Price Controls and Taxes

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Government Policy

- The focus of this section is to analyze different types of government policies using the tools of supply and demand.
- We will also look at the welfare implications of these policies.
- We will assume that markets do not have any positive or negative externalities.
- Under this assumption, we will see that government intervention in markets will *reduce* total surplus and is thus inefficient.
- Next time, we will see that in certain cases (e.g., in markets with externalities), government policy is necessary in order to maximize surplus.

Price Ceilings

- **Price ceiling:** A legal maximum on the price at which a good can be sold.
- Consider two types of price ceilings, one that is above the market price and one that is below:

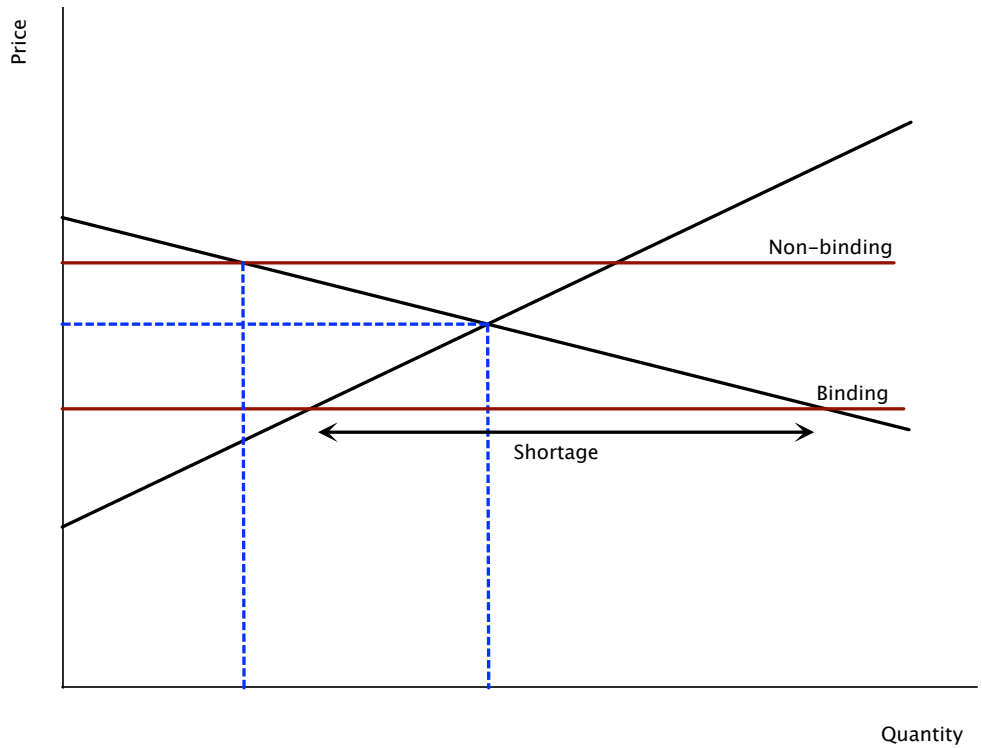

Figure: Price Ceilings

Price Ceilings

- If the government sets a price ceiling above the market price, then the ceiling is non-binding.
- If the government sets a price ceiling below the market price, then the ceiling is binding.

Price Ceilings

- Market forces move the economy towards the equilibrium point where $Q_d = Q_s$.
- In the case of a binding price ceiling, once the price in the market hits the ceiling it cannot increase any further by law.
- Therefore, if the price ceiling is binding, the market price equals the price ceiling.

Price Ceilings

- At this price, we have that Q_D is greater than Q_S. Thus, there is a shortage.
- Due to this shortage, some mechanism for rationing will develop. Two potential ones are
  1. Long lines
  2. Rationing according to seller bias
- Both types of rationing mechanisms above are not efficient.
  1. Long lines waste time
  2. Seller bias: goods do not necessarily go to the buyer that values it most
- On the other hand, free markets ration goods with prices. This mechanism is both efficient and impartial.

Price Ceilings

Example

A recent study found that the demand and supply schedules of Frisbees are as follows (quantities are in millions):

Table: Supply and Demand for Frisbees

Price	Q_D	Q_S
\$11	*1*	*15*
\$10	*2*	*12*
\$9	*4*	*9*
\$8	*6*	*6*
\$7	*8*	*3*
\$6	*10*	*1*

1. *What is the equilibrium price and quantity of Frisbees?*

Price Ceilings

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1. *What is the equilibrium price and quantity of Frisbees?* $P^* = 8, Q^* = 6$
2. *Under pressure from worried college students, officials in Washington pass a law that stipulates the price of Frisbees cannot rise higher than \$6. What is the new market price? How many Frisbees are sold?*

Price Ceilings

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1. *What is the equilibrium price and quantity of Frisbees?* $P^* = 8, Q^* = 6$
2. *Under pressure from worried college students, officials in Washington pass a law that stipulates the price of Frisbees cannot rise higher than \$6. What is the new market price? How many Frisbees are sold?* $P_C = \$6, Q_C = 1$

Price Ceilings

- Consider a market before the introduction of a binding price ceiling and afterwards:

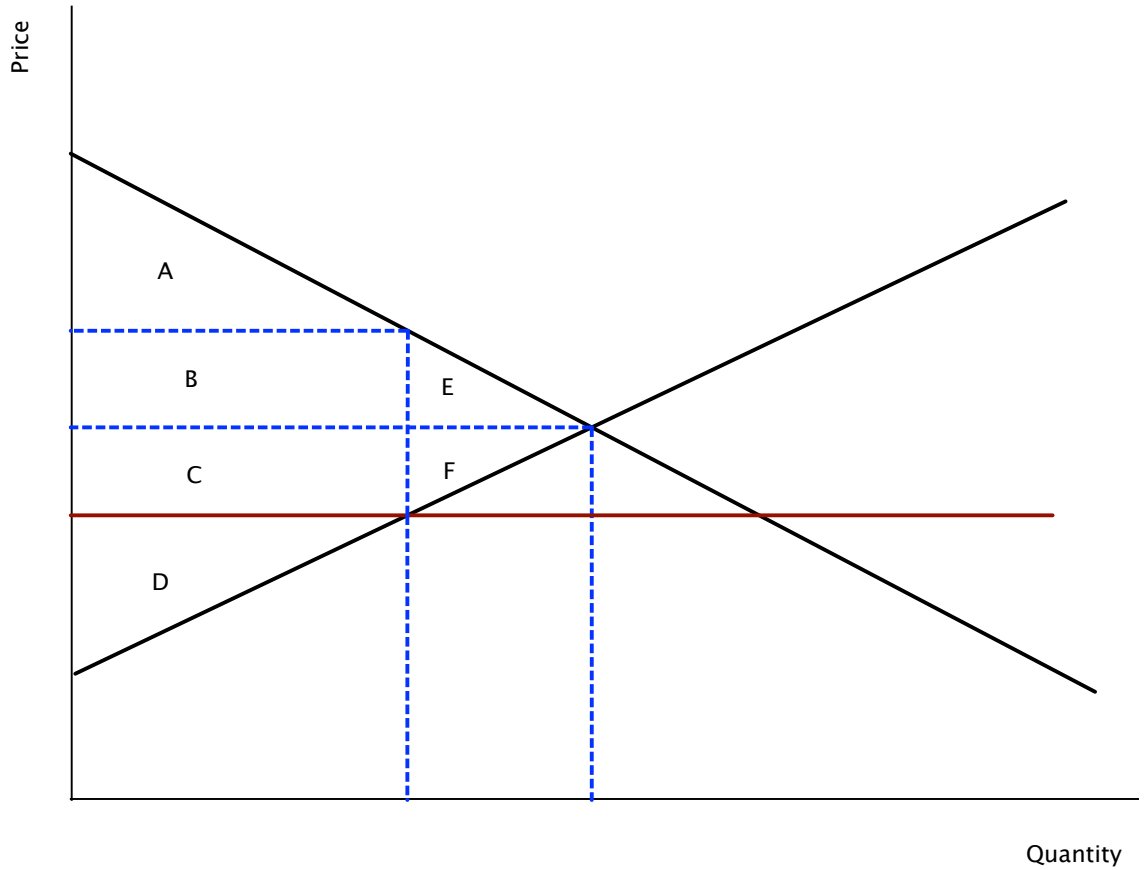

Figure: Price Ceilings and Welfare

Price Ceilings

- Before the introduction of the ceiling, buyers and sellers were paying and receiving price P^*. Thus,

$$CS_0 = A + B + E$$
$$PS_0 = C + D + F$$
$$TS_0 = A + B + C + D + E + F$$

Price Ceilings

- After the price ceiling is introduced, the market price is P_c. Buyers and sellers are now paying and receiving less than before. Moreover, the number of transactions that are taking place has decreased. Now,

$$CS_1 = A + B + C$$
$$PS_1 = D$$
$$TS_1 = A + B + C + D$$

Deadweight Loss

- This decrease in total surplus (the area E + F) is referred to as a deadweight loss.
- **Deadweight Loss (DWL):** The decrease in total surplus that results from a market distortion.
- DWL is caused by either unrealized gains from trade or inefficient transactions.

Price Floors

- **Price floor:** A legal minimum on the price at which a good can be sold.
- Consider two types of price floors, one that is above the market price and one that is below:

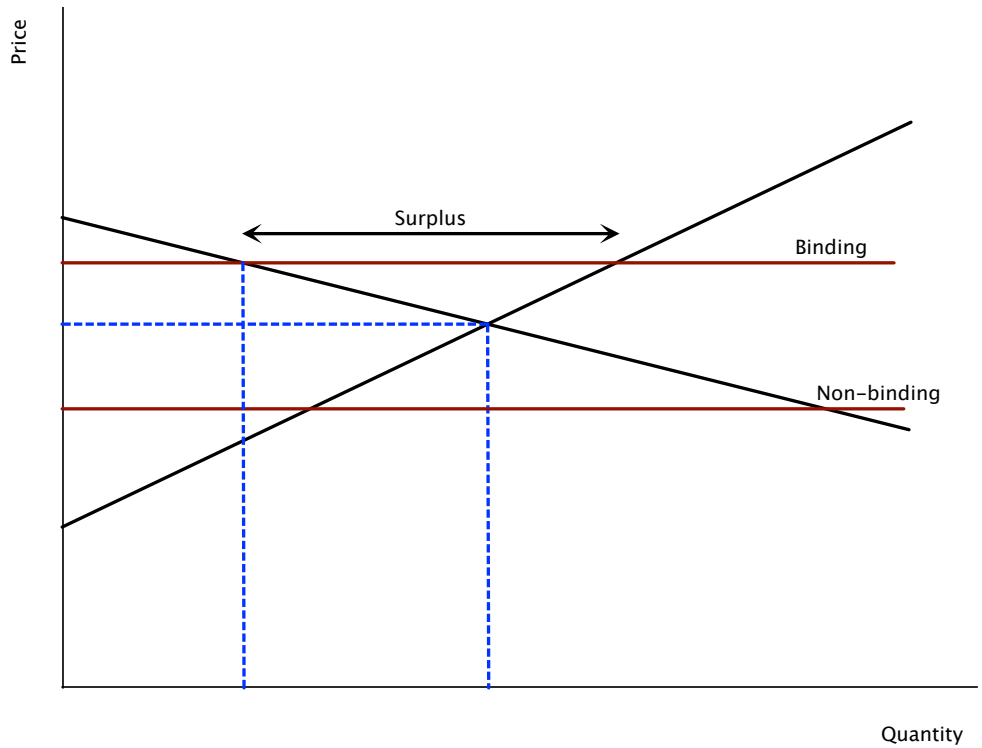

Figure: Price Floors

Price Floors

- If the government sets a price floor above the market price, then the floor is binding.
- If the government sets a price floor below the market price, then the floor is non-binding.

Price Floors

- In the case of a binding price floor, once the price in the market hits the floor it cannot decrease any further by law.
- Therefore, if the price floor is binding, the market price equals the price floor.
- At this price, we have that Q_S is greater than Q_D. Thus, there is a surplus.

Price Floors

- Due to this, some mechanism for rationing will develop. Two potential ones are
  1. Sellers who appeal to personal bias of buyers may be better able to sell the good.
  2. Sellers may try to differentiate by increasing quality (wasteful).

Price Floors

Example

A recent study found that the demand and supply schedules of Frisbees are as follows (quantities are in millions):

Table: Supply and Demand for Frisbees

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After the imposition of the \$6 price ceiling, angry Frisbee manufacturers convince the government to impose a price floor \$1 above the former price ceiling. What is the new market price? How many Frisbees are sold?

Price Floors

Example

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After the imposition of the \$6 price ceiling, angry Frisbee manufacturers convince the government to impose a price floor \$1 above the former price ceiling. What is the new market price? How many Frisbees are sold? The price floor is not binding.
$(P^*, Q^*) = (\$8, 6)$

Application: The Minimum Wage

- A labor market consists of workers that determine the supply of labor and firms that determine the demand for labor.
- The price of labor is the wage that workers receive and firms pay.

Application: The Minimum Wage

- A labor market with a minimum wage above the equilibrium wage (an example of a binding price floor) looks like this:

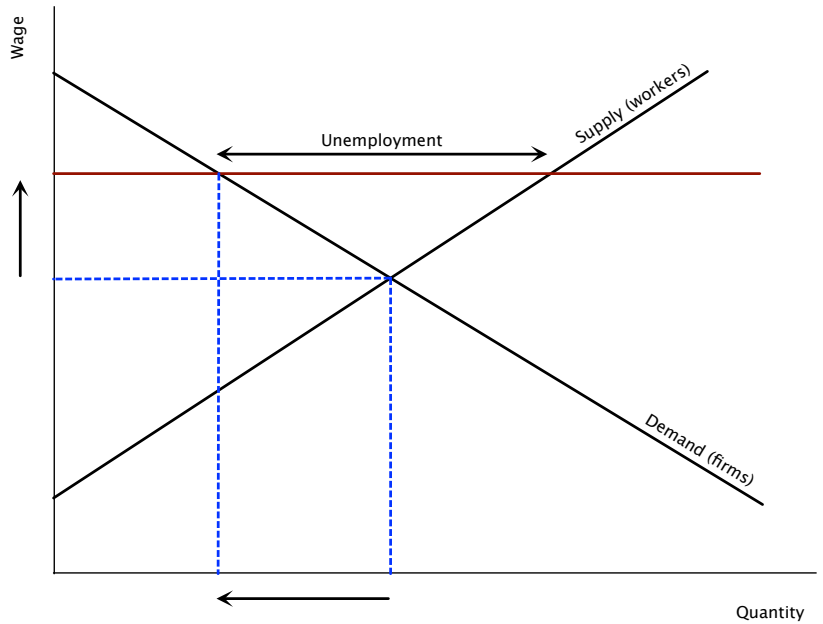


Figure: Market for Labor

- As usual with a binding price floor, there will be a surplus. In the market for labor, this is called unemployment.

Application: The Minimum Wage

Example

Refer to Figure 5. What are the total wage payments made to workers at the equilibrium wage? Suppose a minimum wage of $8.00 is enacted. What are the total wage payments made to workers in this case?

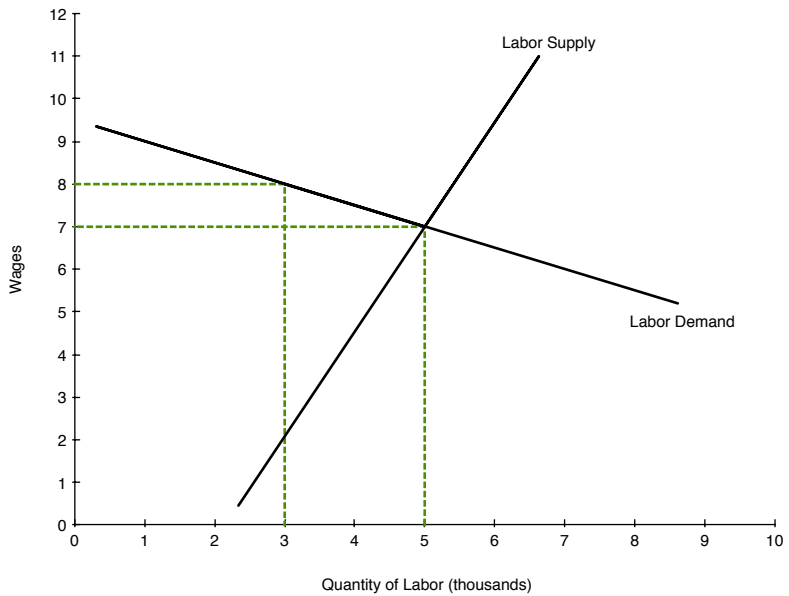


Figure: Labor Market and Wage Payments

Application: The Minimum Wage

Example

Refer to Figure 5. What are the total wage payments made to workers at the equilibrium wage? Suppose a minimum wage of \$8.00 is enacted. What are the total wage payments made to workers in this case?

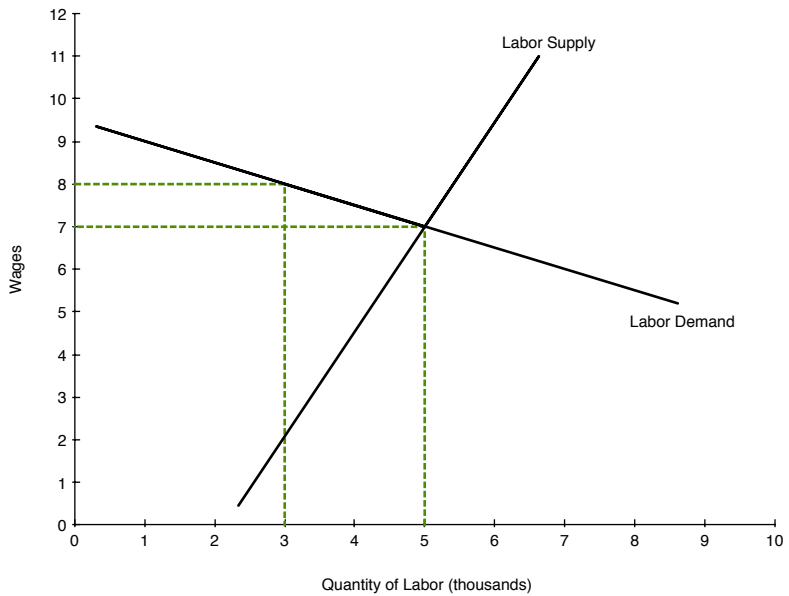


Figure: Labor Market and Wage Payments

At eq. wage: $7 \times 5,000 = \$35,000$
At min wage: $8 \times 3,000 = \$24,000$.

Price Floors

- Consider a market before the introduction of a binding price floor and afterwards:

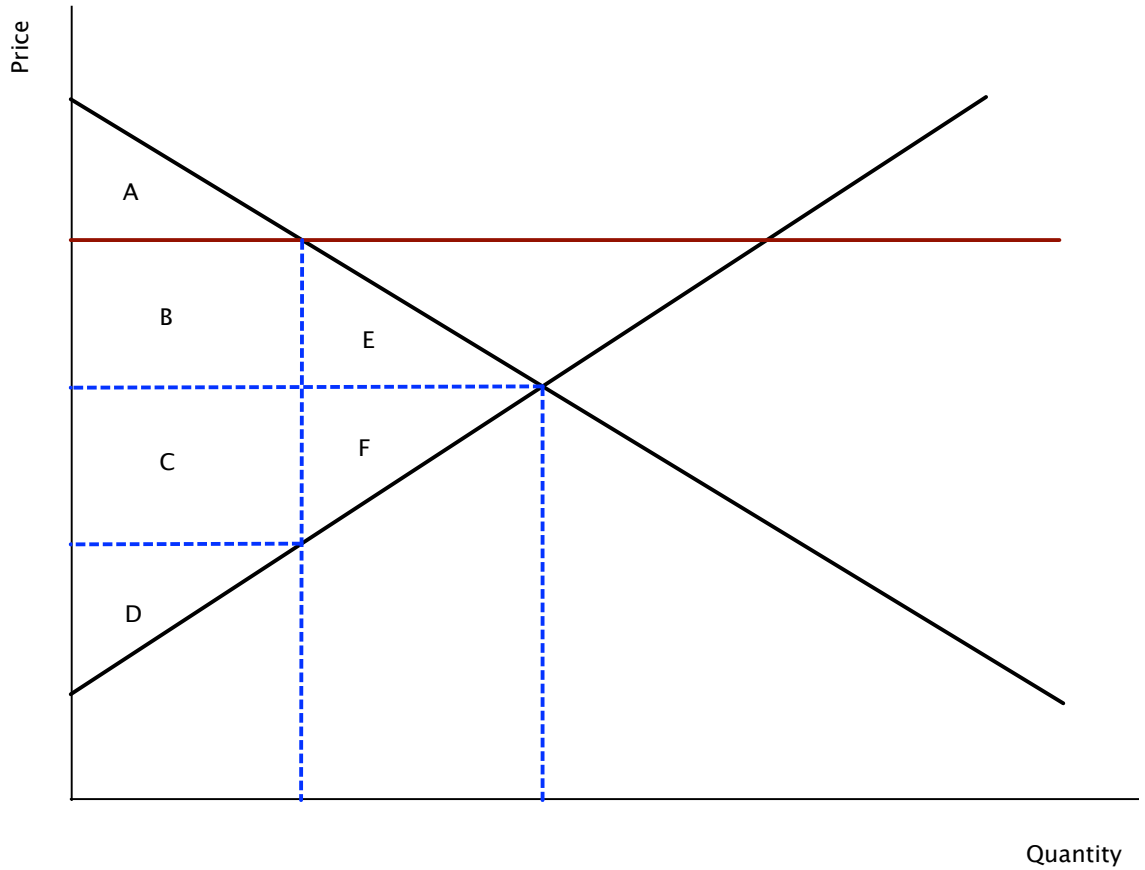


Figure: Price Floors and Welfare

Price Floors

- After the price ceiling is introduced, the market price is P_f. Buyers and sellers are now paying and receiving more than before. Moreover, the number of transactions that are taking place has decreased. Now,

  $CS_1 = A$

  $PS_1 = B + C + D$

  $TS_1 = A + B + C + D$

- Again, we see that total surplus decreases due to the price control and the deadweight loss is represented by E + F.

Taxes

- **Tax incidence:** The manner in which the burden of a tax is shared among participants in a market.
- Taxes can be levied on either (1) sellers or (2) buyers.

Taxes

- A tax levied on buyers will only affect demand.
- The *effective* price buyers pay increases by the size of the tax.
- At any given quantity, the market price must decrease by the size of the tax.
- Thus, a tax on buyers will decrease demand by exactly the size of the tax.

Taxes

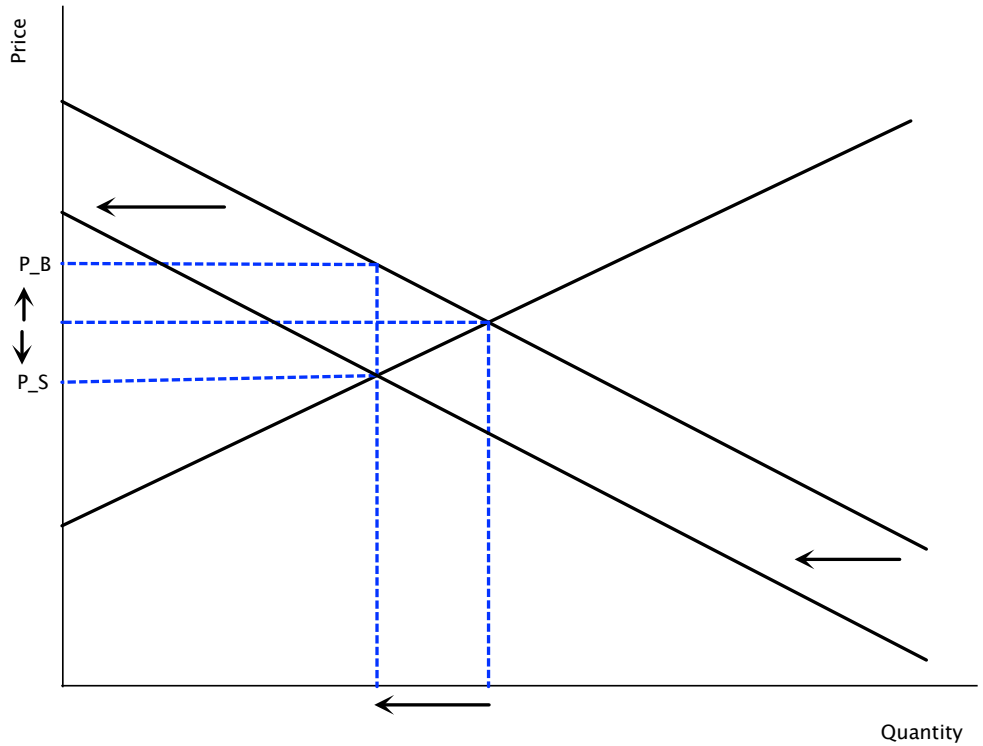


Figure: Tax on Buyers

Taxes

- A tax levied on sellers will only affect supply.
- The *effective* price sellers receive decreases by the size of the tax.
- At any given quantity, the market price must increase by the size of the tax.
- Thus, a tax on sellers will decrease supply by exactly the size of the tax.

Taxes

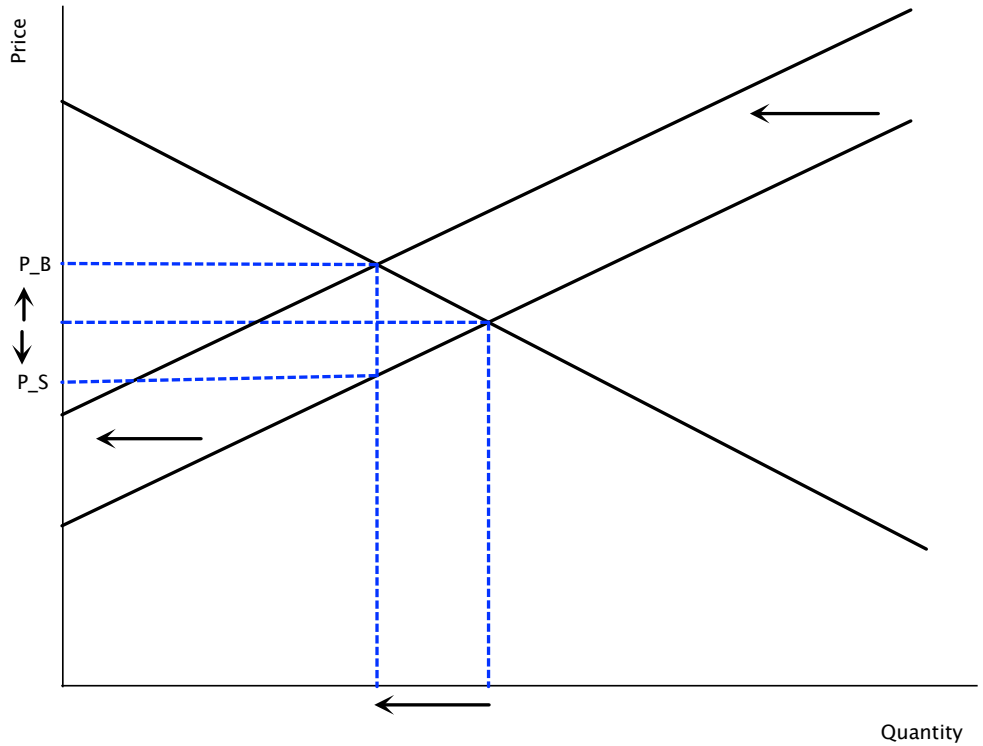


Figure: Tax on Sellers

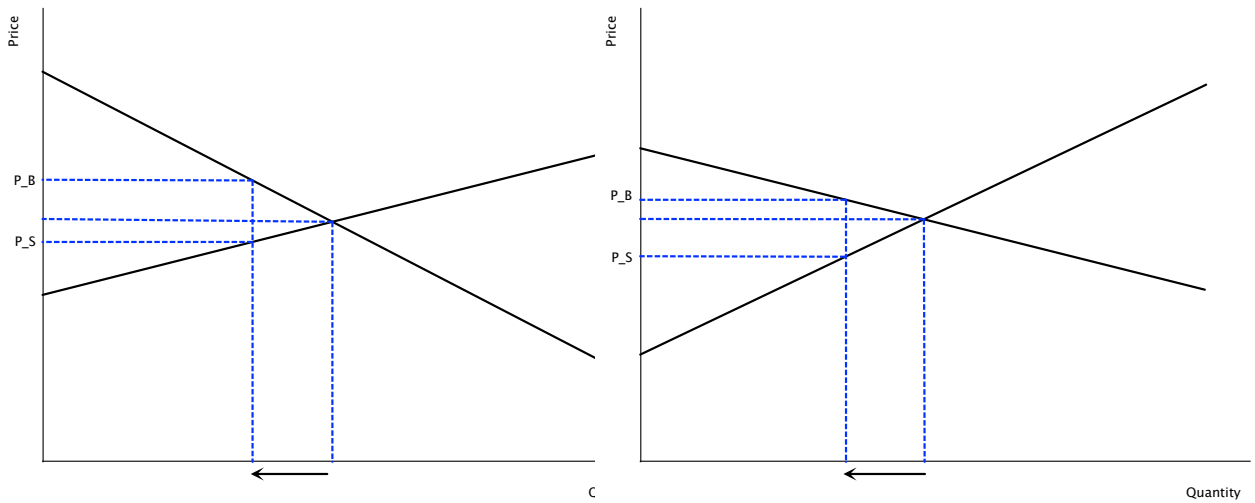
Taxes

- Insights:
  1. Taxes discourage market activity
     - The quantity bought and sold in the market decreases
  2. Buyers and sellers share the burden of taxes.
     - The price buyers pay increases
     - The price sellers receive decreases
  3. Taxes levied on buyer and sellers are equivalent

Taxes

- The way the burden of the tax is split depends on the relative elasticities of supply and demand.

Figure: Elasticity & Tax Incidence



(a) Elastic Supply (b) Elastic Demand

- The tax burden falls more heavily on the side that is less elastic.

Taxes

- When the government levies a tax, it collects tax revenue. Though this benefit accrues to those on whom the revenue is spent and not the government itself, we use this to measure the public benefit from the tax. Tax revenue is simply $\tau \times Q_\tau$.

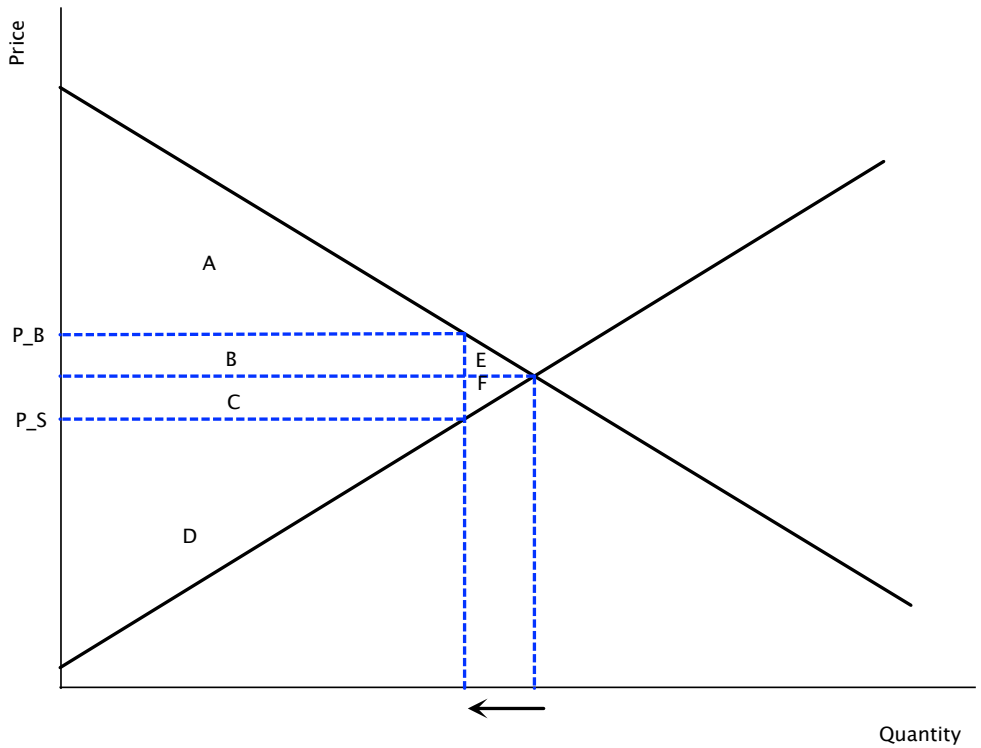


Figure: Taxes and Welfare

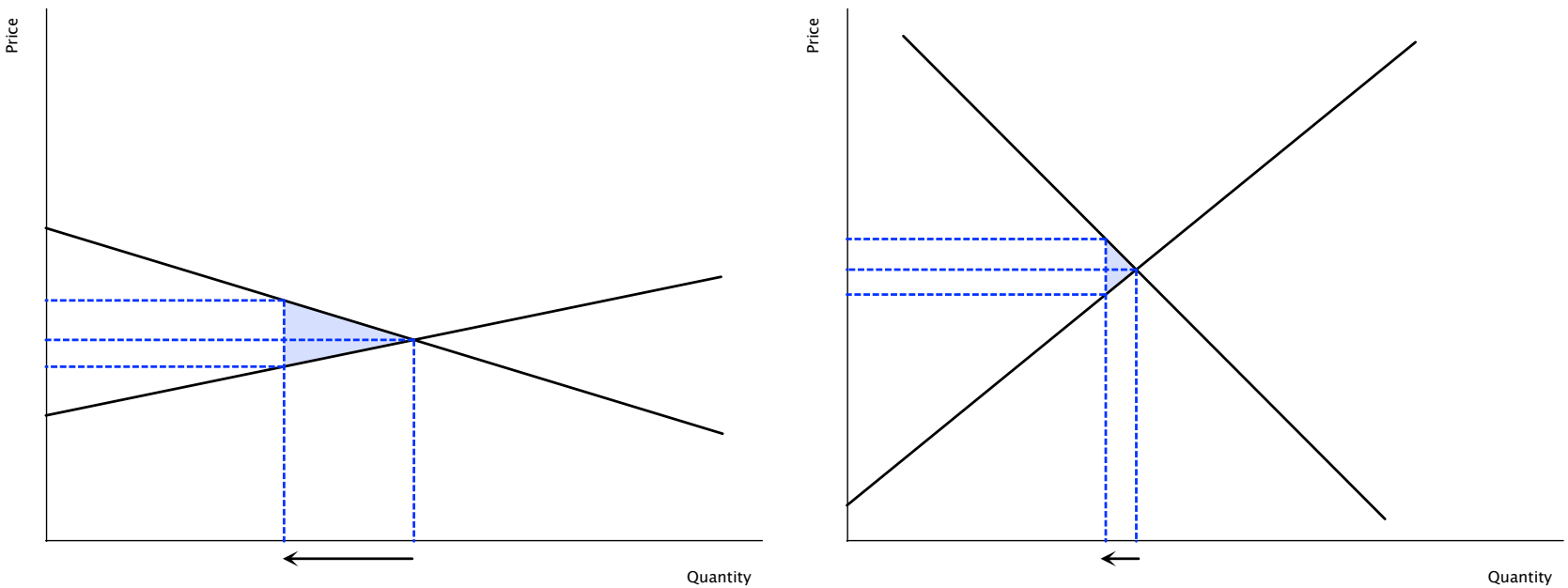
Taxes

- By increasing the price buyers pay and decreasing the price sellers receive, a tax reduces consumer and producer surplus.
- Moreover, total surplus decreases because the tax revenue earned by the government is outweighed by the decreases in CS and PS. Thus, taxes lead to a deadweight loss.
- The decrease in total surplus is due to unrealized gains from trade.

Taxes

- The driving factor behind the size of the deadweight loss is the elasticity of supply and demand.

Figure: Taxes, Elasticity, and DWL



(a) Elastic Supply and Demand (b) Inelastic Supply and Demand

Taxes

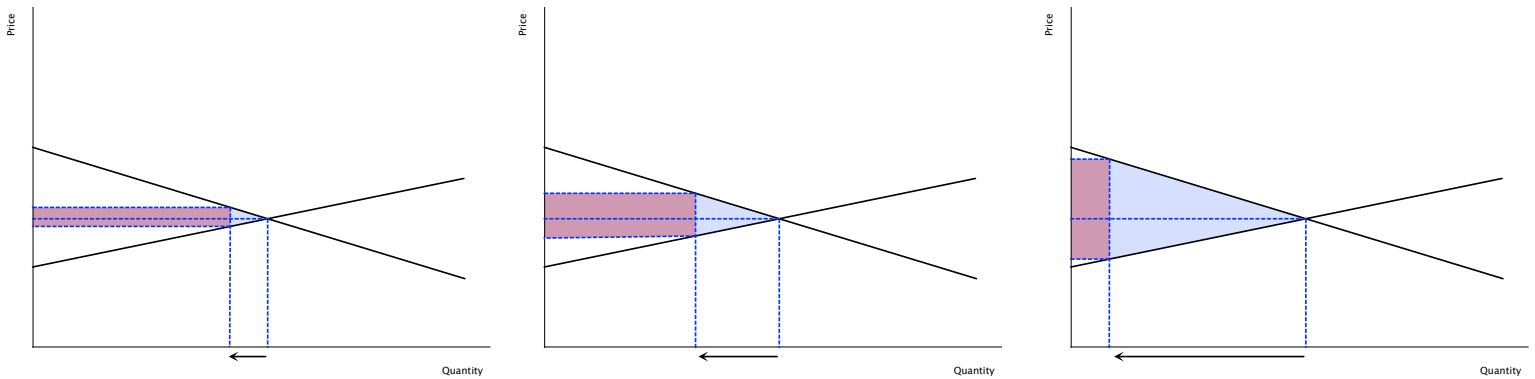
- The greater the elasticities of supply and demand, the greater the DWL of a given tax will be.
- Buyers and sellers are more able to move away from the market, so there are fewer transactions taking place. This leads to more unrealized gains from trade.

Taxes

- For a given supply and demand curve, the DWL of the tax always increases as the tax increases.
- The amount of tax revenue collected increases initially as the tax increases, but eventually decreases as the tax continues to increase.

Taxes

Figure: Taxes, DWL, and Tax Revenue



(a) Small Tax (b) Medium Tax (c) Large Tax

Taxes

Example

Table 3 shows the willingness to pay and costs of six buyers and sellers in the market for headphones.

Table: WTP and Seller Costs for Headphones

WTP	*Seller Costs*
$200	*$80*
$175	*$120*
$160	*$130*
$140	*$140*
$120	*$155*
$100	*$180*

(a) *The government imposes a per-unit tax of $55 on sellers of headphones. What will be the price buyers pay, the price sellers receive, and the quantity exchanged in the market as a result of this tax?*

(b) *What is the tax revenue generated from this tax? The deadweight loss?*

Subsidies

- A (per unit) subsidy is just the reverse of a tax: The government provides buyers (or sellers) a dollar amount per-unit for the good
- Similarly, subsidies have many of the same implications as per-unit taxes:
  1. Subsidies drive a wedge between the price buyers pay and the price sellers receive
     - Buyers pay a lower price than before
     - Sellers receive a higher price than before
  2. The split of the wedge depends on the relative elasticities of supply and demand
- Subsidies must be paid by taxpayers and create deadweight losses due to **inefficient transactions**

Subsidies

- Much like taxes, the relative subsidy benefit between buyers and sellers depends on the elasticities of each curve
- The less elastic curve will realize a greater benefit from the subsidy as given by the difference between the new price received/paid and the old price

Subsidies

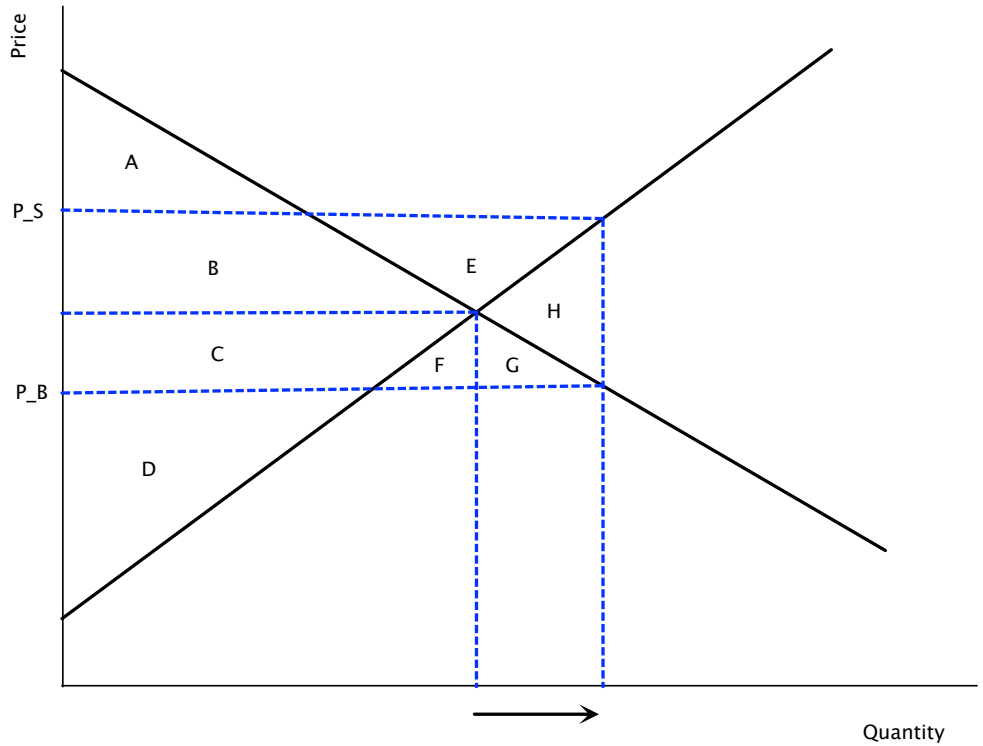


Figure: Subsidies and Welfare

Subsidies

Example

Consider the figure below, which shows the market for low-skilled labor. Suppose the government provides firms with a wage subsidy of $4 per worker hired. How much will firms pay each worker? How much will each worker receive?

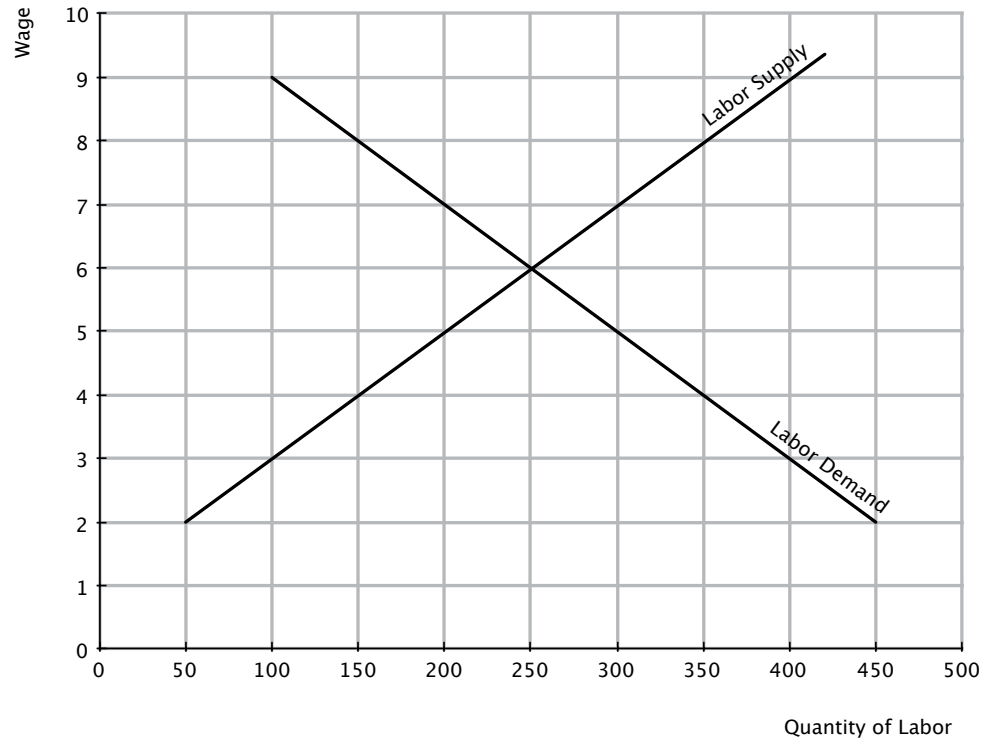


Figure: Labor Market

Readings and Assignments

- Today: Mankiw Ch. 6, Ch. 8
- Next time: Mankiw Ch. 10, Ch. 11
- Problem Set 2, section 2 & 3