

## CH 2- Supply and Demand

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### Info – Definition

**Demand:** want, but you have the money & will 100% spend the money if someone offers to sell at that price you demand

- What affects demand?
  - Price of the good  $P$
  - Price of other goods  $P_o$
  - Information: (i.e. monetary policies)  $I$
  - Purchasing power of consumers  $M$
  - Government policy  $G$

The equation of  $q_d$ , quantity demanded:

$$q_d = -P + P_o + I + M - G$$

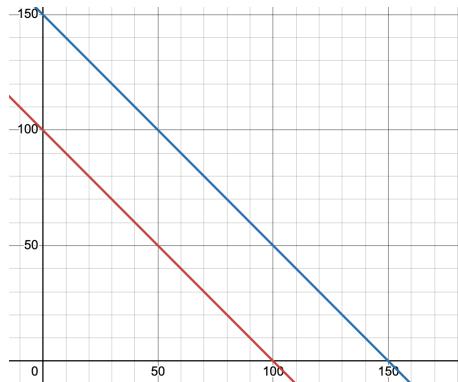
Graphical representation:

where  $q_d$  is on the  $x$ -axis and  $P$  on  $y$ -axis

If another variable changed and we can obtain the new change in  $q_d$ , results in a shift of the curve to left or right.

Changes however on  $P$  will be along the curve.

(i.e.  $q_d = 100 - P$ )



**⚠ Warning** – While solving for the slope, the traditional method of slope mathematically is reciprocal of the graphical representation of the economic model

### Info – Supply

Supply is a measure of how much a market will produce with certainty at any price.

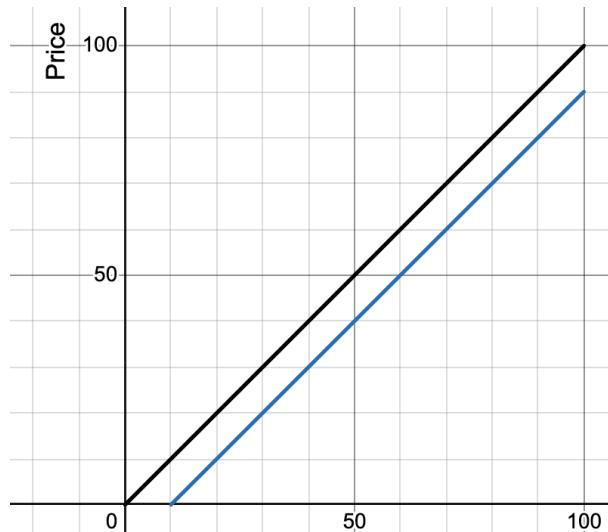
- What affects supply?
  - Price  $P$
  - Price of other goods  $P_o$ 
    - Input materials
    - Other things could have instead produced
  - Government Intervention  $G$

Equation

$$q_s = P - P_o + G$$

where  $q_s$  is the quantity supplied.

(i.e.  $q_s = P$ )



A positive in government intervention shifts the graph to the right whereas to the left

### Tip – Elasticity

The slope of each curve is given by the coefficient in front of  $P$  and it tells us the elasticity of demand → sensitivity to price.

### Info – The Law of Demand

All else constant, an increase in price causes a decrease in demand

→ coefficient of price in the  $q_d$  function will always be negative

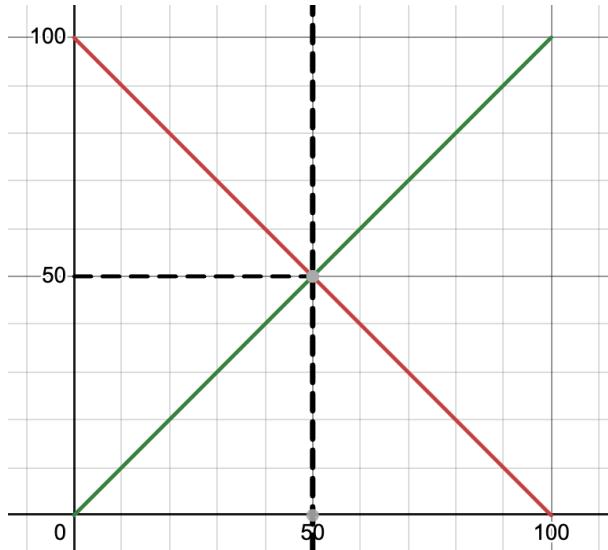
→ demand curve will always be downward sloping

### Info – The Law of Supply

All else constant, an increase in price causes an increase in supply

→ coefficient of price in the  $q_s$  function will always positive

→ supply curve will always be upward sloping



### Info – Equilibrium

The intersection of the 2 curves is the Equilibrium which is a state where no agents could become better off by changing their action. (~Nash Equilibrium in Game Theory)

### Info – Surplus & Efficiency

- Consumer Surplus
  - A measure of “happiness” of consumer
  - Difference between a consumer would have paid and what they end up paying.
  - Graphically, CS can be found in the Supply-Demand graph above the vertical line of the Price of Equilibrium and below the Demand curve.  $\int_0^{50} x - 50 \, dx$  graphically speaking.
- Firm Surplus(Producer Supply)
  - A measure of “happiness” of firm
  - Difference between a firm would have sold for and what they ended up selling.
  - Graphically, FS can be found in the Supply-Demand graph below the vertical line of the Price of Equilibrium and above the Supply curve.  $\int_0^{50} 50 - x \, dx$  graphically speaking.

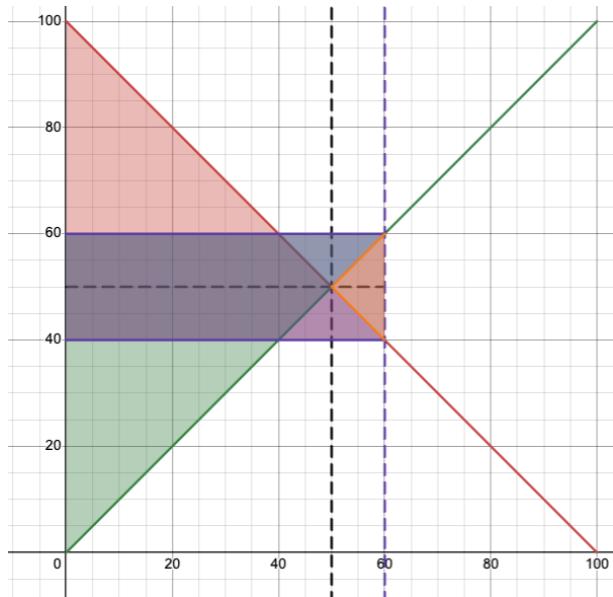
To the right of the Equilibrium are people that are not participating in the market.

Examples:

Assume that we have a quota on goods for  $q_{\text{quota}} = 60$

Is this quota efficient?: Inefficient

- Maximizing total Surplus
- Total Surplus = Consumer Surplus + Producer Surplus + Government



Red + Purple Trapezoid: Consumer Surplus

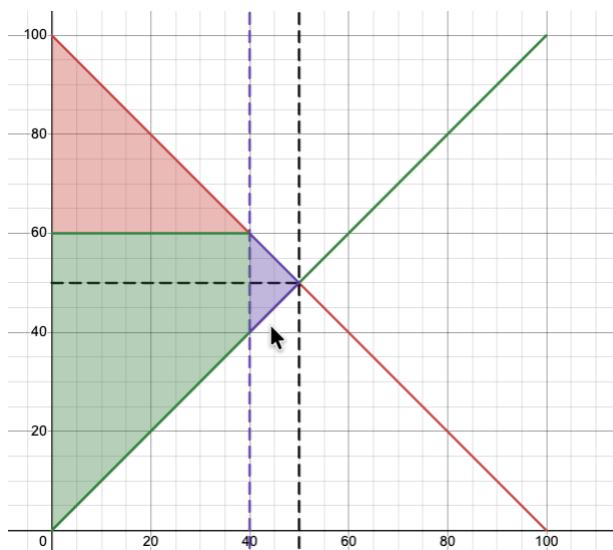
Green: Producer Surplus

Orange Triangle: Deadweight loss

Lower Purple Triangle: Compensated loss

Assume that we have a quota on goods for  $q_{quota} = 40$  What about a negative quota?: Inefficient

Loss on efficiency  $\Rightarrow$  Deadweight loss which comes from both consumer surplus and producer surplus



Red: Consumer Surplus  
 Green: Producer Surplus  
 Purple: Deadweight loss

Limitation to when we can use the Supply & Demand Model

1. Identical goods
2. Full Information
3. Ease of entry/exit
4. Low/No friction
  - Cost of trading are Low

BIG Assumption: Everyone is a pricetaker

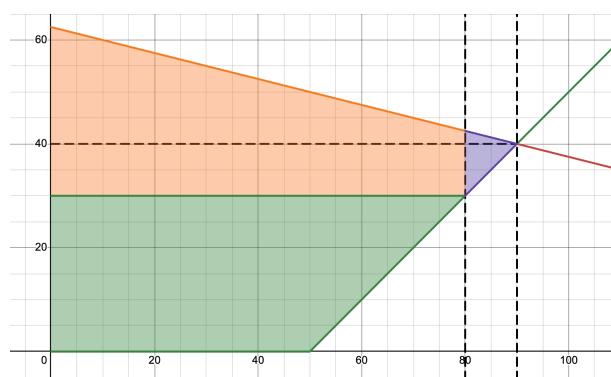
Example analysis (take note that the graph is hard to draw):

$$q_d = 250 - 4p$$

$$q_s = 50 + p$$

1. Find Equilibrium
  - $E(40, 90)$
  - Given Quota: 120
2. Find surpluses
  - $P_{\text{Producer}} = 32.5$
  - $P_{\text{Consumer}} = 62.5$
  - CS Triangle: 1800
  - PS Triangle :  $1625 + 528.125 = 2153.125 - 703.125 = 1450$
  - Firm losses: 703.125
  - Total Surplus = 3250
  - Deadweight loss: 562.5
  - Pre-Quota Surplus =  $3250 + 562.5 = 3812.5$

Post-Policy: We restrict the prices for \$30



Orange: Consumer Surplus = 1800

Green: Producer Surplus = 1950

Total Surplus = 3750

Better than the production quota, more efficient

Better policy is the production quota in context wise as the market is for food.

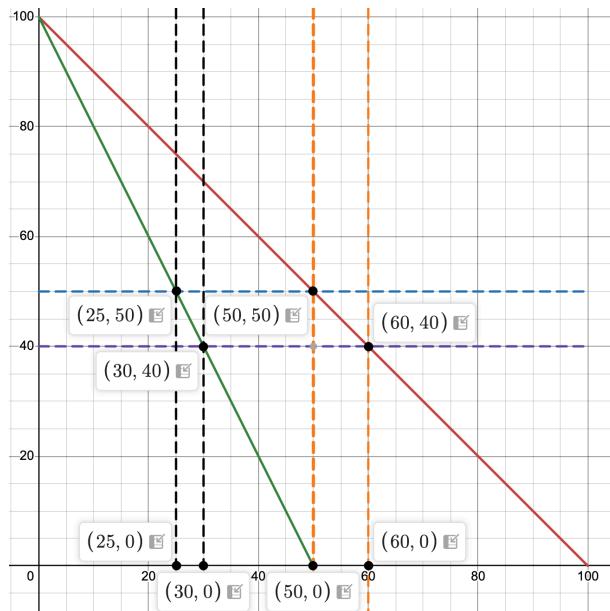
This model has a higher elasticity on the consumer side

The model that has a smaller elasticity on the producer side

## Review

Think of the model as a tool we use to run experiments

Which is more elastic:



The red one. There is a bigger shift in quantity with lowering in price for the red one than the green one.

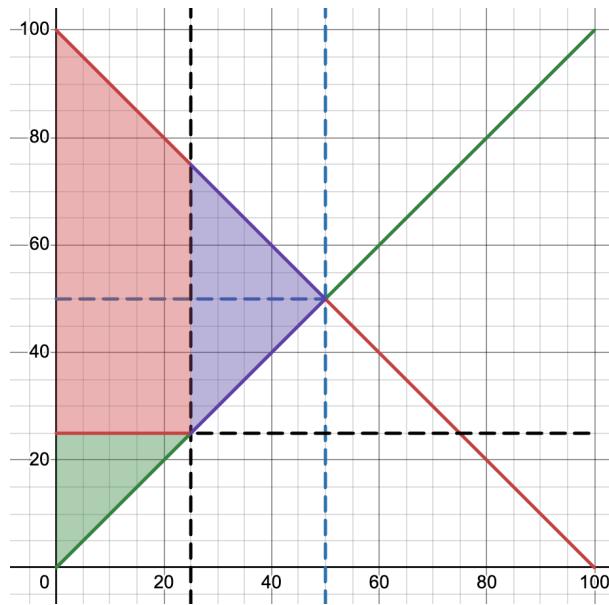
Point elasticity:  $\frac{\Delta q}{\Delta p}$

Arc elasticity:  $\frac{\Delta \% p}{\Delta \% q}$

Question:

Assume a mode in equilibrium

Give it a quota decrease and a price decrease



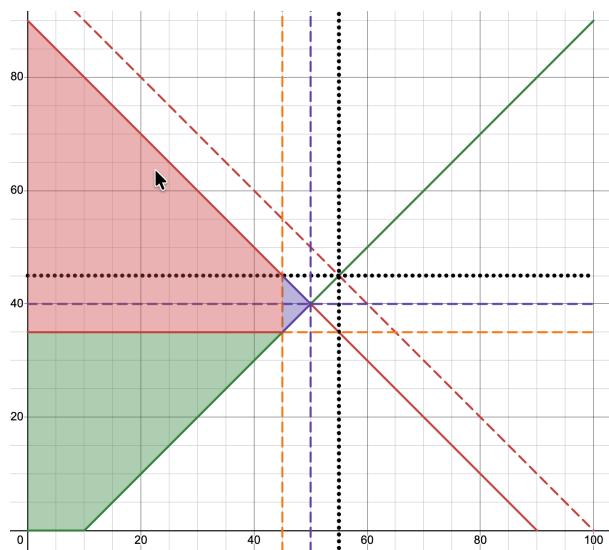
Green: Producer Surplus

Red: Consumer Surplus

Purple: Deadweight loss

Question:

1. We have a price control downward
2. Reduction in Demand



Green: Producer Surplus

Red: Consumer Surplus

Purple: Deadweight loss