

Key concepts

- ▶ Consumer & producer surplus
- ▶ Willingness to pay
- ▶ Deadweight loss
- ▶ World price....

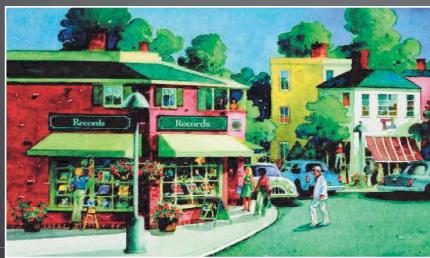
Lecture 4

Welfare economics and its applications

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Presentation is based on:
http://www.swlearning.com/economics/mankiw/mankiw_te_powerpoint_micro.html

Welfare economics: consumer surplus



Welfare Economics

Welfare economics is the study of how the allocation of resources affects economic well-being.

- ▶ Buyers and sellers receive benefits from taking part in the market.
- ▶ The equilibrium in a market maximizes the total welfare of buyers and sellers.

Welfare Economics

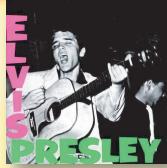
- ▶ **Consumer surplus** measures economic welfare from the buyer's side.
- ▶ **Producer surplus** measures economic welfare from the seller's side.

Willingness to pay (WTP)

Willingness to pay is the maximum amount that a buyer will pay for a good.

- ▶ It measures how much the buyer values the good or service:
 - If the price of a good > WTP, than a buyer refuses to buy a good
 - If the price of a good < WTP, than a buyer is eager to buy it
 - If the price of a good = WTP, than a buyer is indifferent to buy.

Table 1 Four Possible Buyers' Willingness to Pay



The bidding price = \$10

Buyer	Willingness to Pay	
John	\$100	John pays \$80 and gets the album...
Paul	80	
George	70	
Ringo	50	
John's bargain: he was willing to pay \$100 for the album but he has paid only \$80!		
We say that John receives consumer surplus of \$20!		

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CONSUMER SURPLUS

Consumer surplus is the buyer's willingness to pay for a good minus the amount the buyer actually pays for it.

The market demand curve depicts the various quantities that buyers would be willing and able to purchase at different prices.

The Demand Schedule and the Demand Curve

Price	Buyers	Quantity Demanded
More than \$100	None	0
\$80 to \$100	John	1
\$70 to \$80	John, Paul	2
\$50 to \$70	John, Paul, George	3
\$50 or less	John, Paul, George, Ringo	4

Fig. 1 The Demand Schedule and the Demand Curve

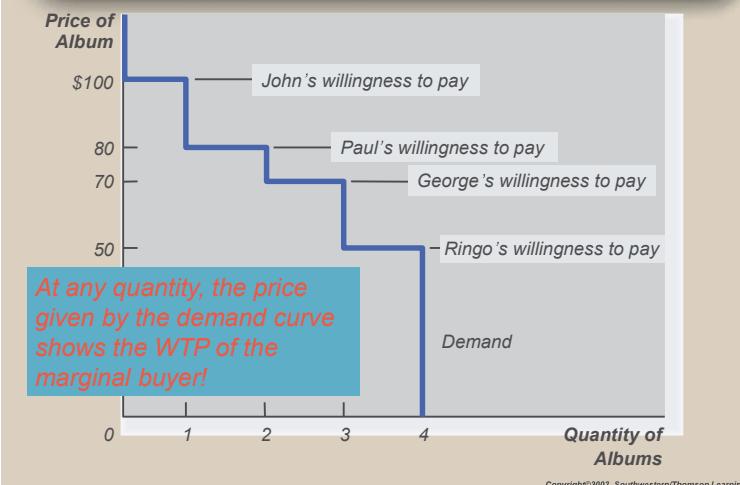
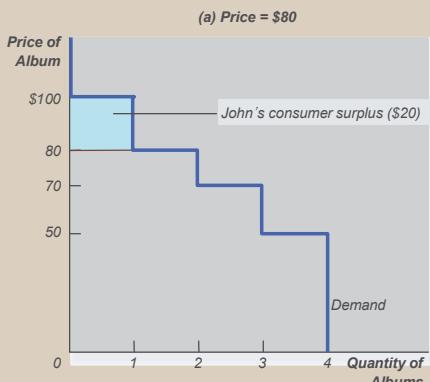
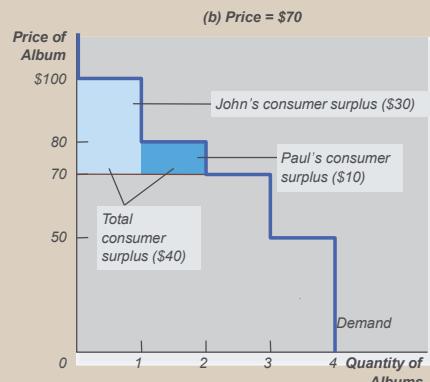


Fig. 2. Measuring Consumer Surplus with the Demand Curve



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Fig. 3. Measuring Consumer Surplus with the Demand Curve



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Using the Demand Curve to Measure Consumer Surplus

- The area below the demand curve and above the price measures the **consumer surplus** in the market.
- The height of the demand curve measures the value buyers place on the good (WTP for it).
- The total area below the demand curve and above the price is sum of the consumer surplus of all buyers in the market for a good or service.

Fig. 4. How the Price Affects Consumer Surplus

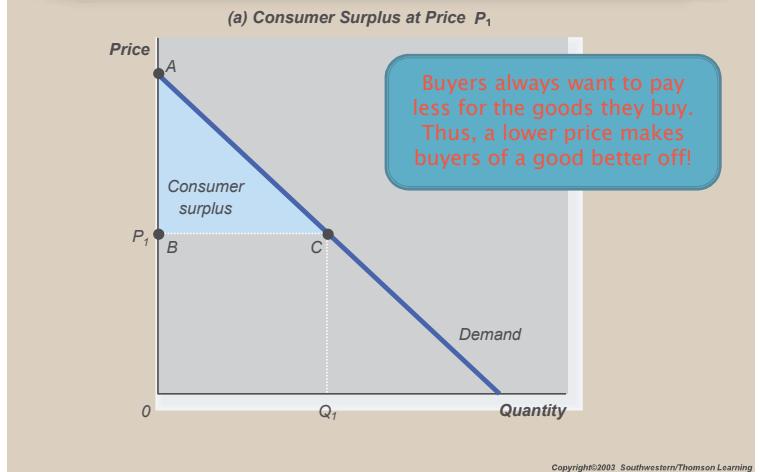
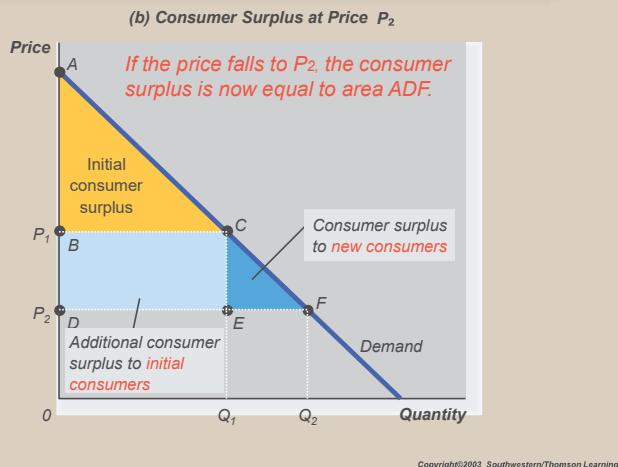


Fig. 5. How the Price Affects Consumer Surplus



Producer surplus...

PRODUCER SURPLUS

- It measures the benefit to sellers participating in a market.

Producer surplus is the amount a seller is paid for a good minus the seller's cost.

Table 2 The Costs of Four Possible Sellers

Seller	Cost
Mary	\$900
Frida	800
Georgia	600
Grandma	500

Each painter is willing to do the work, if the price is right... The price must exceed the cost of doing the work.

Cost as a measure of willingness to sell...

- Because a painter's cost is the lowest price he would accept for his work,
- Cost** is a measure of his willingness to sell the services.
- Each painter would be:
 - eager to sell the services at a price greater than the cost.
 - would refuse to sell the services at a price less than the cost.
 - indifferent about selling his services at a price exactly equal to the cost.

Using the Supply Curve to Measure Producer Surplus

- Producer surplus measures the benefits to sellers of participating in a market.
- Just as consumer surplus is related to the demand curve, producer surplus is closely related to the supply curve.

Who would get a job?

- The job goes to the painter who can do the work **at the lowest cost**...
- If the painters compete for the job, the price falls...



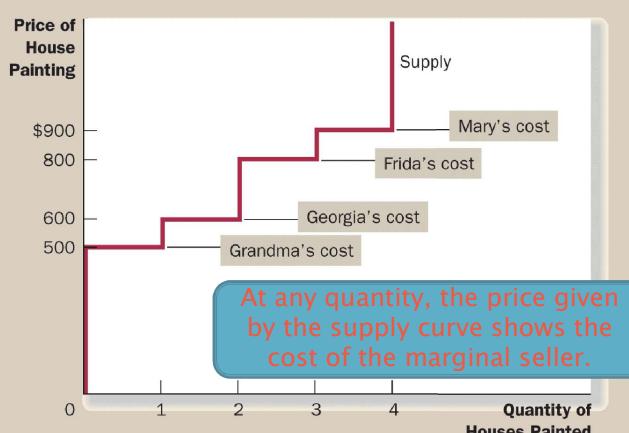
Seller	Cost
Mary	\$900
Frida	800
Georgia	600
Grandma	500

If Grandma bids \$600, she receives the producer surplus of \$100.

The Supply Schedule and the Supply Curve

Price	Sellers	Quantity Supplied
\$900 or more	Mary, Frida, Georgia, Grandma	4
\$800 to \$900	Frida, Georgia, Grandma	3
\$600 to \$800	Georgia, Grandma	2
\$500 to \$600	Grandma	1
Less than \$500	None	0

Fig. 1. The Supply Schedule and the Supply Curve

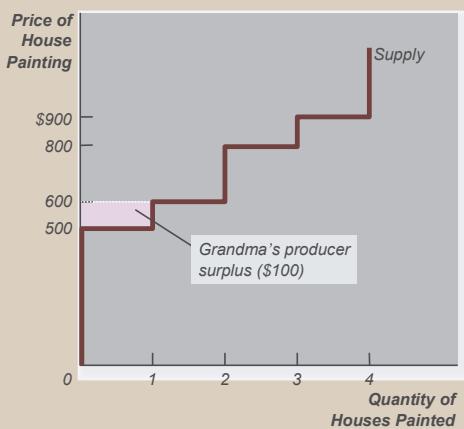


Using the Supply Curve to Measure Producer Surplus

- The area **below the price** and **above the supply curve** measures the **producer surplus** in a market.
- The height of the supply curve measures seller's cost, and the difference between the price and the cost is each seller's producer surplus.
- The total area is the sum of the producer surplus of all sellers.

Fig. 2. Measuring Producer Surplus with the Supply Curve

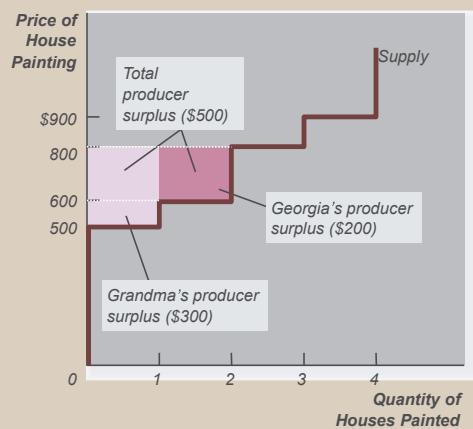
(a) Price = \$600



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Fig. 3. Measuring Producer Surplus with the Supply Curve

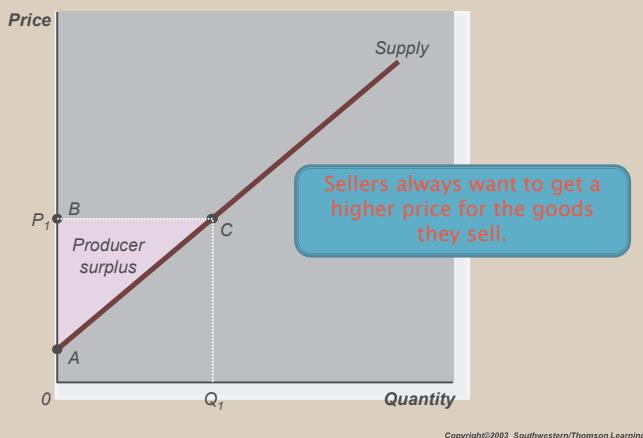
(b) Price = \$800



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Fig. 4. How the Price Affects Producer Surplus

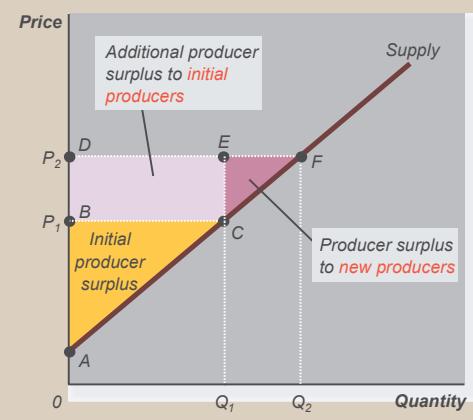
(a) Producer Surplus at Price P_1



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Fig. 5. How the Price Affects Producer Surplus

(b) Producer Surplus at Price P_2



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MARKET EFFICIENCY

- ▶ Consumer surplus and producer surplus may be used to address the following question:
- Is the allocation of resources determined by free markets in any way desirable?

MARKET EFFICIENCY

- Consumer Surplus**
 = Value to buyers – Amount paid by buyers
 and
Producer Surplus
 = Amount received by sellers – Cost to sellers

MARKET EFFICIENCY

Total surplus

= Consumer surplus + Producer surplus
or

Total surplus

= Value to buyers - Cost to sellers

MARKET EFFICIENCY

Efficiency is the property of a resource allocation of maximizing the total surplus received by all members of society.

- ▶ An allocation is **inefficient** if:
 - a good is not being consumed by the buyers who value it most highly.
 - Is not being produced by the sellers who could produce it with the lowest cost.

Fig. 6. Consumer and Producer Surplus in the Market Equilibrium

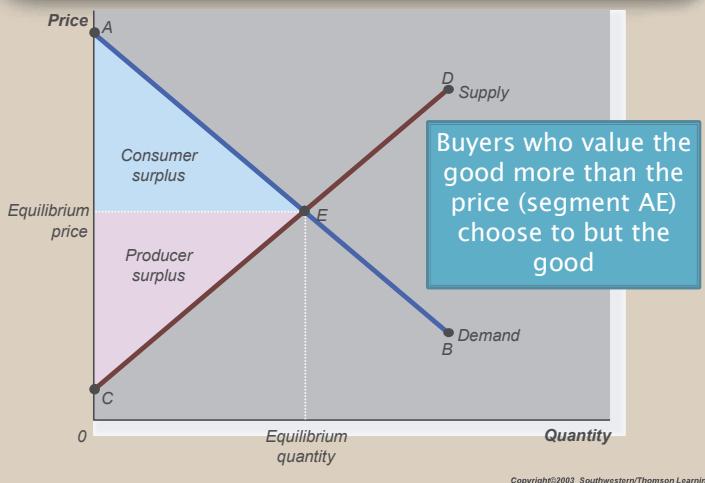
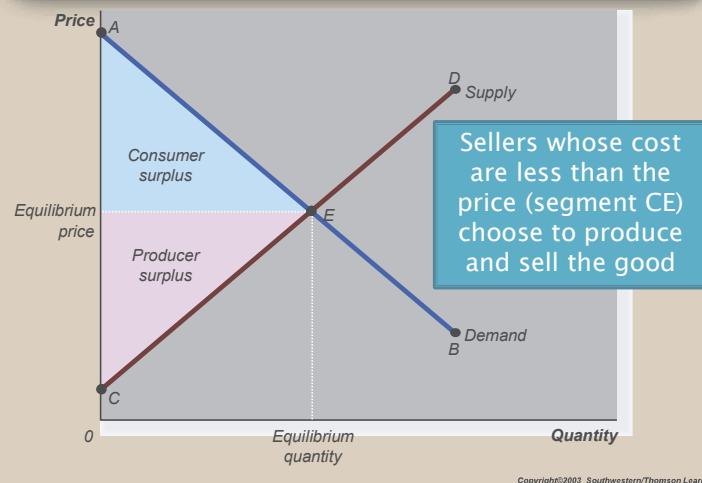


Fig. 6. Consumer and Producer Surplus in the Market Equilibrium



MARKET EFFICIENCY

Three Insights Concerning Market Outcomes:

- Free markets allocate the supply of goods to the buyers who value them most highly, as measured by their willingness to pay.
- Free markets allocate the demand for goods to the sellers who can produce them at least cost.
- Free markets produce the quantity of goods that maximizes the sum of consumer and producer surplus.

Evaluating the Market Equilibrium

Market Power

- If a market system is not perfectly competitive, **market power** may result:
 - Market power is the ability to influence prices.
 - Market power can cause markets to be inefficient because it keeps price and quantity from the equilibrium of supply and demand.

Evaluating the Market Equilibrium

► Externalities

- created when a market outcome affects individuals other than buyers and sellers in that market.
 - cause welfare in a market to depend on more than just the value to the buyers and cost to the sellers.
- When buyers and sellers do not take externalities into account when deciding how much to consume and produce, the equilibrium in the market can be inefficient.

Application: costs of taxation

The deadweight loss of taxation

- How do taxes affect the economic well-being of market participants?
- It does not matter whether a tax on a good is levied on buyers or sellers of the good . . .
- ...the price paid by buyers rises, and the price received by sellers falls.



Fig. 8. The Effects of a Tax

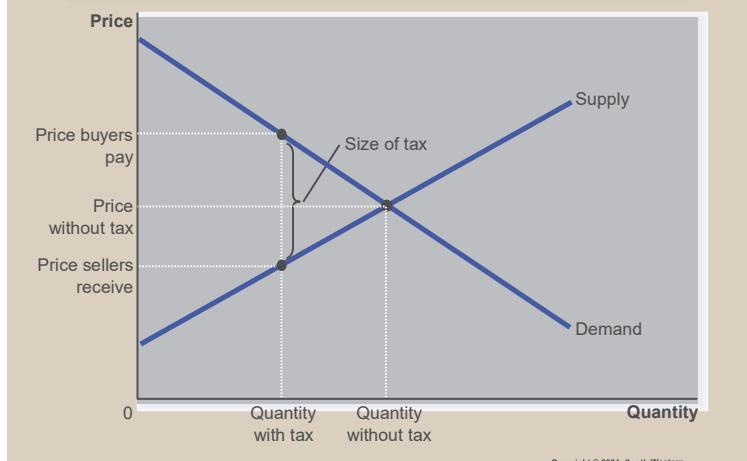


Fig. 9. Tax Revenue

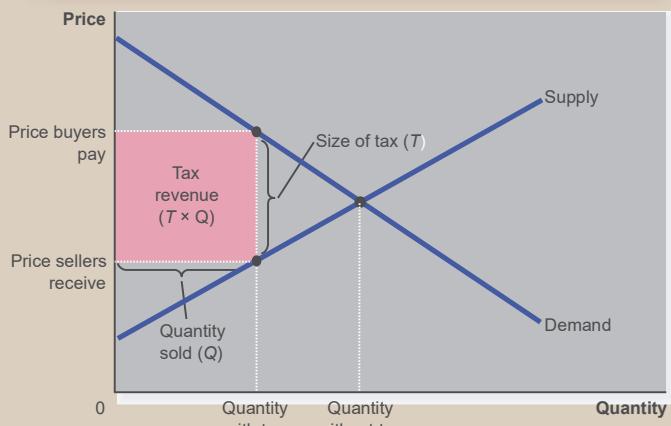
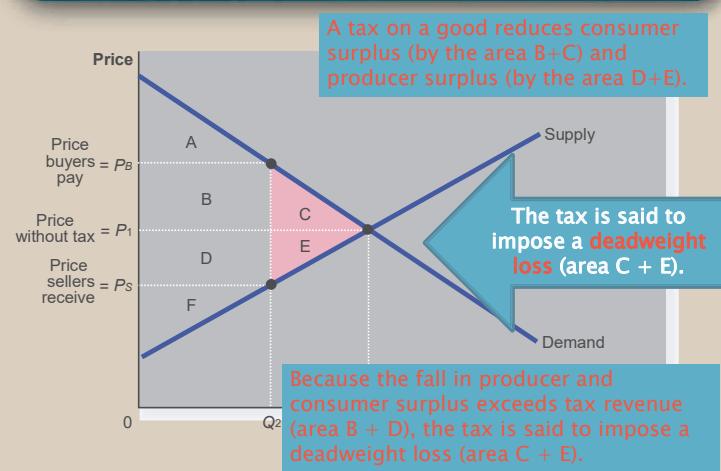
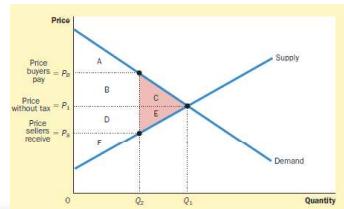


Fig. 10. How a Tax Effects Welfare



How a tax affects the welfare



	Without Tax	With Tax	Change
Consumer Surplus	A + B + C	A	-(B + C)
Producer Surplus	D + E + F	F	-(D + E)
Tax Revenue	None	B + D	+(B + D)
Total Surplus	A + B + C + D + E + F	A + B + D + F	-(C + E)

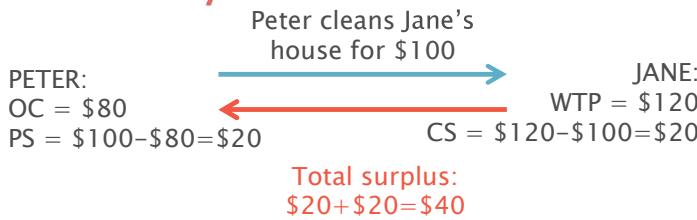
The area C + E shows the fall in total surplus and is the deadweight loss of the tax.

How a Tax Affects Market Participants

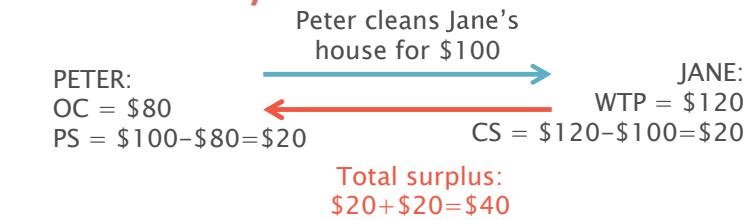
Changes in Welfare

A **deadweight loss** is the fall in total surplus that results from a market distortion, such as a tax.

Case study



Case study



If the tax \$50 is levied on supplier of the service, then...



Deadweight Losses and the Gains from Trade

- Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade.

Determinants of the deadweight loss

- What determines whether the deadweight loss from a tax is large or small?
 - The magnitude of the deadweight loss depends on how much the quantity supplied and quantity demanded respond to changes in the price.
 - That, in turn, depends on the price elasticities of supply and demand.

Fig. 12. Tax Distortions and Elasticities

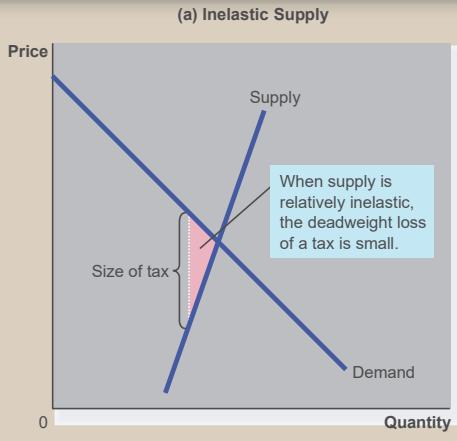


Fig. 13. Tax Distortions and Elasticities

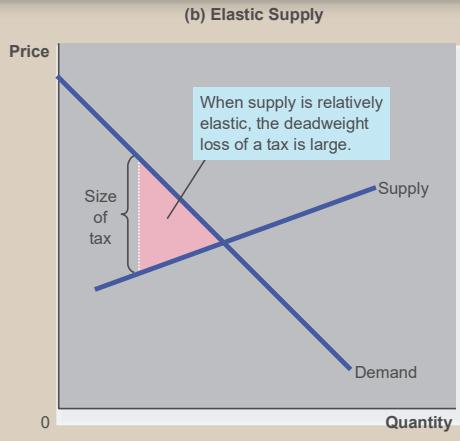


Fig. 14. Tax Distortions and Elasticities

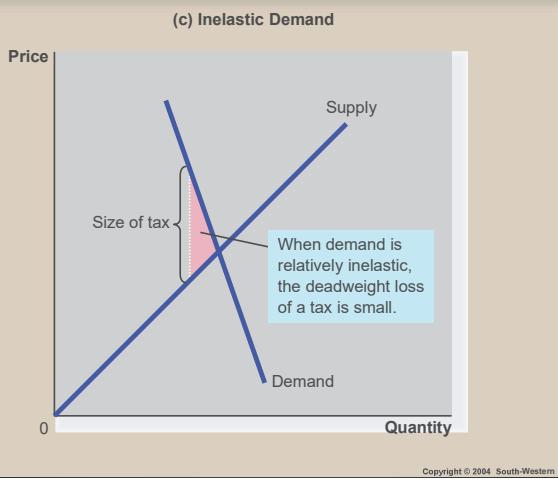
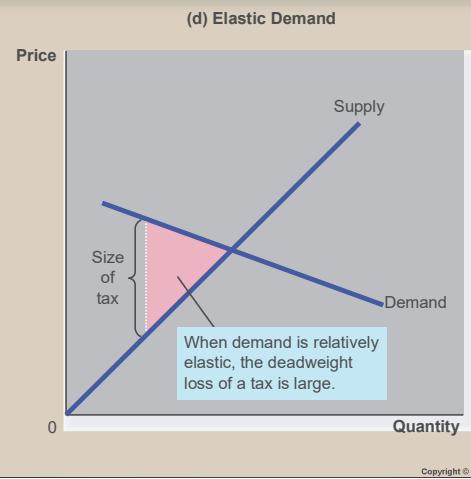


Fig. 15. Tax Distortions and Elasticities



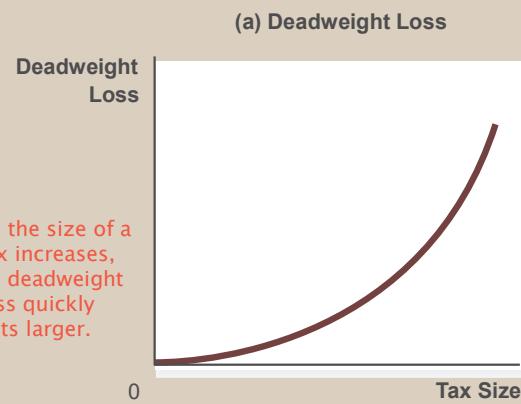
Determinants of the deadweight loss

- ▶ The greater the elasticities of demand and supply:
 - the larger will be the decline in equilibrium quantity and,
 - the greater the deadweight loss of a tax.

Deadweight loss and tax revenue as taxes vary

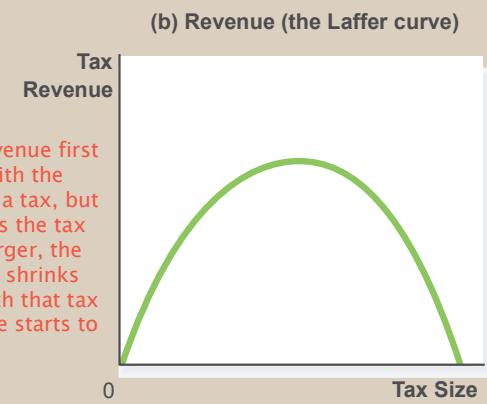
- ▶ For the small tax, tax revenue is small.
- ▶ As the size of the tax rises, tax revenue grows.
- ▶ But as the size of the tax continues to rise, tax revenue falls because the higher tax reduces the size of the market.

Fig. 19. How Deadweight Loss and Tax Revenue Vary with the Size of a Tax



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Fig. 20. How Deadweight Loss and Tax Revenue Vary with the Size of a Tax



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Application: International Trade



Consider your typical day...

- You wake up to an alarm clock made in Korea.
- You pour yourself orange juice made from Florida oranges and coffee from beans grown in Brazil.
- You put on some clothes made of cotton grown in Georgia and sewn in factories in Thailand.
- You watch the morning news broadcast from New York on your TV made in Japan.
- You drive to class in a car made of parts manufactured in a half-dozen different countries.



The determinants of trade

- What determines whether a country imports or exports a good?
- Who gains and who loses from free trade among countries?
- What are the arguments that people use to advocate trade restrictions?

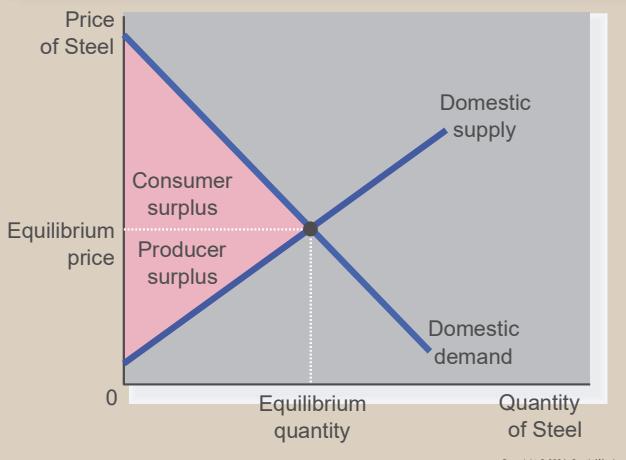


The determinants of trade

Equilibrium Without Trade

- Assume:
- A country is isolated from rest of the world and produces steel.
- The market for steel consists of the buyers and sellers in the country.
- No one in the country is allowed to import or export steel.

Figure 1. The Equilibrium without International Trade



The Equilibrium Without International Trade

► Equilibrium Without Trade

- **Results:**

- Domestic price adjusts to balance demand and supply.
- The sum of consumer and producer surplus measures the total benefits that buyers and sellers receive.

The World Price and Comparative Advantage

- If the country decides to engage in international trade, will it be an importer or exporter of steel?

The World Price and Comparative Advantage

- The effects of free trade can be shown by comparing the domestic price of a good without trade and the *world price* of the good.

The *world price* refers to the price that prevails in the world market for that good.

The World Price and Comparative Advantage

- If a country has a comparative advantage, then the domestic price will be below the world price, and the country will be an *exporter* of the good.
- If the country does not have a comparative advantage, then the domestic price will be higher than the world price, and the country will be an *importer* of the good.

Figure 2. International Trade in an Exporting Country

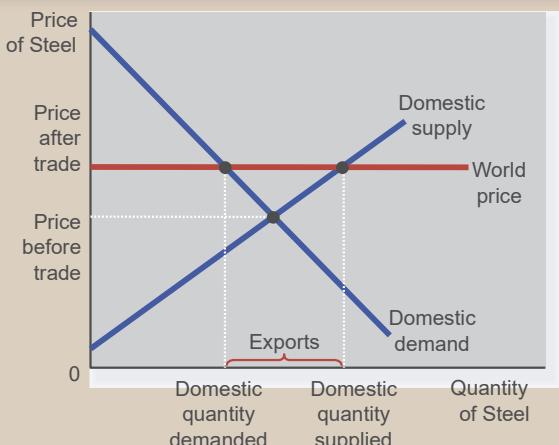
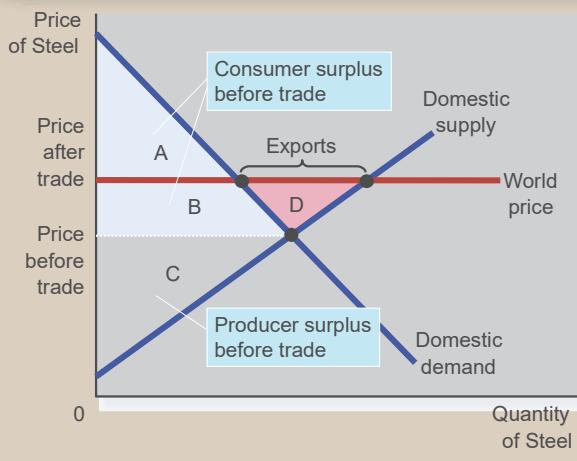
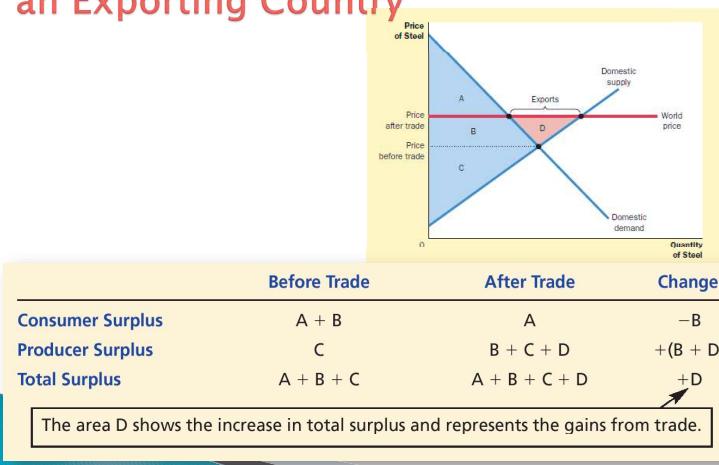


Figure 3 How Free Trade Affects Welfare in an Exporting Country



How Free Trade Affects Welfare in an Exporting Country



The winners and losers from trade

- The analysis of an **exporting country** yields two conclusions:
 - Domestic producers of the good are better off, and domestic consumers of the good are worse off.
 - Trade raises the economic well-being of the nation as a whole.

The Gains and Losses of an Importing Country

- International Trade in an Importing Country**
 - If the world price of steel is lower than the domestic price, the country will be an importer of steel when trade is permitted.
 - Domestic consumers will want to buy steel at the lower world price.
 - Domestic producers of steel will have to lower their output because the domestic price moves to the world price.

Figure 4. International Trade in an Importing Country

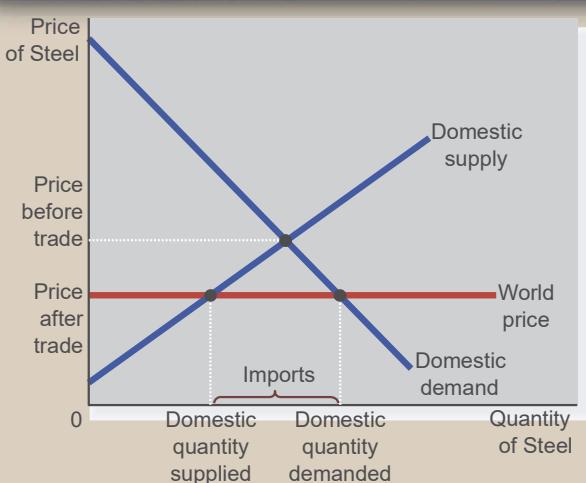
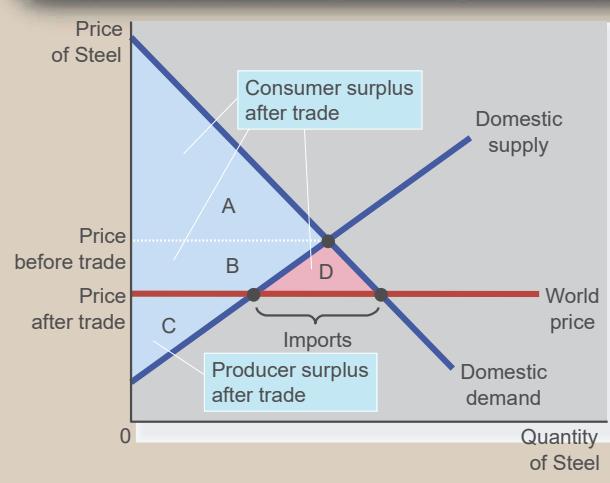
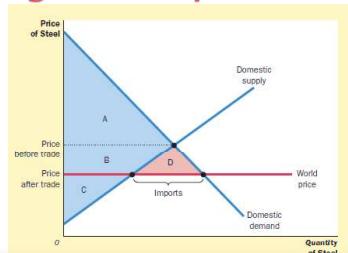


Figure 5. How Free Trade Affects Welfare in an Importing Country



How Free Trade Affects Welfare in an Importing Country



	Before Trade	After Trade	Change
Consumer Surplus	A	A + B + D	+(B + D)
Producer Surplus	B + C	C	-B
Total Surplus	A + B + C	A + B + C + D	+D

The area D shows the increase in total surplus and represents the gains from trade.

The winners and losers from trade

- The gains of the winners exceed the losses of the losers.
- The winners could compensate the losers.
- The net change in total surplus is positive.
- But will trade make EVERYONE better off?
- In practice, compensation for the losers from international trade is rare...

Without such compensation, opening up to international trade is a policy that expands the size of the economic pie, while perhaps leaving some participants in the economy with a smaller slice...



The winners and losers from trade

- The analysis of an **importing country** yields two conclusions:
 - Domestic producers of the good are worse off, and domestic consumers of the good are better off.
 - Trade raises the economic well-being of the nation as a whole because the gains of consumers exceed the losses of producers.

Welfare economics

» Externalities

Externalities and market inefficiency

- Externalities cause markets to be inefficient, and thus fail to maximize total surplus.
- They refer to the uncompensated impact of one person's actions on the well-being of a bystander.

Externality: the direct effect of the actions of a person or firm on another person's wellbeing or a firm's production capability rather than an indirect effect through changes in prices.

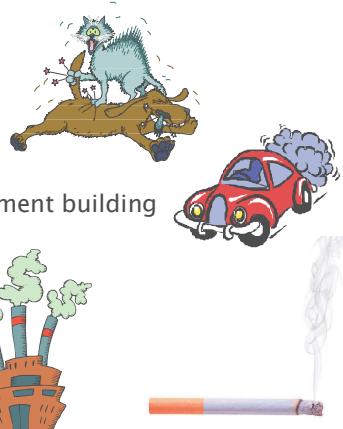
Externalities and market inefficiency

- An externality arises...
 - ... when a person engages in an activity that influences the well-being of a bystander and yet neither pays nor receives any compensation for that effect.
- When the impact on the bystander is adverse, the externality is called a **negative externality**.
- When the impact on the bystander is beneficial, the externality is called a **positive externality**.

Externalities and market inefficiency

Negative Externalities

- Automobile exhaust
- Cigarette smoking
- Barking dogs (loud pets)
- Loud stereos in an apartment building



Externalities and market inefficiency

Positive Externalities

- Immunizations
- Restored historic buildings
- Research into new technologies

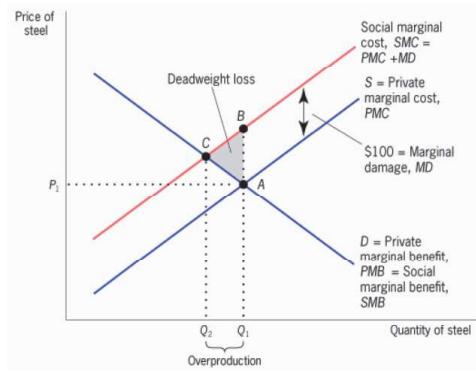


<https://www.youtube.com/watch?v=DOuBxJNIFkY>

Negative externality in production

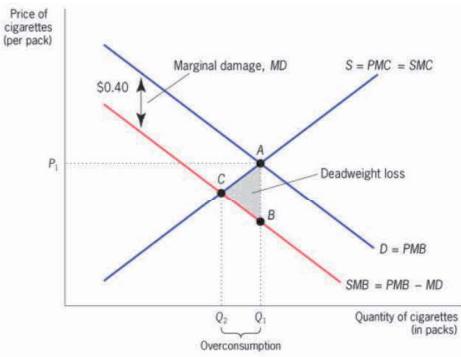
- When a firm's production reduces the well-being of others who are not compensated by the firm.
 - Private marginal cost (PMC):** The direct cost to producers of producing an additional unit of a good
 - Marginal Damage (MD):** Any additional costs associated with the production of the good that are imposed on others but that producers do not pay
 - Social marginal cost (SMC = PMC + MD):** The private marginal cost to producers plus marginal damage
- Example: steel plant pollutes a river but plant does not face any pollution regulation (and hence ignores pollution when deciding how much to produce)

Negative externality in production



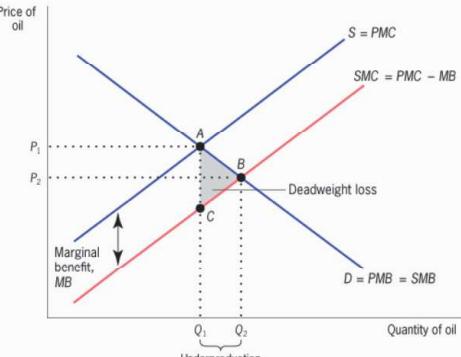
Market Failure Due to Negative Production Externalities in the Steel Market • A negative production externality of \$100 per unit of steel produced (marginal damage, MD) leads to a social marginal cost that is above the private marginal cost, and a social optimum quantity (Q_2) that is lower than the competitive market equilibrium quantity (Q_1). There is overproduction of $Q_1 - Q_2$, with an associated dead-weight loss of area BCA.

Negative externality in consumption



Market Failure Due to Negative Consumption Externalities in the Cigarette Market • A negative consumption externality of 40¢ per pack of cigarettes consumed leads to a social marginal benefit that is below the private marginal benefit, and a social optimum quantity (Q_2) that is lower than the competitive market equilibrium quantity (Q_1). There is overconsumption $Q_1 - Q_2$, with an associated dead-weight loss of area ACB.

Positive externality in production



Market Failure Due to Positive Production Externalities in the Oil Exploration Market • Expenditures on oil exploration by any company have a positive externality because they offer more profitable opportunities for other companies. This leads to a social marginal cost that is below the private marginal cost, and a social optimum quantity (Q_2) that is greater than the competitive market equilibrium quantity (Q_1). There is underproduction of $Q_2 - Q_1$, with an associated dead-weight loss of area ABC.

Internalize the externality

- Achieving the Socially Optimal Output:
 - The government can internalize an externality by imposing a **tax** on the producer to reduce the equilibrium quantity to the socially desirable quantity.
- <https://www.youtube.com/watch?v=zcPRmh5Arl>

Internalizing an externality involves altering incentives so that people take account of the external effects of their actions.

Summary

