

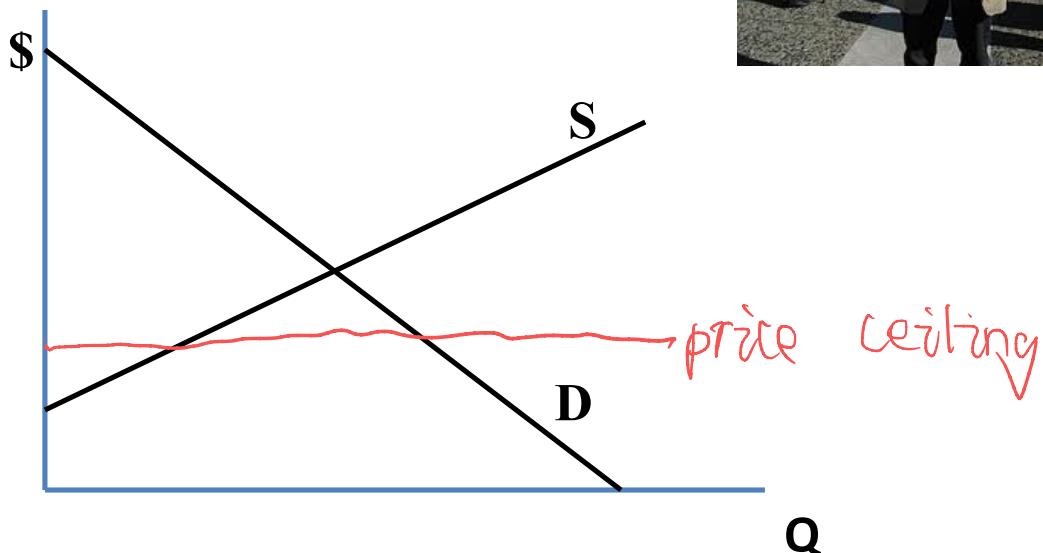
Chapter 5

Government Actions in Markets

In reality, prices and quantities are often not at the equilibrium because the government interferes in many markets by imposing taxes, quotas, or price controls.

Price Controls: Price Ceilings or Price Floors

Price Ceiling = A maximum price set below the equilibrium price, p^* , to help E.g. Rent controls are set to help consumers, help people afford housing.

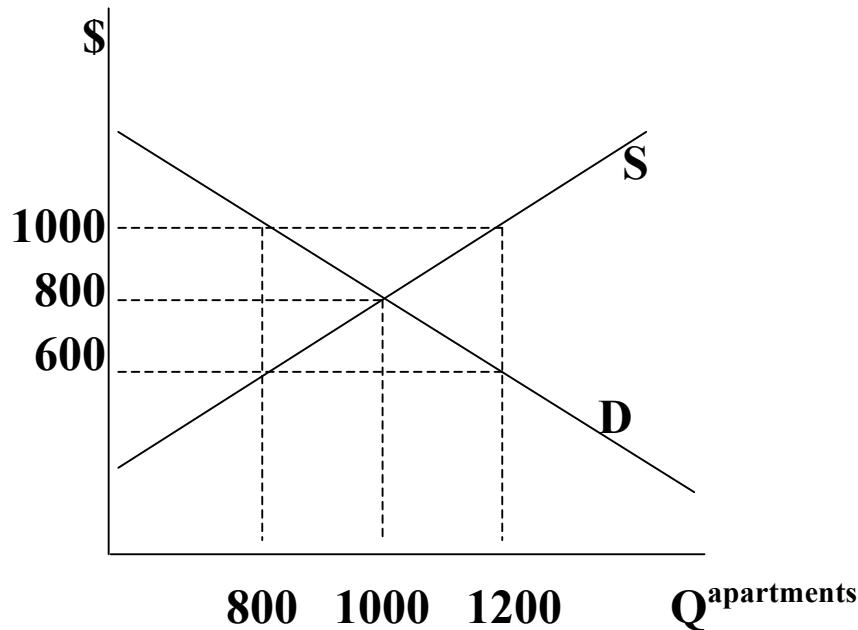


Example: Venezuela and Zimbabwe both suffer from severe food shortages because of government price ceilings designed to make food "more affordable".

Price Ceilings

Example: Rent Control

Assume for simplicity that all apartments are the same.



If a price ceiling is set at \$600/month: $Q_D = 1200$

$$Q_S = 800$$

There will be a shortage of 400 apartments.

The \$600 price ceiling is binding because it prevents the market from reaching the equilibrium.

Price ceilings are not effective, or *not binding*, if set ABOVE the equilibrium price.

E.g. If the price ceiling were set at \$1000 per month there would be a surplus, so the price would fall to \$800 and the ceiling would not be binding.

What are the Consequences of Price Ceilings?

1. Shortages will get worse over time.

- Apartment buildings will be converted to condos and sold (no longer for rent) because landlords cannot make enough profit.
- Q_s keeps decreasing.
- Q_d increases with population growth.



2. The market will be inefficient

- Some people would be willing to pay more than \$600 and some landlords would be willing to rent for more than \$600, but they can't make the mutually beneficial transaction \Rightarrow missed opportunities = deadweight loss.



3. The quality will be inefficient low

- Some people would be willing to pay more for a nicer apartment, and some landlords would be willing to fix up their building if they could charge a higher rent \rightarrow these mutually beneficial transactions are prevented \rightarrow missed opportunities = deadweight loss



4. Black Markets

- Subletting apartments
- Illegal food markets



Example:

Demand Curve: $P = 500 - 1.5Q$ Supply Curve: $P = 100 + 2.5Q$

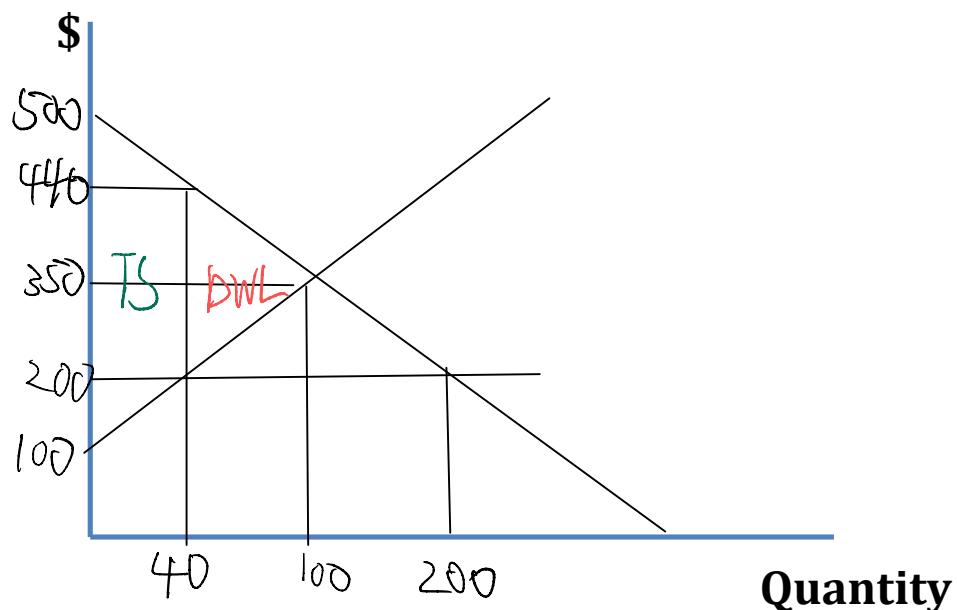
Equilibrium without price controls:

$$500 - 1.5Q = 100 + 2.5Q \quad Q = 100$$
$$400 = 4Q \quad P = 350$$

- What will happen if the government places a \$400 price ceiling in the market?

Nothing. That would be a non-binding price ceiling,

- What will happen if the government places a price ceiling of \$200 in the market?



$$DWL = (440 - 200)(100 - 40)(\frac{1}{2}) \approx 7200$$

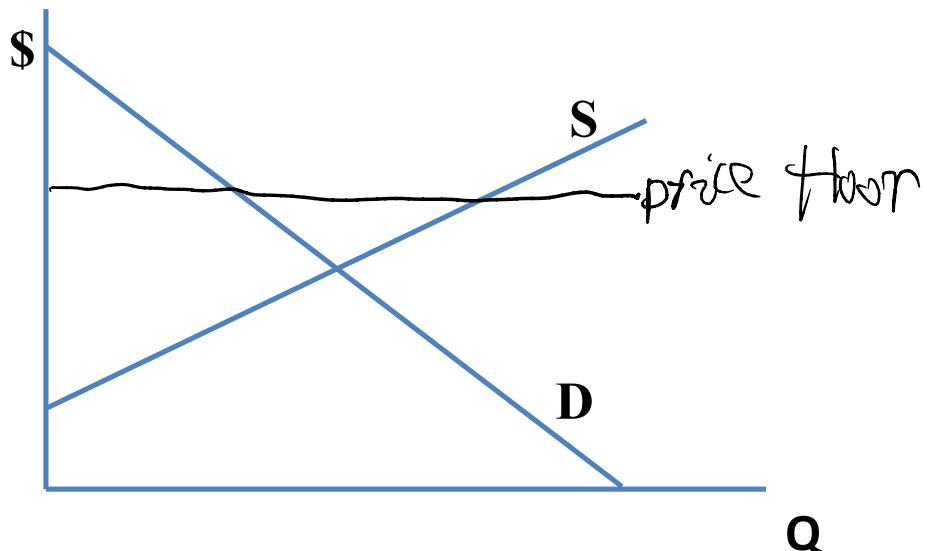
Price Floors

Price floors = a minimum price set above the equilibrium price, p^* , to help suppliers.

E.g. Minimum wage

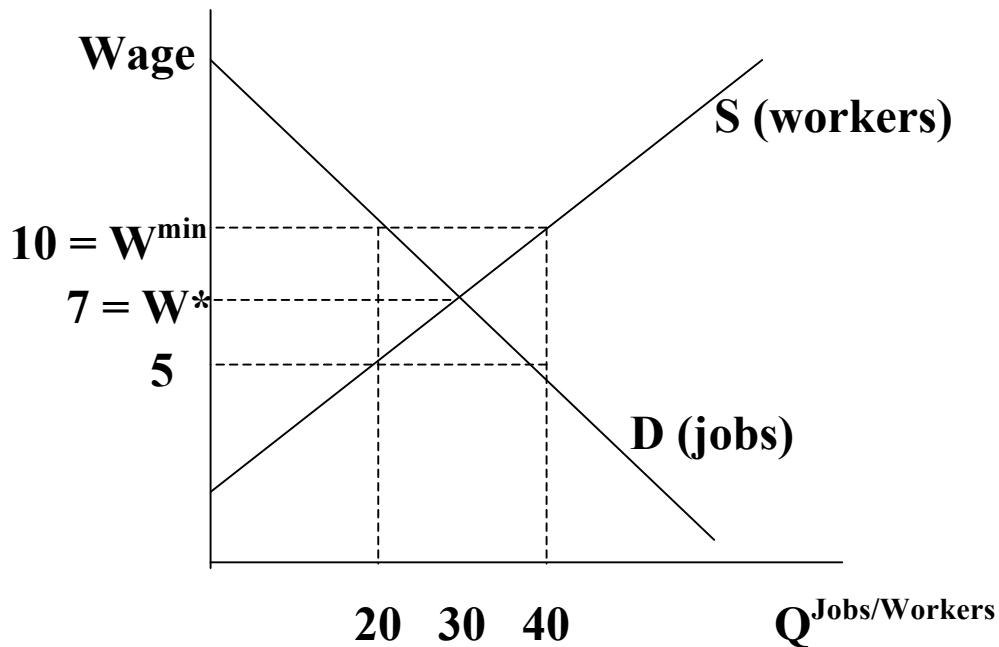


"I guess it's an OK job. Minimum wage plus all you can eat. I tried to quit once but couldn't get out the door."



The United States has a huge surplus of peanuts because of a price floor designed to help farmers. Farmers are paid \$535 per ton while the market price is only \$400 per ton.

Example: Minimum Wage



$L^S - L^D =$
unemployed
workers

If a price floor is set at \$10/hour: $L_D = 20$

$$L_S = 40$$

There will be a surplus of 20 workers.

The \$10 price floor is binding because it prevents the market from reaching the equilibrium.

Price floors are not effective, or *not binding*, if set BELOW the equilibrium price.

E.g. If the price floor were set at \$5 per hour there would be a shortage, so the price would increase to \$7 and the price floor would not be binding.

What are the Consequences of Price Floors?

1. There will be a *Surplus*

- There is more labour supplied than there are jobs available → *unemployment*
- With agriculture surpluses the government may buy the extra and sell abroad or give it away as foreign aid.

2. The markets are *inefficient*

- Some people would be willing to work for less than minimum wage, and firms would be willing to hire them for less, but that is not legal → missed opportunities → *deadweight loss*

3. There will be *inefficiently high quality*

- Some employers would be willing to hire less skilled workers at below minimum wage, but cannot.
- Some people would be willing to buy goods of lower quality at a lower price but cannot (e.g. full service gas).
- There are missed opportunities (*deadweight loss*).

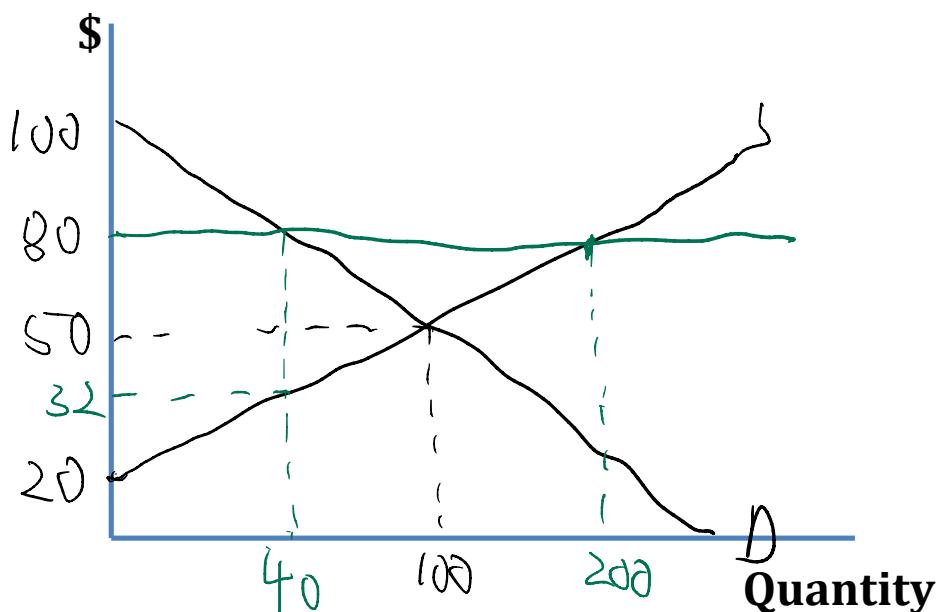
4. Black markets

- E.g. Immigrants working ‘under the table’

Exercise 1: Suppose a price floor is set at \$80. Graph and calculate the surplus and DWL caused by a price floor.

Demand Curve: $P = 100 - 0.5Q^D$

Supply Curve: $P = 20 + 0.3Q^S$



$$100 - 0.5Q = 20 + 0.3Q$$

$$Q = 100$$

$$P = 50$$

$$80 = 100 - 0.5Q_D$$

$$Q_D = 40$$

$$80 = 20 + 0.3Q_S$$

$$Q_S \approx 200$$

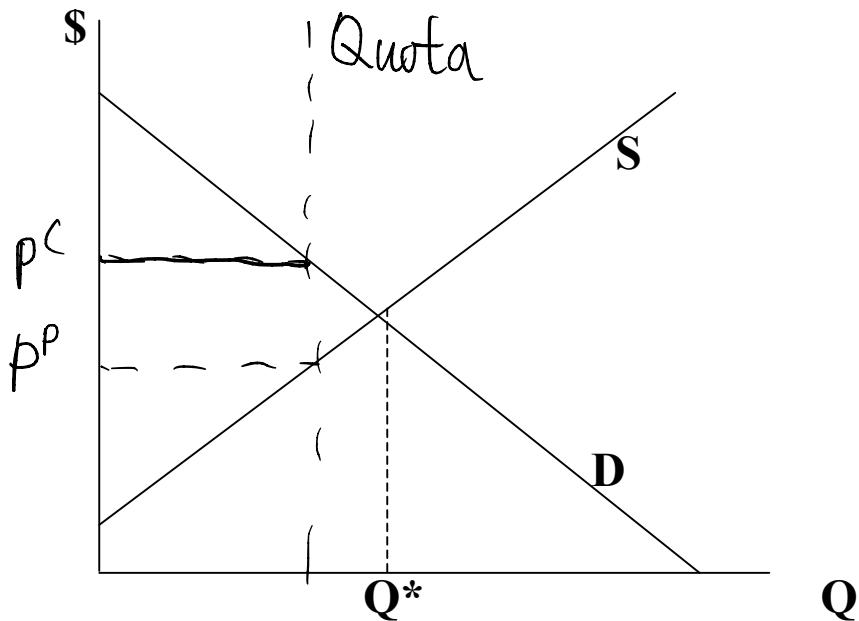
$$\text{Surplus} = 200 - 40 = 160$$

$$P = 20 + 0.3 \cdot 40 = 32$$

$$\begin{aligned} \text{DWL} &= (80 - 32)(100 - 40) \cdot \frac{1}{2} \\ &= 1440 \end{aligned}$$

Controlling Quantities: Quotas

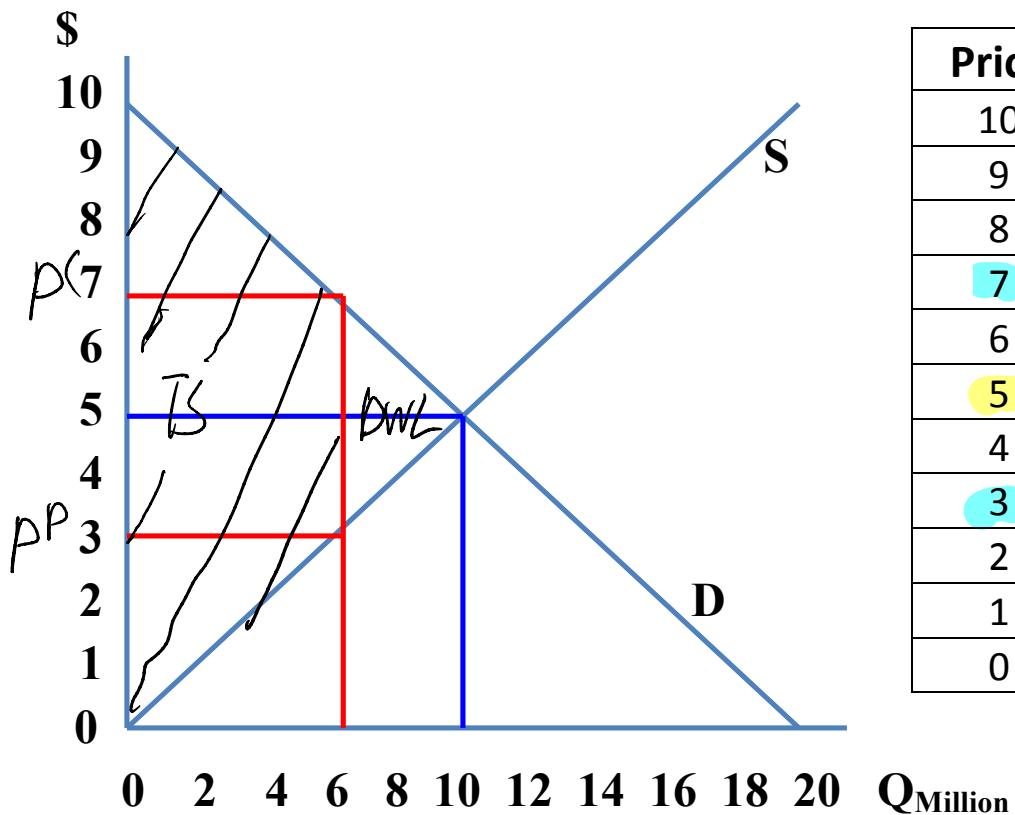
- Because of embarrassing surpluses caused by price floors on agricultural goods, some governments try to maintain higher prices by restricting quantities instead.
- If a smaller quantity is supplied, consumers are willing to pay a higher price.
- Quotas help producers at the expense of consumers
- Quota limit = the total quantity of a good that can be produced
 - Producers must have a quota license that gives them the right to produce a certain quantity.
- Quotas limit quantity to less than the equilibrium quantity.



Demand price = P^c = the price consumers are willing to pay.

Supply price = P^e = the price producers are willing to accept.

Example: Milk production (Quota = 6 million jugs)



Price	QD	QS
10	0	20
9	2	18
8	4	16
7	6	14
6	8	12
5	10	10
4	12	8
3	14	6
2	16	4
1	18	2
0	20	0

Producers would supply 6 million jugs for \$5 each

But consumers will pay \$7 each

Producers will earn \$4 of quota rent

(extra profit received by quota license holders)



The value of having a quota licence reflects the potential quota rent, and milk producers will buy or sell licences from each other.

The price to buy a quota licence can be very high since owning a quota gives a producer an indefinite stream of profit.

Quotas cause inefficiency because of missed opportunities.

- For the units of milk between 6 and 10 million jugs, the demand price > supply price or $MWP > MC$
- Mutually beneficial exchanges are possible but not allowed → Missed opportunities → deadweight loss.
$$DWL = (7-3)(10-5) \cdot \frac{1}{2} = 8 \text{ million}$$
- Canadians waste a lot of time driving to the US to buy milk and cheese.



Bellingham Costco

Quotas also provide incentives for illegal activities, such as selling without a licence, or sneaking milk and cheese across the border from the USA, or stealing Canadian maple syrup to sell in the USA.

Why keep quotas?

- Quotas benefit and protect producers at the expense of consumers.
- But to eliminate the system the government would have to compensate quota owners for the lost future stream of income.
 - Could cost billions of tax dollars in compensation.

Exercise 2: Suppose there is a quota at $Q = 80$.

Graph and do the following calculations.

$$\text{Demand Curve: } P = 100 - 0.5Q^D$$

$$\text{Supply Curve: } P = 20 + 0.3Q^S$$

Equilibrium quantity: $Q^* = 100$

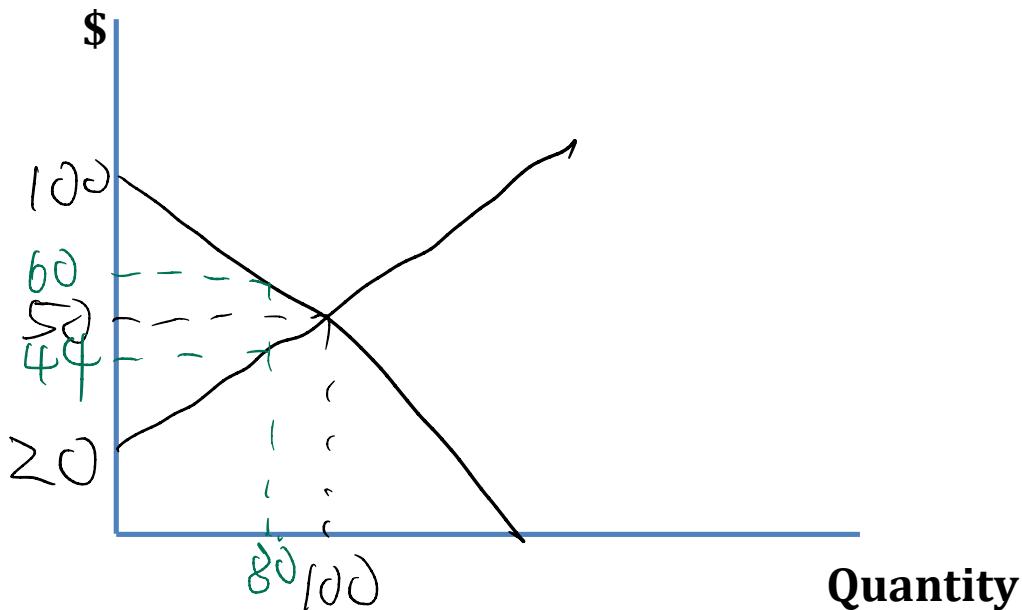
$$P^* = 50$$

Demand price with quota = $P^C = 100 - 0.5 \cdot 80 = 60$

Supply price with quota = $P^P = 20 + 0.3 \cdot 80 = 44$

Quota rent per unit = $P^C - P^P = 16$

Total quota rent = $(P^C - P^P)(Q) = 16 \cdot 80 = 1280$

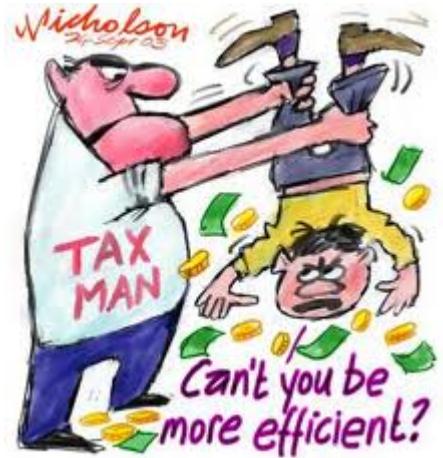
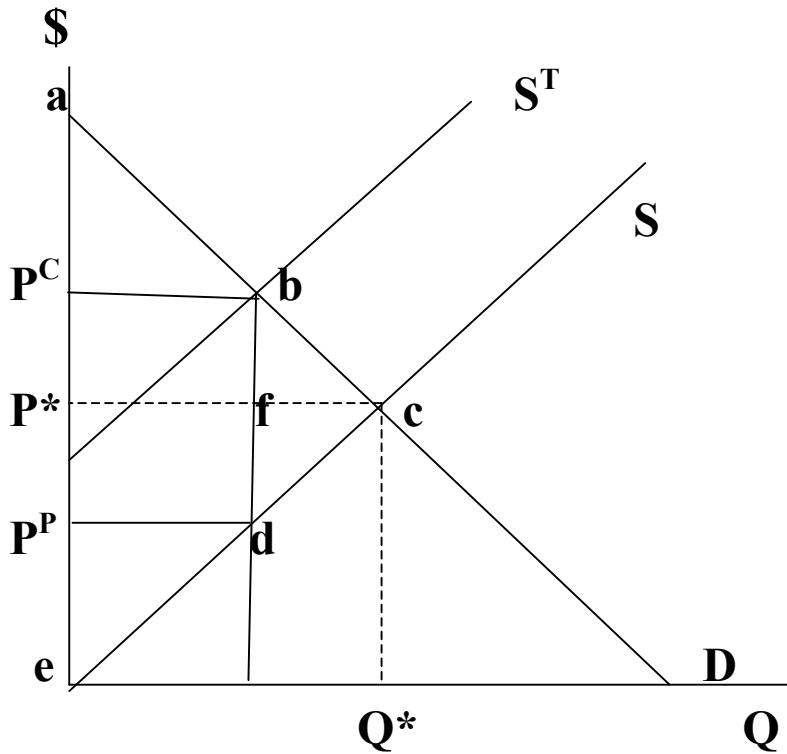


$$\text{DWL} = 160$$

$$\text{TS} = (80 + 16) \cdot 80 \cdot \frac{1}{2} = 3840$$

How do Government Controls Affect Surplus?

Taxes



Before Tax: $CS = acP^*$

$$PS = P^*ce$$

$$TS = ace$$

After tax: $CS = abP^C$

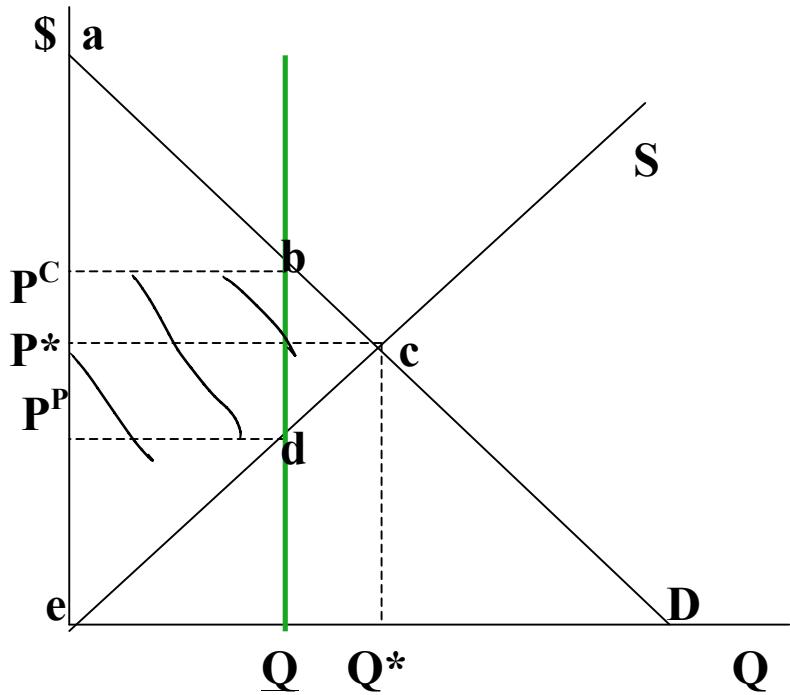
$$PS = P^Pde$$

$$\text{Tax revenue} = P^C b d P^P$$

$$TS = CS + TR + PS = abde$$

$$DWL = bcd$$

Quotas



$$CS = abP^C$$

$$PS = P^C bde$$

$$\text{Quota rent} = P^C bdPP$$

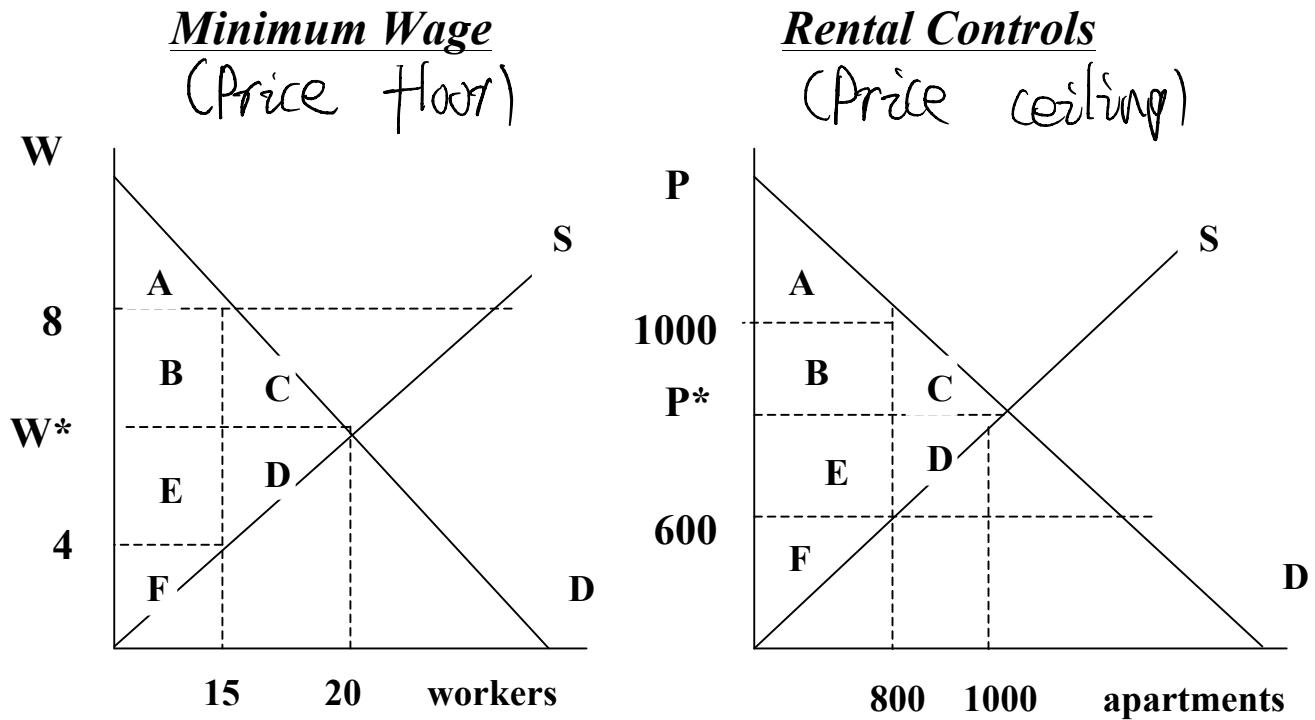
$$TS = abde$$

$$DWL = bcd$$



Milk quotas make cows mad...

Price Controls



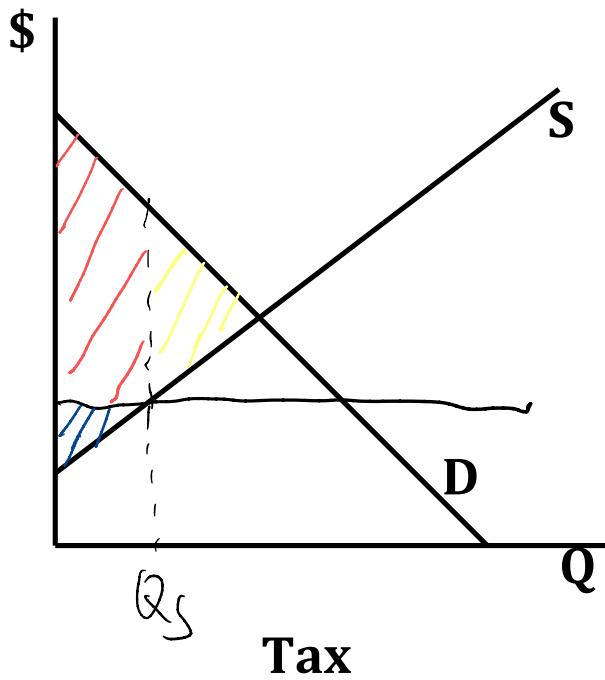
<i>Wage</i>	Before	After	Change
CS	$A+B+C$	A	$-B-C$
PS	$D+E+F$	$B+E+F$	$-D+B$
TS	$A+B+C+D+E+F$	$A+B+E+F$	$-C-D$
DWL		$C+D$	$C+D$

<i>Rent</i>	Before	After	Change
CS	$A+B+C$	$A+B+E$	$-C+E$
PS	$D+E+F$	E	$-D-E$
TS	$A+B+C+D+E+F$	$A+B+E+F$	$-C-D$
DWL		$C+D$	$C+D$

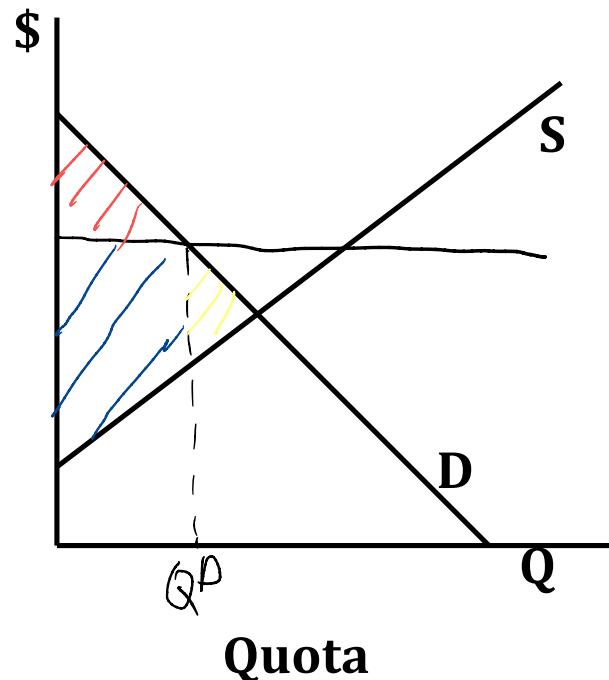
Summary

Red = CS Blue = PS Yellow = DWL Green = Tax revenue

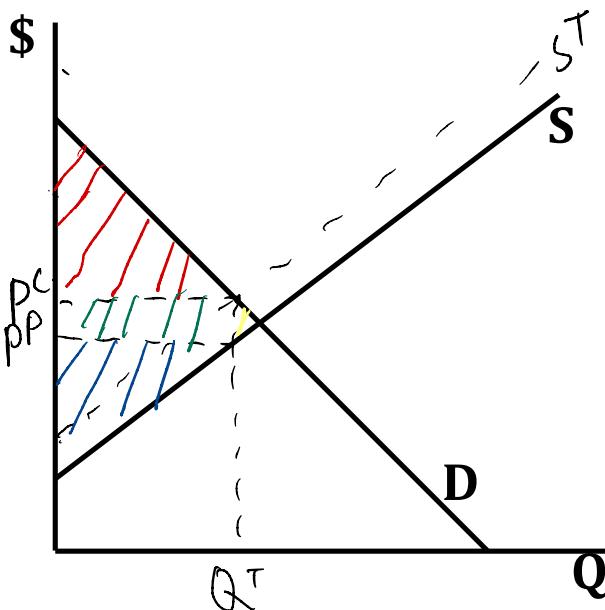
Price Ceiling



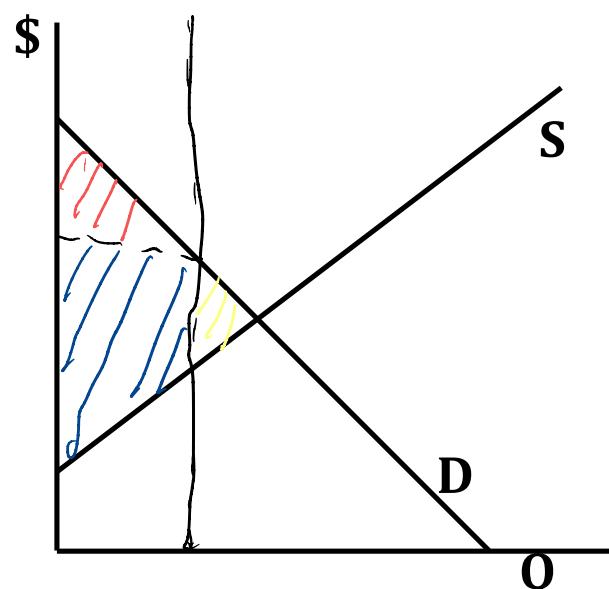
Price Floor



Tax



Quota



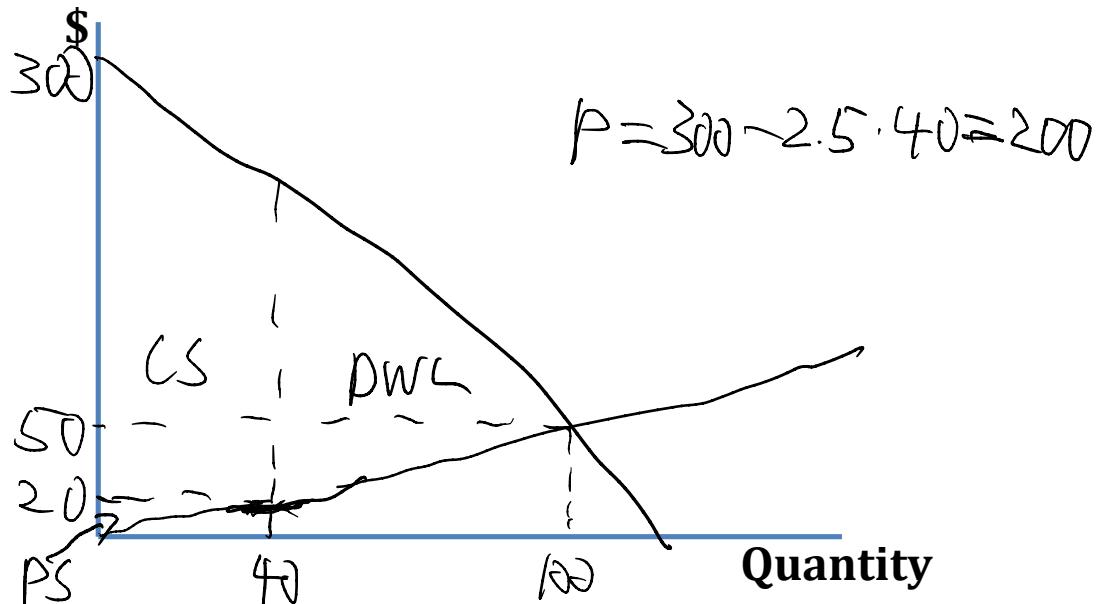
Exercise 3: Do the following calculations

Demand: $P = 300 - 2.5Q^D$ Supply: $P = 0.5Q^S$

Equilibrium: $300 - 2.5Q = 0.5Q \rightarrow Q = 100$

If there is a \$20 price ceiling what is the quantity traded?

$$20 = 0.5Q^S \rightarrow Q^S = 40$$



$$CS = (280 + 180) \cdot 40 \cdot \frac{1}{2} = 9200$$

$$PS = 20 \cdot 40 \cdot \frac{1}{2} = 400$$

$$TS = 9600$$

$$DWL = 180 \cdot 60 \cdot \frac{1}{2} = 5400$$

Suppose instead there is a quota at $Q = \underline{40}$

$$CS = 100 \cdot 40 \cdot \frac{1}{2} = 2000$$

$$PS = (200 + 180) \cdot 40 \cdot \frac{1}{2} = 7600$$

$$TS = 9600$$

$$DWL = 5400$$