CH 2- Supply and Demand

Luke Lu • 2026-02-03

🐋 **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:

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

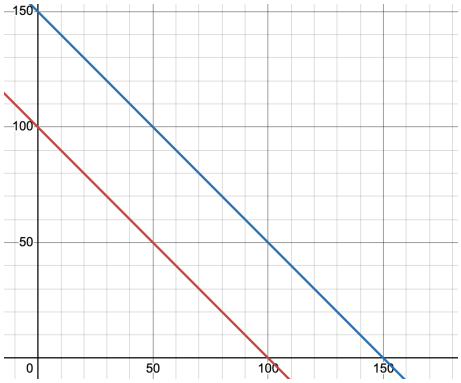
Graphical representation:

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.

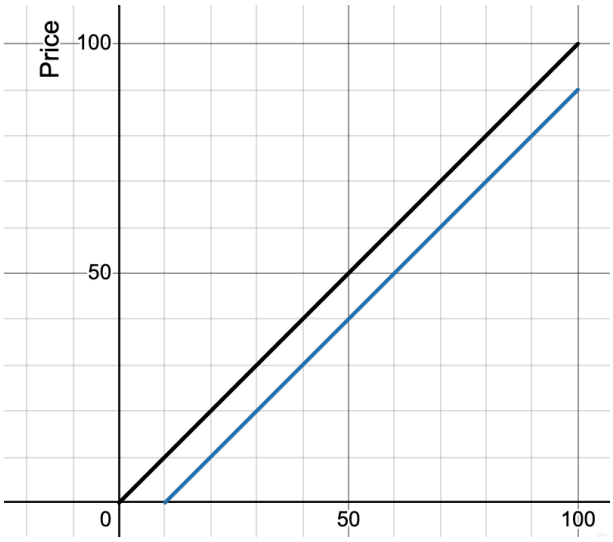
- What affects supply?
  - Price P
  - Price of other goods P_o
    - Input materials
    - Other things could have instead produced
  - Government Intervention G

Equaiton

$$q_s = P - P_o + G$$

where q_s is the quantity supply.

(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

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

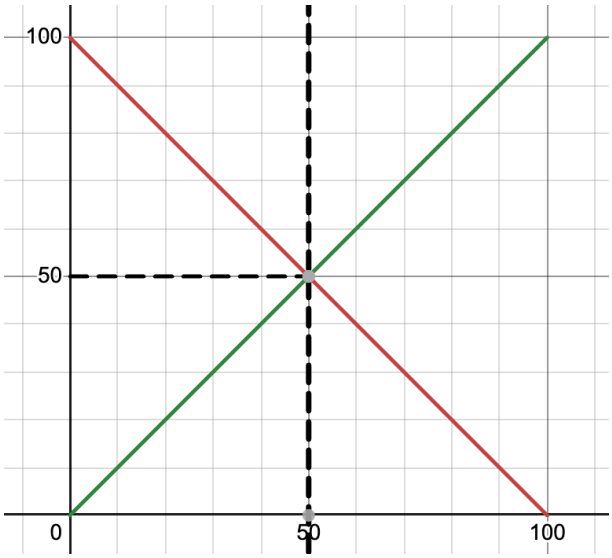
$\longrightarrow$ demand curve will always be downward sloping

Info — The Law of Supply

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

$\longrightarrow$ coefficient of price in the q_s function will always positive

$\longrightarrow$ 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. $\int_0^{50} x - 50 \, \mathrm{d}x$ 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 veritcal line of the Price of Equilibrium and above the Supply curve. $\int_0^{50} 50 - x \, \mathrm{d}x$ graphically speaking.

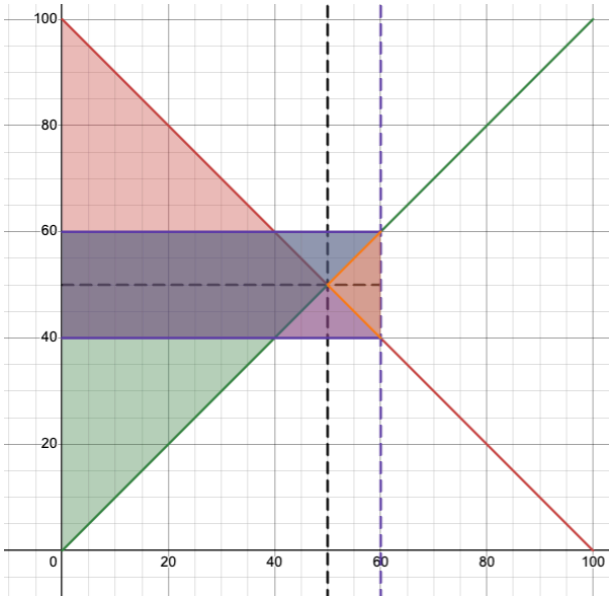
To the right of the Equilibrium are people that are not participating in the market.

Examples:

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

Is this quota efficient?: Inefficient

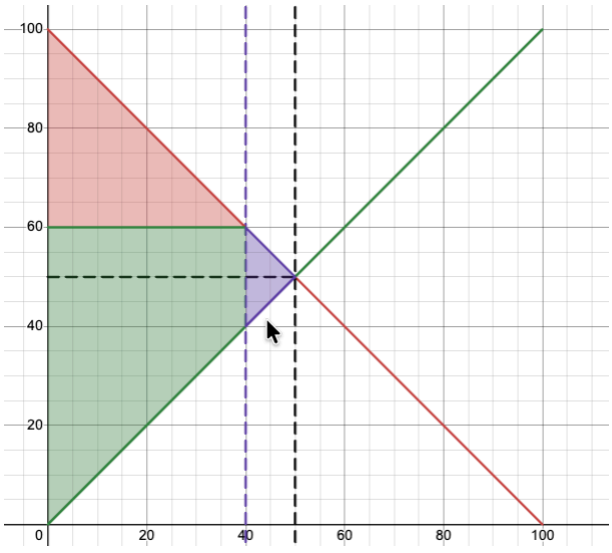
- Maximizing total Surplus
- Tota Surplus = Consumer Surplus + Producer Surplus + Government



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 $q_{\text{quota}} = 40$ What about a negative quota?: Inefficient

Loss on efficiency $\Longrightarrow$ 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

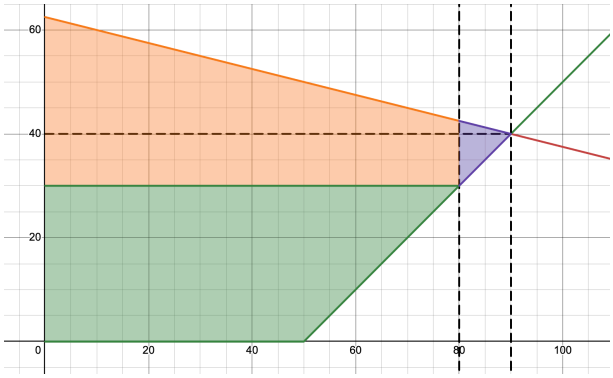
Example analysis (take note that the graph is hard to draw):

$q_d = 250 - 4p$

$q_s = 50 + p$

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.

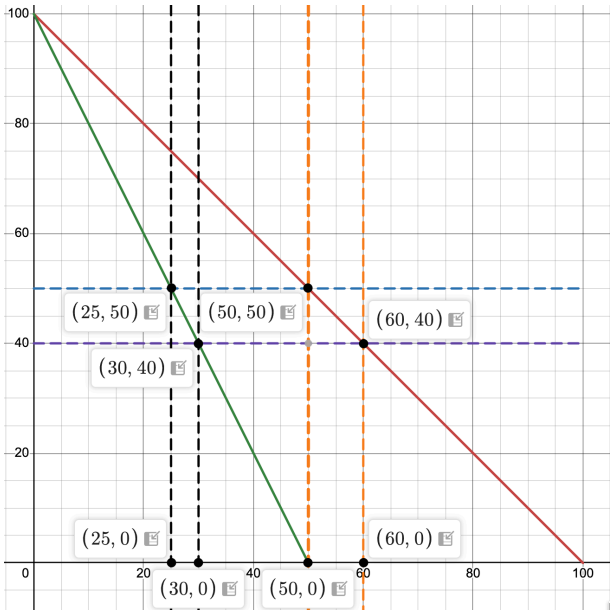
This model has a higher elasticity on the consumer side

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.

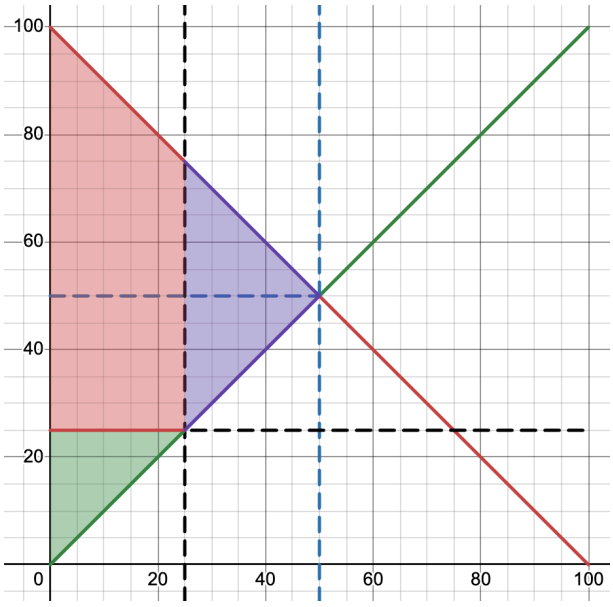
Point elasticity: $\frac{\Delta q}{\Delta p}$

Arcelaticity: $\frac{\Delta \% p}{\Delta \% q}$

Question:

Assume a mode in equilibrium

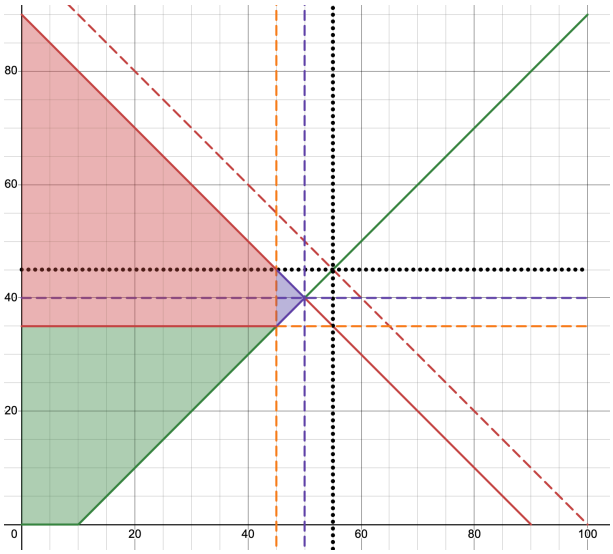
Give it a quota decrease and a price decrease



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

> ⚠ **Warning — Elasticity**
> The steeper the curve, the more **inelastic** it is.
>
> The flatter the curve, the more **elastic** it is.