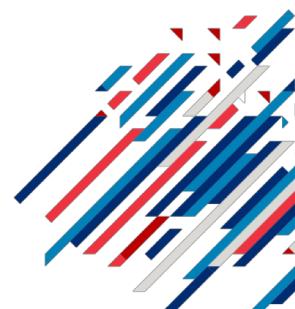
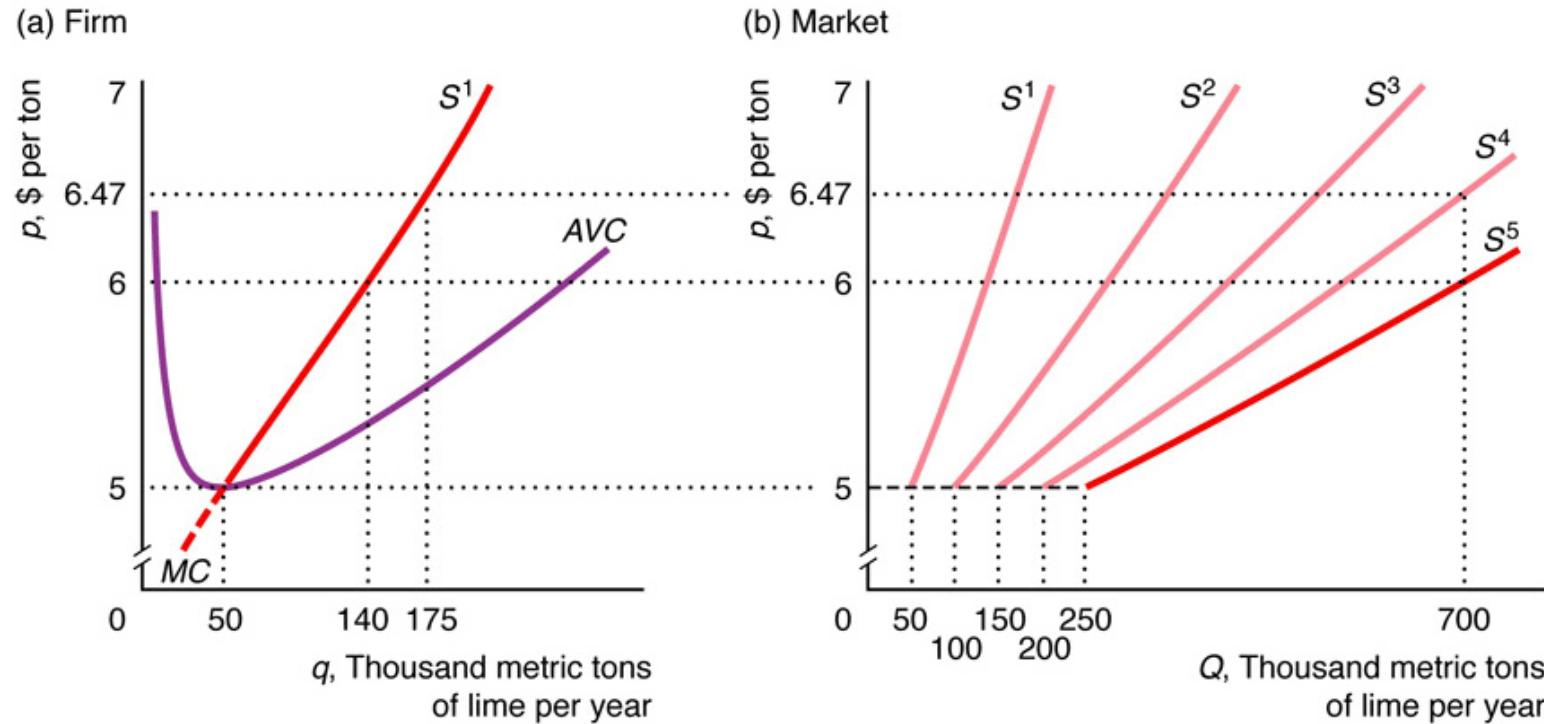
Short-run Market Supply Curve: Identical Firms

- Consider a typical firm's supply curve.



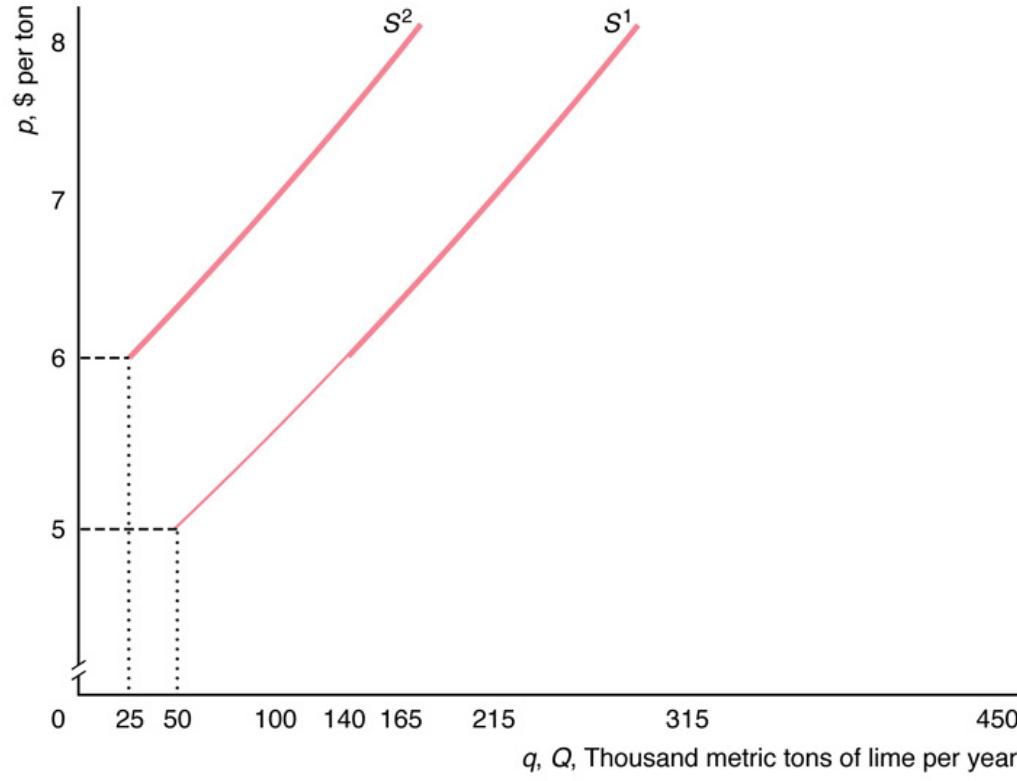
Short-run Market Supply Curve: Identical Firms

- The market supply curve is the horizontal sum of the firm supply curves.



Short-run Market Supply Curve: Different Firms

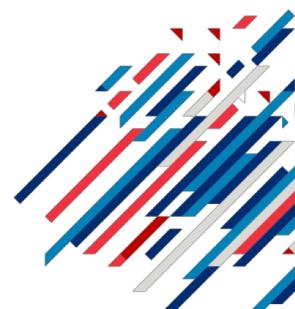
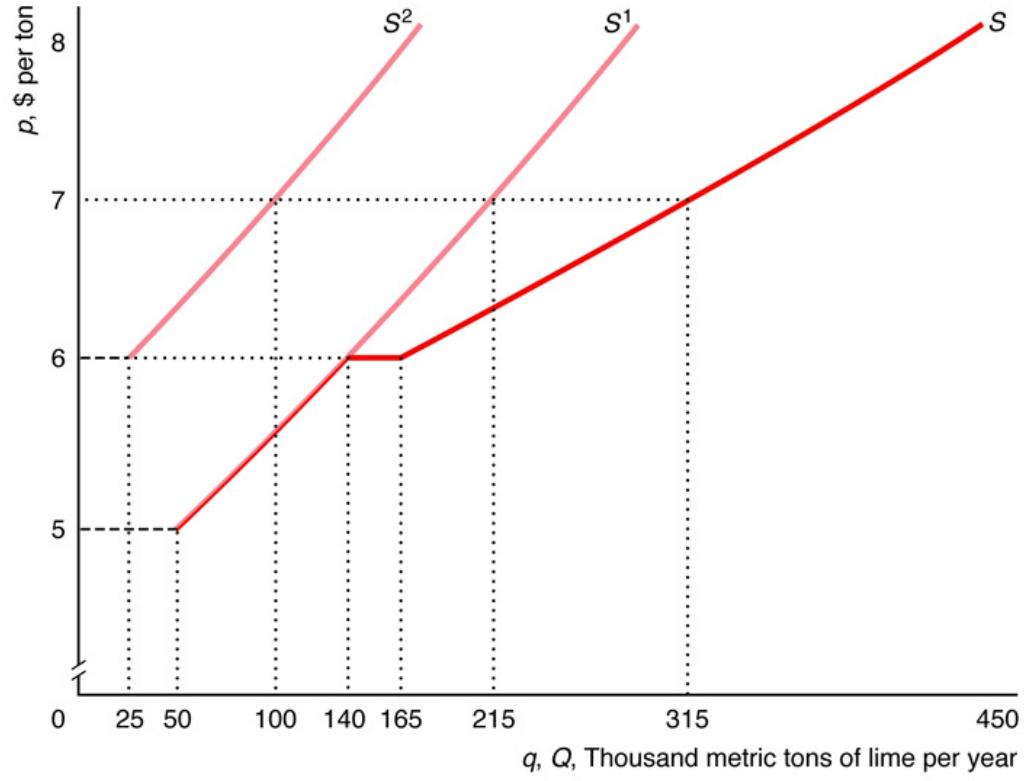
- Consider two firms in the market.



Short-run Market Supply Curve: Different Firms



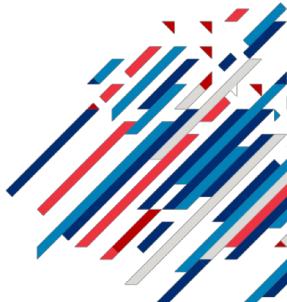
- Market supply curve is the horizontal sum of the two firm supply curves.



Long-Run Market Supply Curve



- As in the SR, the LR market supply curve is the horizontal sum of individual firm supply curves.
- In the LR, firms can enter or exit the market, so the number of firms is not fixed as it is in the SR.
 - A firm enters the market if it can make a LR profit.
 - As more firms enter the market, the aggregate supply increases.
 - As a result, price decreases as the profit becomes zero.



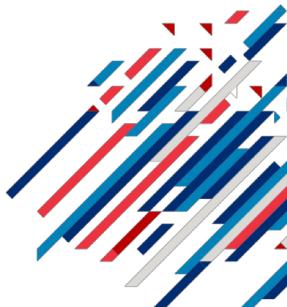
Long-Run Market Supply Curve



- In the LR,
 1. Firms maximize profit: $p = MC(q)$
 2. Firms make zero profits: $p = AC(q)$
- Combining the two conditions:

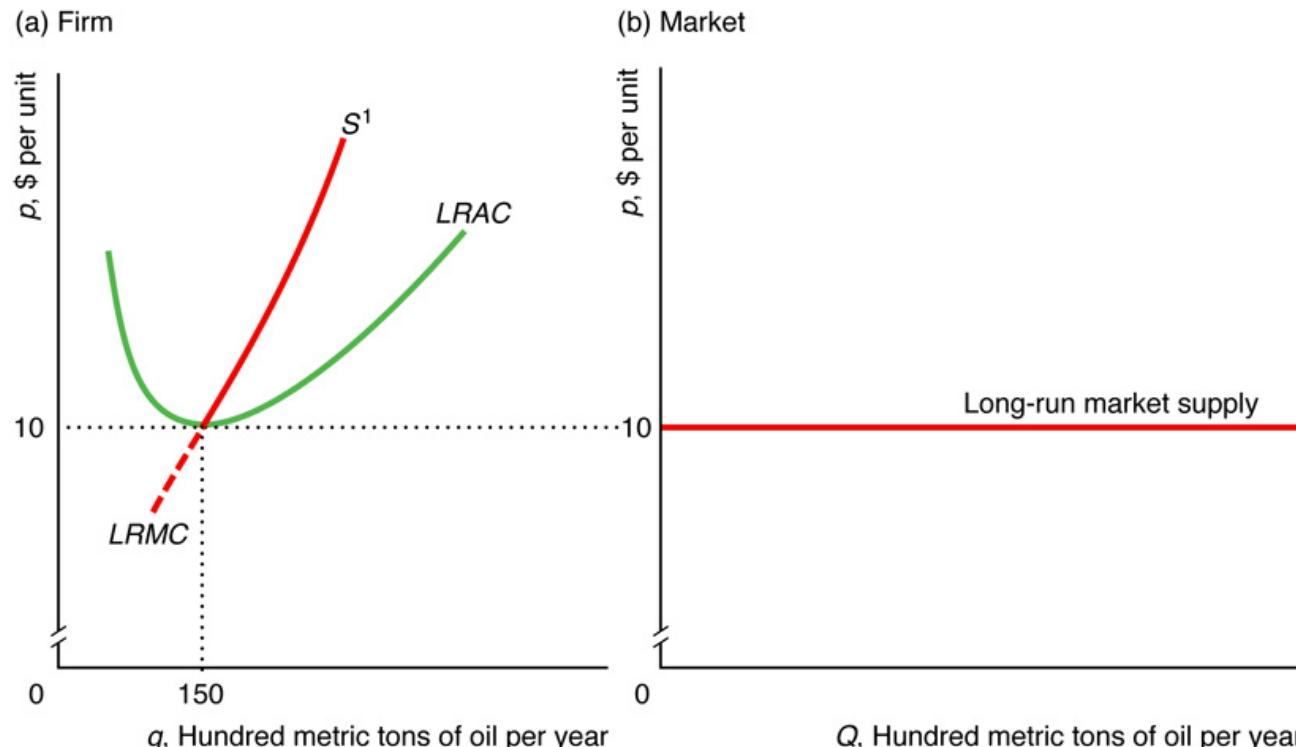
$$p = MC(q) = AC(q)$$

- This is satisfied only when AC is minimized.
- Therefore, the LR market supply curve is flat at the minimum (long-run) AC.



Long-Run Market Supply Curve: Identical Firms

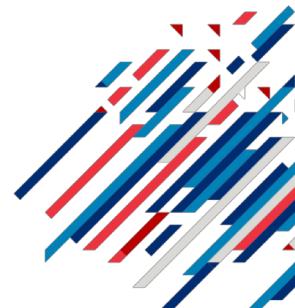
- With identical firms, free entry into the market, and constant input prices, the LR market supply curve is **flat at the minimum LRAC**.



Long-Run Market Supply Curve



- LR market supply is upward-sloping if
 - Entry is limited:
 - Government restricts number of firms, firms need a scarce resource, or entry is costly.
 - Firms are heterogeneous:
 - Firms with relatively low minimum LRAC are willing to enter market at lower prices than others
 - Input prices rise with output

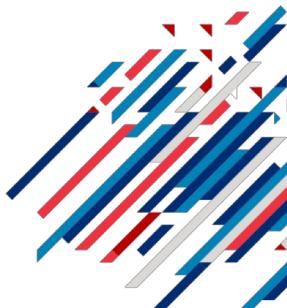


3. Market Equilibrium

Market Equilibrium

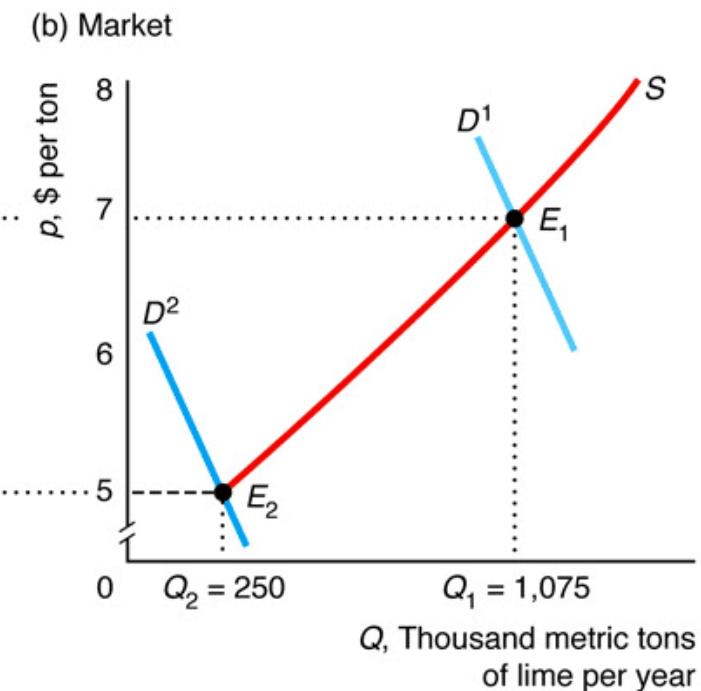
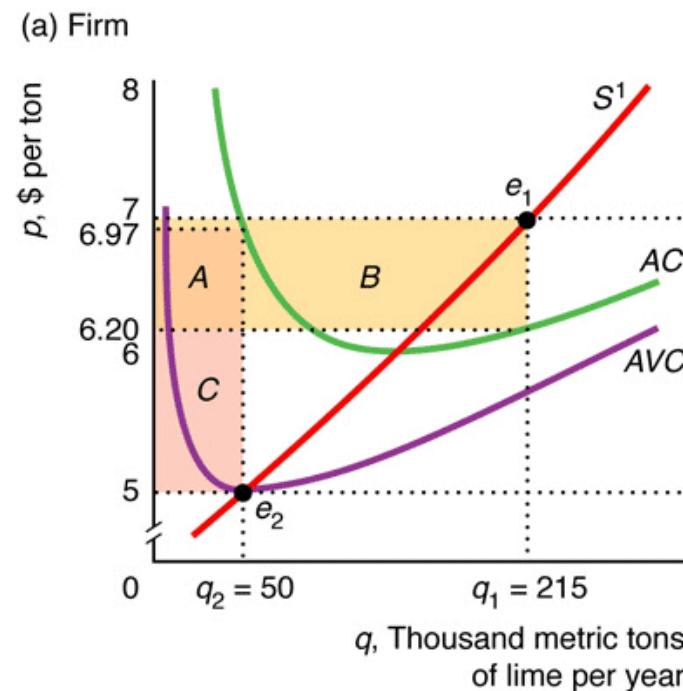


- Equilibrium occurs at the intersection of market demand and supply.
 - In the short-run, the number of firms is fixed.
 - In the long-run, we can solve for the equilibrium number of firms.
- Reading: pp. 466-495



Short-Run Competitive Equilibrium

- Market equilibrium (E_1) indicates price faced by individual firm, and profit-maximizing quantity, q_1 .

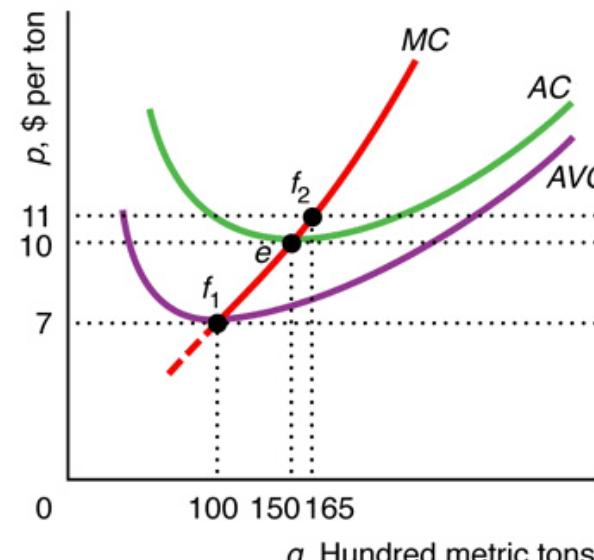


Long-Run Competitive Equilibrium

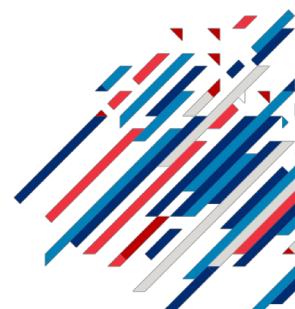
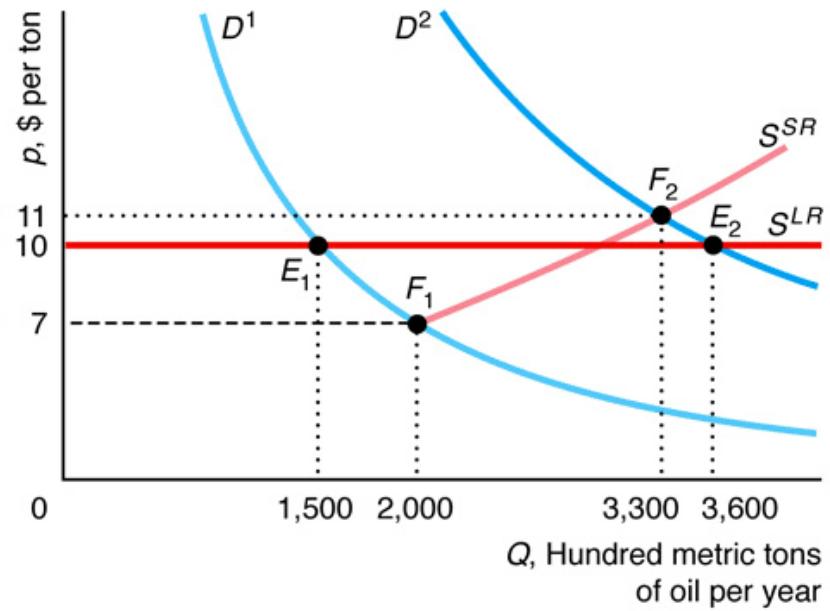


- Equilibrium occurs at the intersection of LR market demand and LR market supply, which is different from SR market supply.

(a) Firm



(b) Market

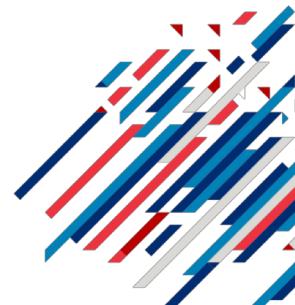


4. Competitive Equilibrium and Social Welfare

Competitive Equilibrium and Social Welfare



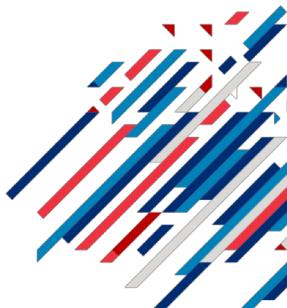
- Represent the social welfare of a market outcome both graphically and mathematically.
 - Consumer surplus
 - Producer surplus
- Understand why the social welfare is maximized in a competitive market.
- Measure the welfare effects of a sales tax.
- Reading: pp. 505-527



Social Welfare



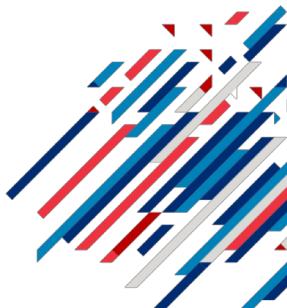
- If we weight the well-being of consumers and producers equally, the social welfare is the sum of **consumer surplus** and **producer surplus**



Consumer Surplus

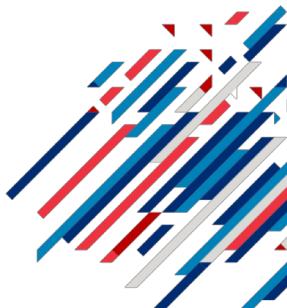
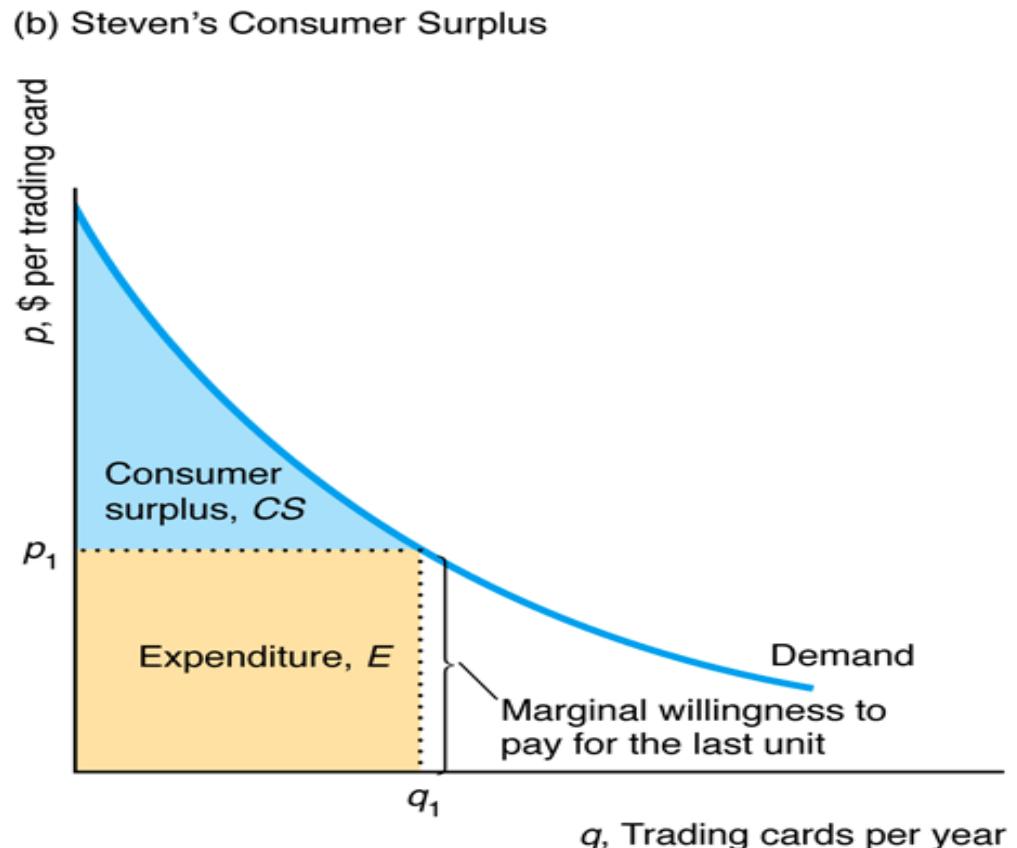


- Benefits of the consumption of a good:
 - Total benefits to a consumer are measured in terms of dollars by the **(maximum) willingness to pay**.
 - The willingness to pay is represented by the **demand curve**.
- Costs of the consumption of a good:
 - Total costs to a consumer are the total expenditures on the good



Consumer Surplus: Diagram

- Consumer surplus is the difference between the willingness to pay and the total expenditures.



Consumer Surplus: Math



- Consumer surplus is the area under the demand curve and above the market price up to the quantity purchased by the consumers.
- Suppose we know
 1. Demand function: $Q = D(p)$
 2. Market output and price: q^* and $p^* = D^{-1}(q^*)$
- Consumer Surplus:

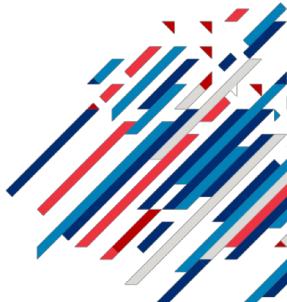
$$\int_0^{q^*} D^{-1}(x)dx - p^*q^*$$



Producer Surplus



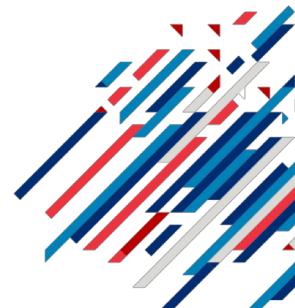
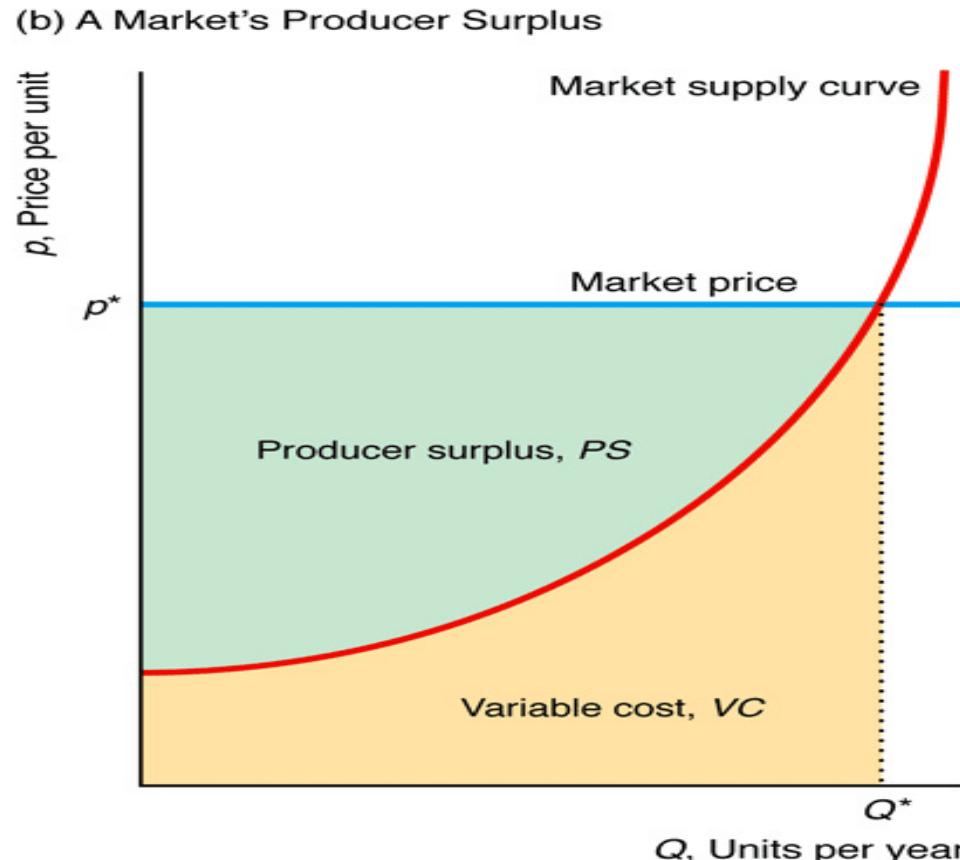
- Benefits of the production of a good:
 - Total benefits to a producer are measured by the total revenue.
- Costs of the production of a good:
 - Total economic costs to a producer are the total variable costs.
 - In the SR, if a firm does not produce, it loses FC.



Producer Surplus: Diagram



- Producer surplus is the difference between the total revenue and the total variable cost

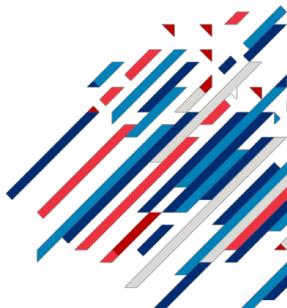


Producer Surplus: Math



- Producer surplus is the area above the supply curve and below the market price up to the quantity sold by the producer.
- Suppose we know
 1. Marginal cost function: $MC(Q)$
 2. Market output and price: q^* and p^*
- Producer Surplus:

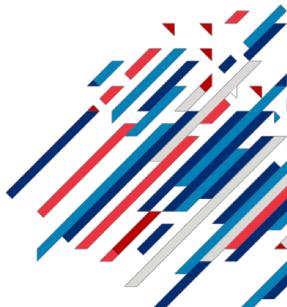
$$p^*q^* - \int_0^{q^*} MC(x)dx$$



Competition Maximizes Welfare

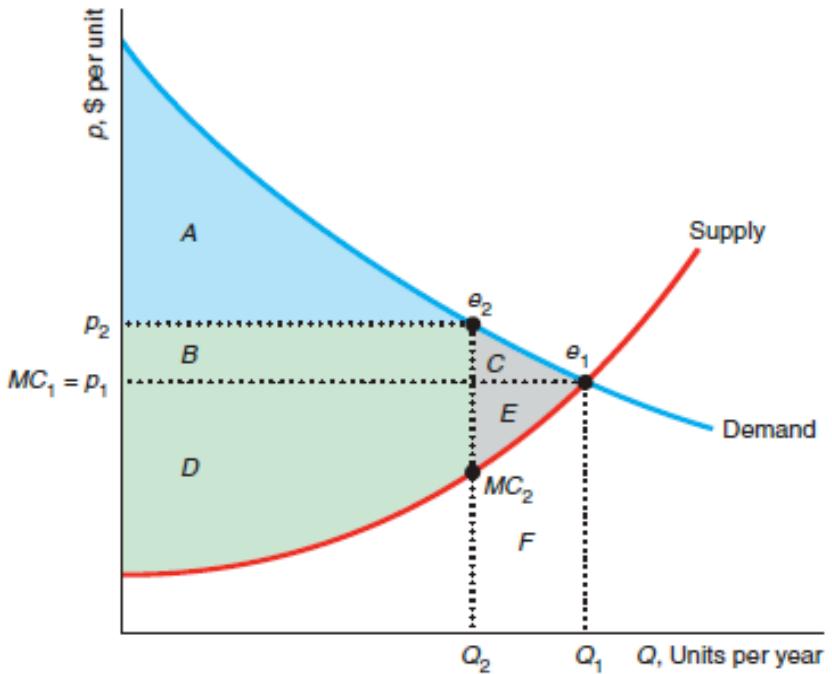


- Producing the competitive quantity maximizes welfare.
 - Put another way, producing less than or more than the competitive level of output lowers total welfare.
 - **Deadweight loss (DWL)** is the net reduction in welfare from the loss of surplus by one group that is not offset by a gain to another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



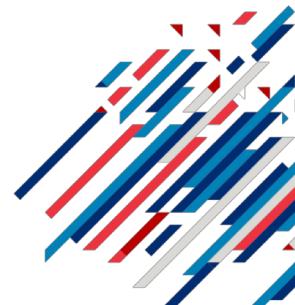
Competition Maximizes Welfare

- Reduce output from Q_1 , to Q_2 .
- DWL: (C+E)



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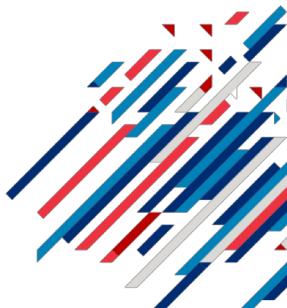
Consumer Surplus, CS	$A + B + C$	A	$-B - C = \Delta CS$
Producer Surplus, PS	$D + E$	$B + D$	$B - E = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E$	$A + B + D$	$-C - E = \Delta W = DWL$



Competition Maximizes Welfare

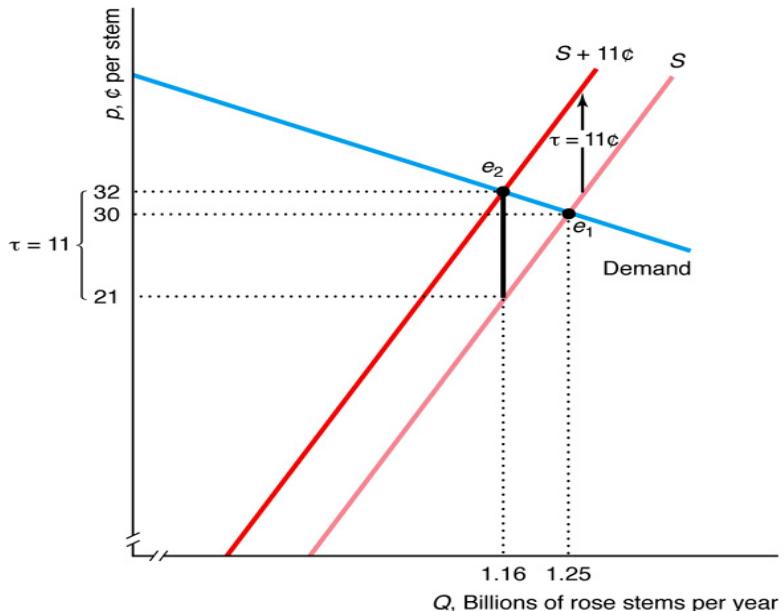


- The reason that competition maximizes welfare is that price equals marginal cost at the competitive equilibrium.
 - *Consumers value the last unit of output by exactly the amount that it costs to produce it.*
- A **market failure** is inefficient production or consumption, often because a price is different from the marginal cost.

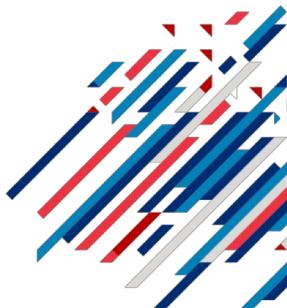


Welfare Effects of a Sales Tax

- Sales tax causes the price that consumers pay to rise and the price that firms receive to fall.

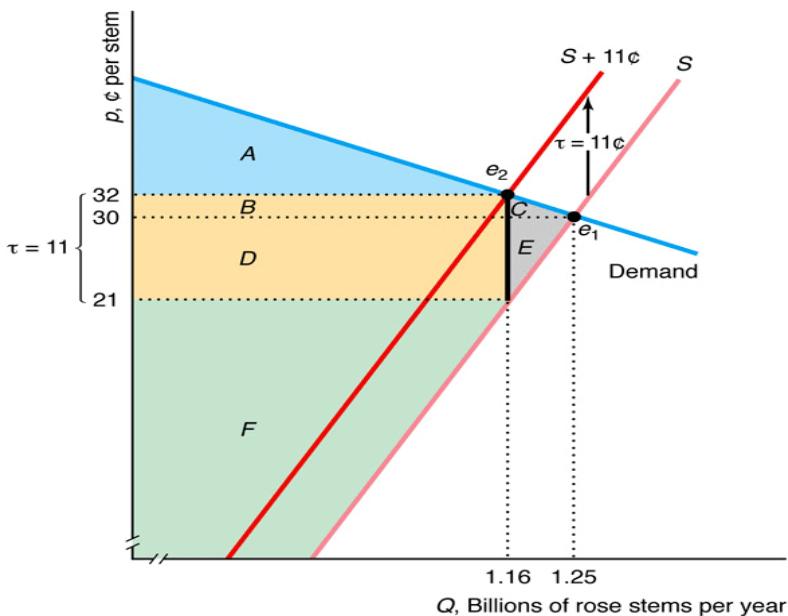


	No Tax	Specific Tax	Change (\$ millions)
Consumer Surplus, CS	$A + B + C$	A	$-B - C = -24.1 = \Delta CS$
Producer Surplus, PS	$D + E + F$	F	$-D - E = -108.45 = \Delta PS$
Tax Revenue, $T = \tau Q$	0	$B + D$	$B + D = 127.6 = \Delta T$
Welfare, $W = CS + PS + T$	$A + B + C + D + E + F$	$A + B + D + F$	$-C - E = -4.95 = DWL$

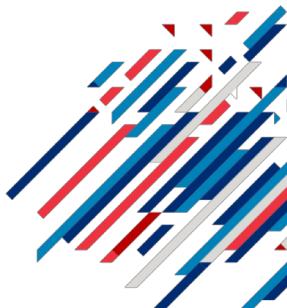


Welfare Effects of a Sales Tax

- Sales tax creates wedge that generates tax revenue of $B+D$ and DWL of $C+E$.



	No Tax	Specific Tax	Change (\$ millions)
Consumer Surplus, CS	$A + B + C$	A	$-B - C = -24.1 = \Delta CS$
Producer Surplus, PS	$D + E + F$	F	$-D - E = -108.45 = \Delta PS$
Tax Revenue, $T = \tau Q$	0	$B + D$	$B + D = 127.6 = \Delta T$
Welfare, $W = CS + PS + T$	$A + B + C + D + E + F$	$A + B + D + F$	$-C - E = -4.95 = \Delta DWL$



The Fundamental Welfare Theorems

- An allocation is *Pareto-efficient* if there is no way to make someone better off without making anyone else worse off.
- The First Welfare Theorem:
 - Under certain conditions, the allocation achieved through competitive equilibrium prices is Pareto efficient.
- The Second Welfare Theorem:
 - Under certain conditions, any Pareto efficient allocation can be supported through competitive equilibrium prices once appropriate (lump-sum) redistribution of endowments has been undertaken.

