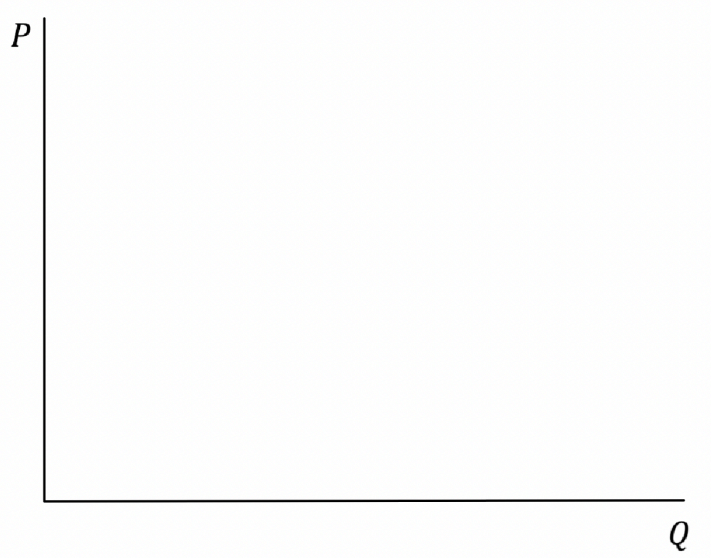
Chapter 10 Applications of Demand and Supply

We discuss three applications:

1. Maximum Price (Ceiling Price)
2. Minimum Price (Floor Price)
3. Tax
4. Subsidy

1. Maximum Price (Ceiling Price) Suppose the market is in equilibrium at $E = (Q_0, P_0)$. If the government imposes and controls the price to be at P_{Max}. No seller can sell at any price higher than P_{Max}.

• Is $P_{Max} > P_0$?



At P_{Max}, there will be Excess =

Can the market mechanism work to raise the price to the Equilibrium Price P_0?

The actual quantity that is bought and sold =

What is the value placed on the last unit bought?

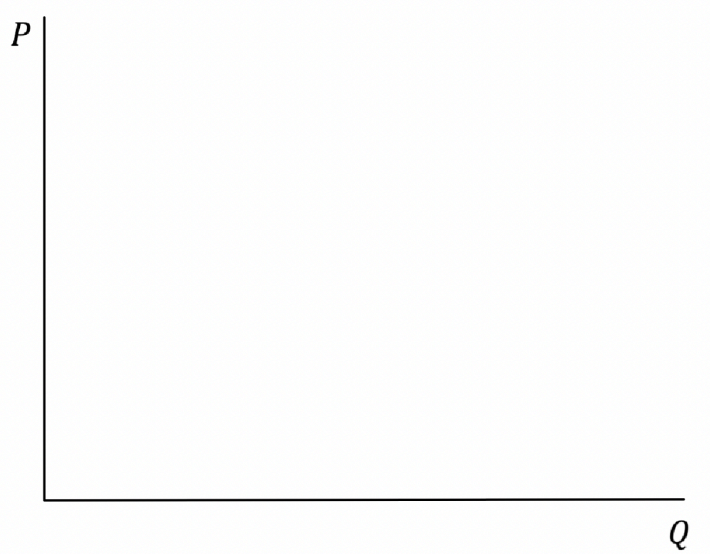
What is the cost of producing the last unit sold?

	Before	After	Change
Consumer's Surplus			
Producer's Surplus			

Deadweight Loss is the loss of Social Welfare caused by market distortion.

2. Minimum Price (Floor Price) Suppose the market is in equilibrium at $E = (Q_0, P_0)$. The government imposes and controls the price to be at P_{Min}. The buyers cannot buy at any price less than P_{Min}.

• Is $P_{Max} > P_0$?



At P_{Min}, there will be Excess =

Can the market mechanism work to lower the price to the Equilibrium Price P_0?

The actual quantity that is bought and sold =

What is the value placed on the last unit bought?

What is the cost of producing the last unit sold?

	Before	After	Change
Consumer's Surplus			
Producer's Surplus			

Deadweight Loss is the loss of Social Welfare caused by market distortion.
At any quantity $Q > Q_0$, the value of the product is less than the cost of producing it. Thus we have the deadweight loss that comes from over production. The area that represents this deadweight loss is =

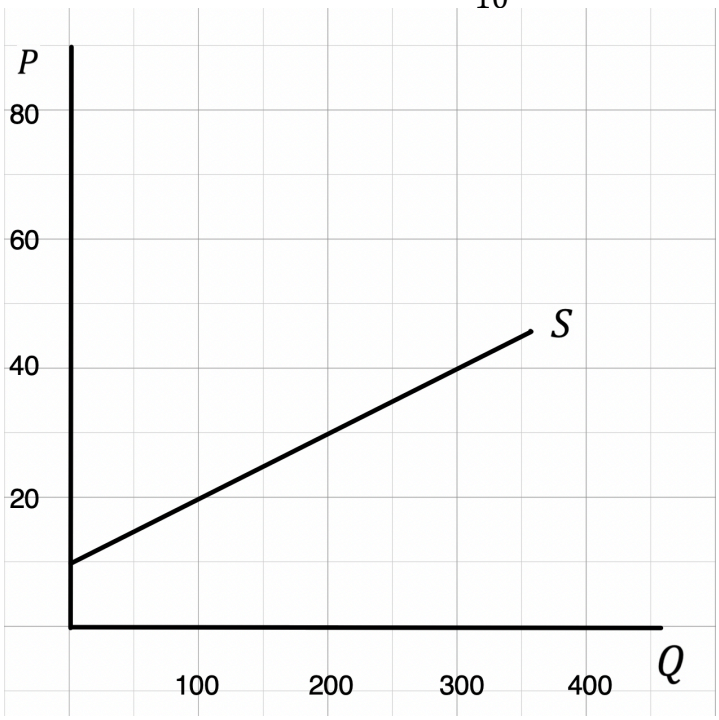
3. Tax The government collect a tax of t bahts/unit. This is called Specific Tax. When tax is a percentage of price it is called Ad Valorem tax.

There are two possibilities:

Case 1. The ***sellers pay tax*** to the government t bahts/unit.

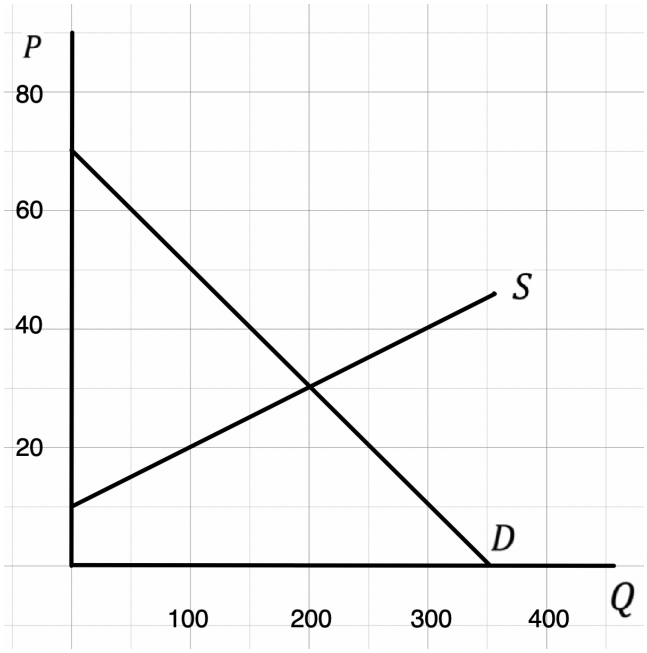
Tax $t = 15\ bahts/unit$ on the sellers will affect the Supply curve. How?

$$Supply\text{: } P = 10 + \frac{1}{10}Q_S$$



Given the Demand and Supply:

$$D:\ P = 70 - \frac{1}{5}Q_D$$
$$S:\ P = 10 + \frac{1}{10}Q_S$$
$$S':\ P = (10 + t) + \frac{1}{10}Q_S$$
$$= (10 + 15) + \frac{1}{10}Q_S$$
$$= 25 + \frac{1}{10}Q_S$$



Before tax, the equilibrium is at $E = (Q_1, P_1) = (200,30)$.

Once tax is imposed, at the original equilibrium price P_1 there is an Excess =

$\Longrightarrow$ The price thus will increase/decrease

The new equilibrium will be at $F = (Q_2, P_2) =$

Solving equations to find the new equilibrium:

With tax,
the eq. quantity decreases from $Q_1 = 200$ to $Q_2 =$
the eq. price increases from $P_1 = 30$ to $P_2 =$

Question: Is P_2 the price the buyers pay or the sellers receive in their pockets?

Tax Burden (Tax Incidence) *(Compare the total payment out of the pockets of buyers and total amount received by the sellers)*

Before:
Price the buyers pay $P_1 = 30$, sellers receive $P_1 = 30$

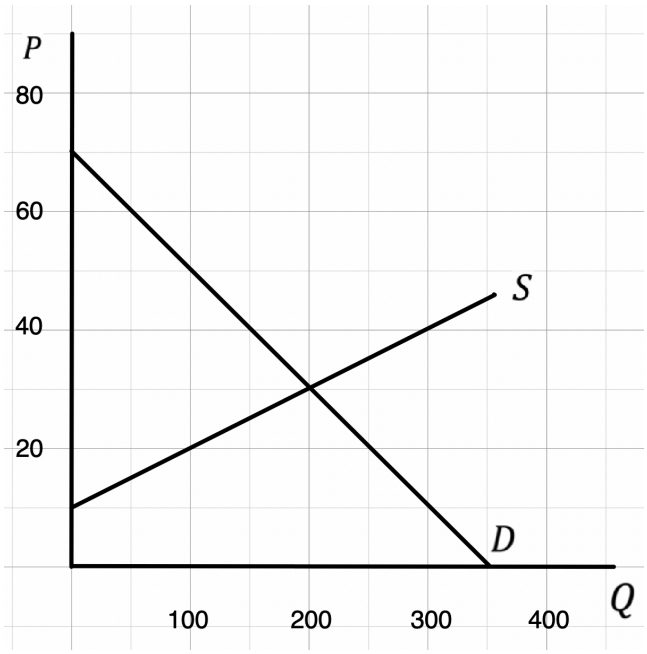
After:
Price the buyers pay $P_2 = 40$, sellers receive

Tax burden: Buyers' = bahts/unit
Sellers' = bahts/unit

Total Tax burden: Buyers' = bahts = Area
Sellers' = bahts = Area

Total Tax Collected:

Share of Tax Burden:



Both buyers and sellers share the burden of tax. The share of burden is determined by the relative value of the price elasticities of demand and supply.

Let

$$a = burden\ on\ buyers/unit = P_2 - P_1$$
$$b = burden\ on\ sellers/unit = P_1 - (P_2 - tax)$$

Note $a + b = tax$

At the original equilibrium, $E = (Q_1, P_1) = (200,30)$, the price elasticity of demand and price elasticity of supply are

$$\eta_D = \frac{1}{Slope\ of\ D\ at\ E}\frac{P_1}{Q_1} = \frac{1}{-a/c}\frac{P_1}{Q_1}$$
$$\eta_S = \frac{1}{Slope\ of\ S\ at\ E}\frac{P_1}{Q_1} = \frac{1}{b/c}\frac{P_1}{Q_1}$$

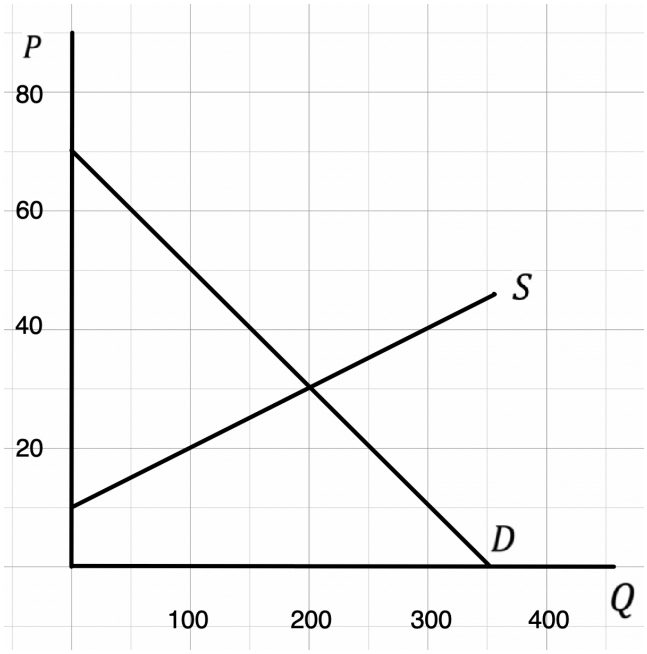
Thus

$$\frac{\eta_S}{|\eta_D|} = \frac{\frac{1}{b/c}\frac{P_1}{Q_1}}{\frac{1}{a/c}\frac{P_1}{Q_1}} = \frac{a}{b} = \frac{burden\ on\ buyers/unit}{burden\ on\ sellers/unit}$$

If $\eta_S > |\eta_D|$, buyers will bear more tax burden than sellers do. Those who are more sensitive to price change will have less burden.

Example At the point $= (Q_1, P_1) = (200,30)$, $\eta_S = 1.5$, $|\eta_D| = 0.75$, then $\frac{\eta_S}{|\eta_D|} = \frac{1.5}{0.75} = 2$. That means the buyers' burden is twice that of sellers'

Change in Consumer's and Producer's Surpluses



	Before	After	Change
Consumer's Surplus			
Producer's Surplus			

Deadweight Loss =

What is the value the buyers place on the last unit bought?

What is the cost of producing the last unit sold?