EE211
PRINCIPLES OF MICROECONOMICS

Topic 2:Demand, Supply, and Equilibrium

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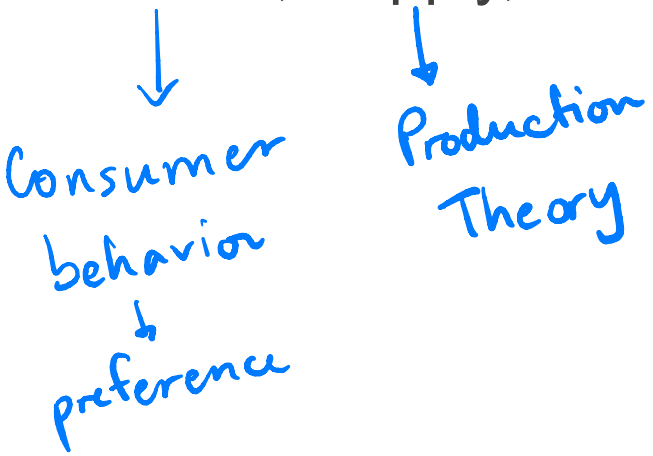
Topic 2:Demand, Supply, and Equilibrium



Topics

I. Market: Meaning and components
II. Demand
III. Supply
IV. Market equilibrium

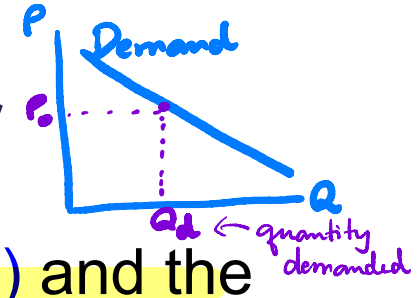
I. Meaning and Components of Market

- Market – a place where buyers and sellers make transactions.
  - Does it need to be a physical place?

- Types of market:
  - Commodity markets – consumption goods & services.
  - Factor markets → labor, capital → wage ~ price of factor.

- Market structure:
  - Perfect competition – many buyers & sellers ⇒ "price takers"
  - Monopolistic competition
  - Oligopoly (2-3 sellers) } sellers has market power → Moderna, Pfizer, J&J
  - Monopoly (1 seller) } → "OPEC"

II. Demand: Buyers' Behavior



- **Demand** is a relationship between the price (P) and the quantity demanded (Q_D) by consumers that they are *willing and able to pay*.
  - Quantity demanded is the amount of a good or service that consumers wish to purchase during some time period.

WTP

- **Law of demand:**

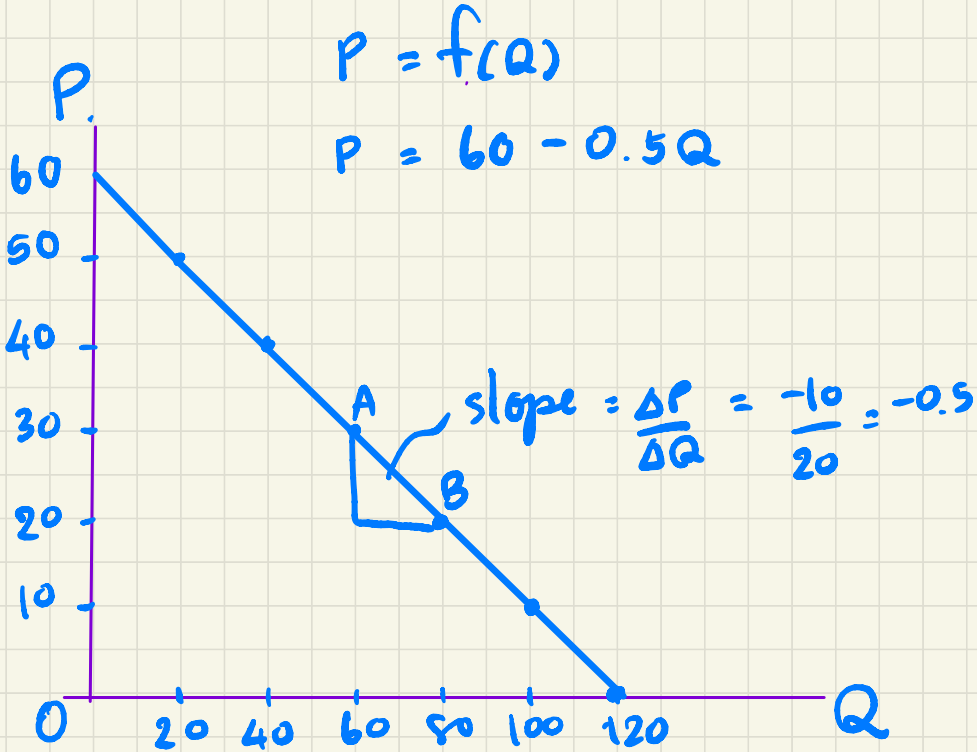
  "Holding other things constant, if the price increases (decreases), then the quantity demanded decreases (increases)."

  - The price and quantity demanded have inverse relationship.
  - The slope of demand is negative.

Example

Price	Quantity
0	120
10	100
20	80
30	60
40	40
50	20

Price	Quantity
0	120
10	100
20	80
30	60
40	40
50	20



$P = 60 - 0.5Q$

- $Q = 0$, $P = 60$
- $Q = 20$, $P = 50$

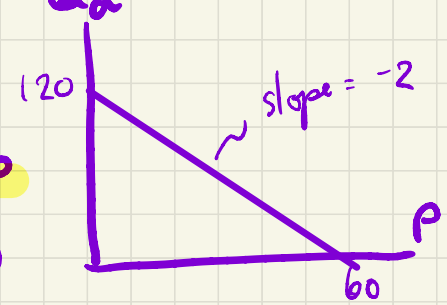
$\Rightarrow$ $Q = g(P) = ?$ Q_d

$0.5Q = 60 - P$

$Q = 120 - 2P$

↳ $P = 60 \Rightarrow Q_d = 0$

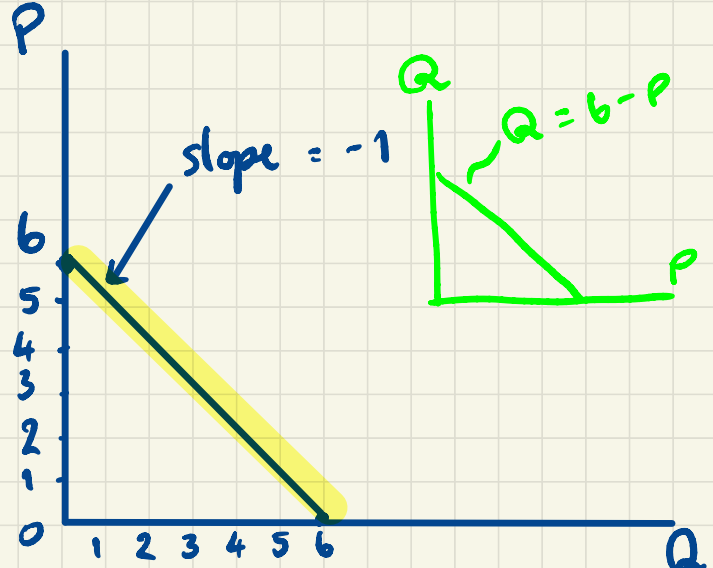
$P = 30 \Rightarrow Q_d = 60$



Exercise. Given D_1 : $P = 6 - Q$

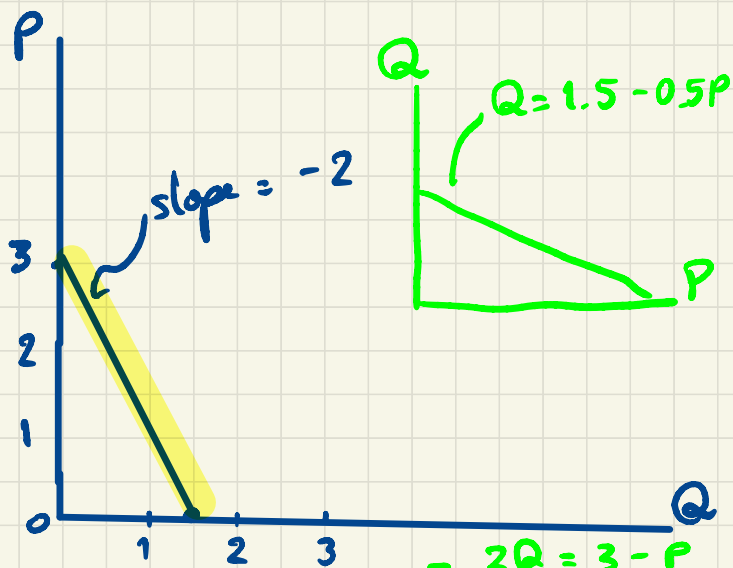
D_2 : $P = 3 - 2Q$

Draw the corresponding demand curves.



$P = 6 - Q$: $P = f(Q)$

↳ $Q = 6 - P$; $Q = g(P)$



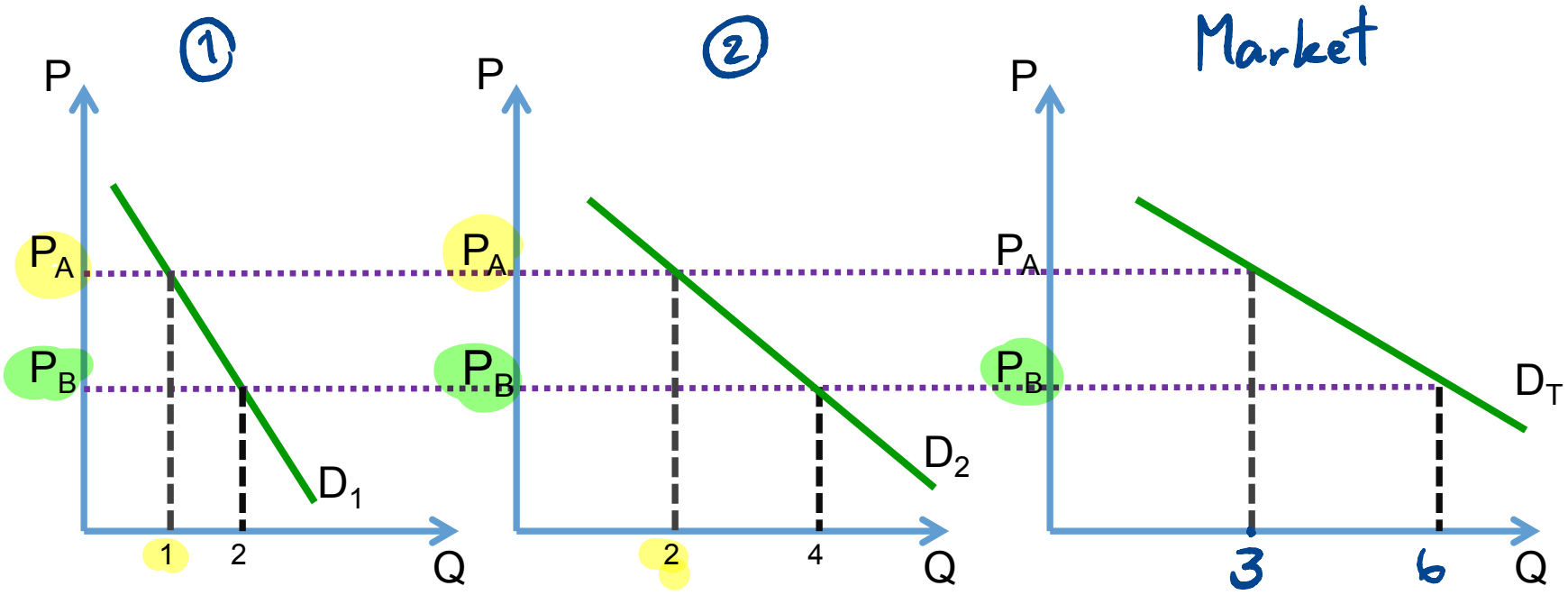
$P = 3 - 2Q$ → $2Q = 3 - P$ → $Q = 1.5 - \frac{1}{2}P$

$P = 0 \Rightarrow 0 = 3 - 2Q \Rightarrow Q = 1.5$

↳ $Q = g(P) = ?$

Individual and Market Demands

- Market demand can be derived from a horizontal sum of individual demands.



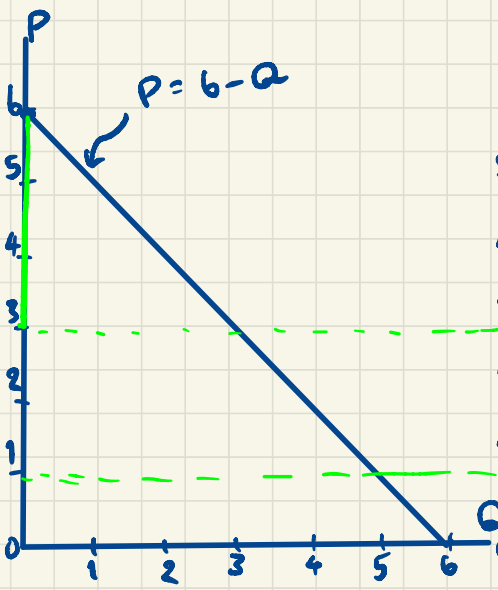
Market Demand

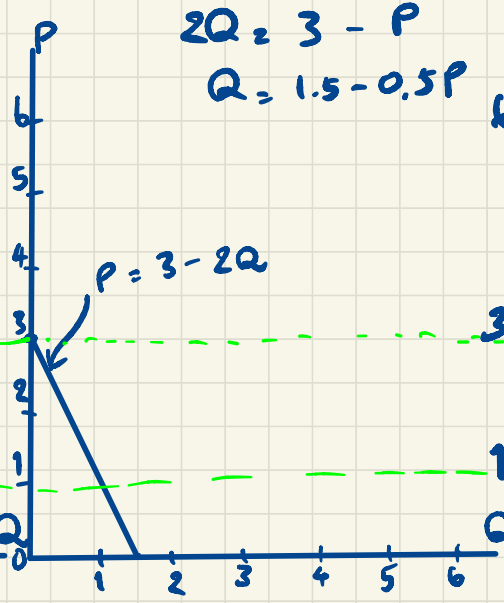
D_1: $P = 6 - Q$

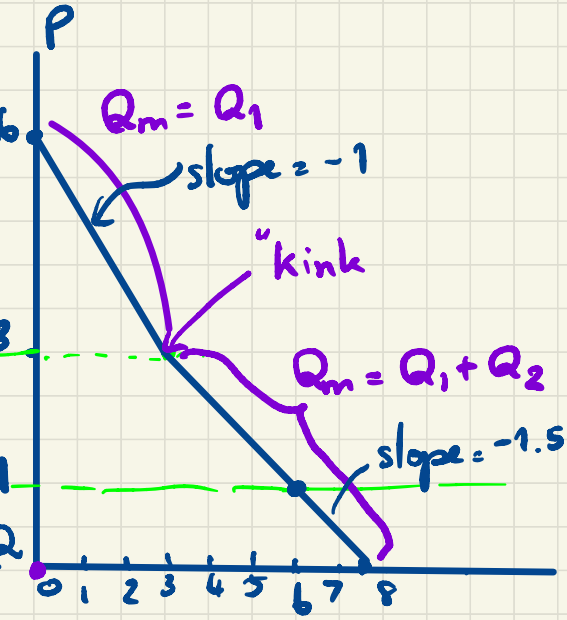
D_2: $P = 3 - 2Q$

$2Q = 3 - P$

$Q = 1.5 - 0.5P$







$P = 6 \Rightarrow Q_1 = 0$

$P = 3 \Rightarrow Q_1 = 3$

$P = 1 \Rightarrow Q_1 = 5$

$P = 0 \Rightarrow Q_1 = 6$

$P = 6,\ Q_2 = 0$

$P = 3,\ Q_2 = 0$

$P = 1,\ Q_2 = 1$

$P = 0,\ Q_2 = 1.5$

$P = 6,\ Q_m = 0$

$P = 3,\ Q_m = 3$

$P = 1,\ Q_m = 6$

$P = 0,\ Q_m = 7.5$

Given $P = 6 - Q_1$

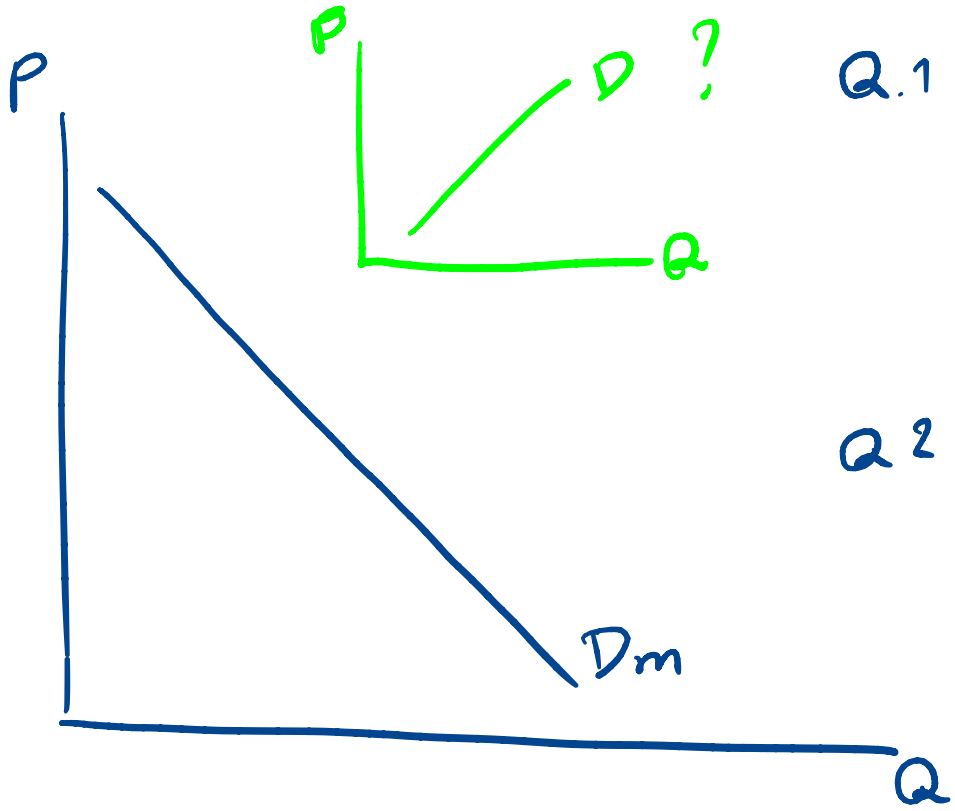
$P = 3 - 2Q_2$,

Market Demand:

$$Q_m = \begin{cases} Q_1 & \text{if } P \geq 3 \\ Q_1 + Q_2 & \text{if } P < 3 \end{cases}$$

$$Q_m = \begin{cases} 6 - Q_1 & \text{if } P \geq 3 \\ 7.5 - 1.5P & \text{if } < 3 \end{cases}$$

Example: Market Demand



Q.1 : Is it possible to have an upward-sloping demand curve?
↳ "Giffen good"

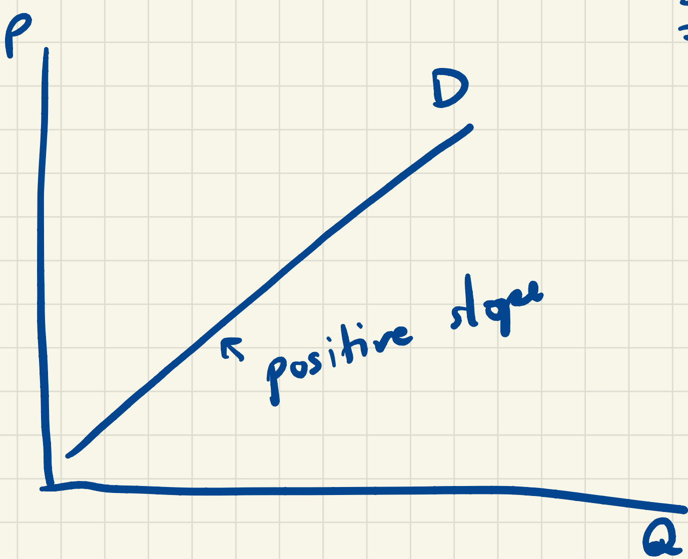
Q2 : Any possibilities of horizontal and vertical examples?

"Giffen" Goods

"Necessities"

- Goods that you consume less (more) when its price is lower (higher)

Ex potatoes, low-quality rice
staples

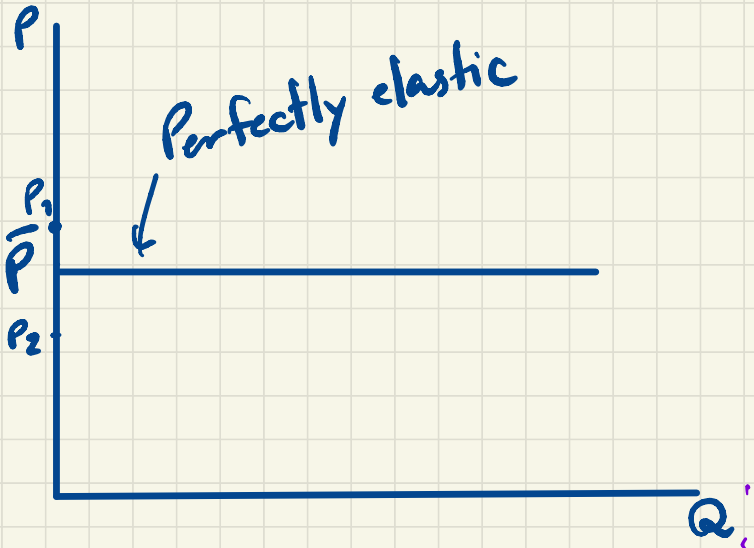


Price of potatoes ⇑

Substitution effect: − −

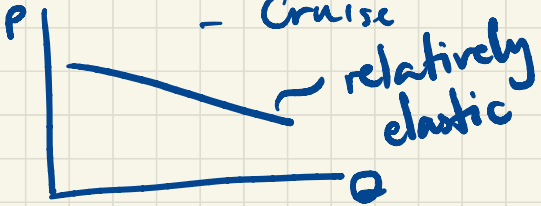
Income effect (↑ Ability to pay)
meat − − − −
potatoes + + + +

Horizontal Demand

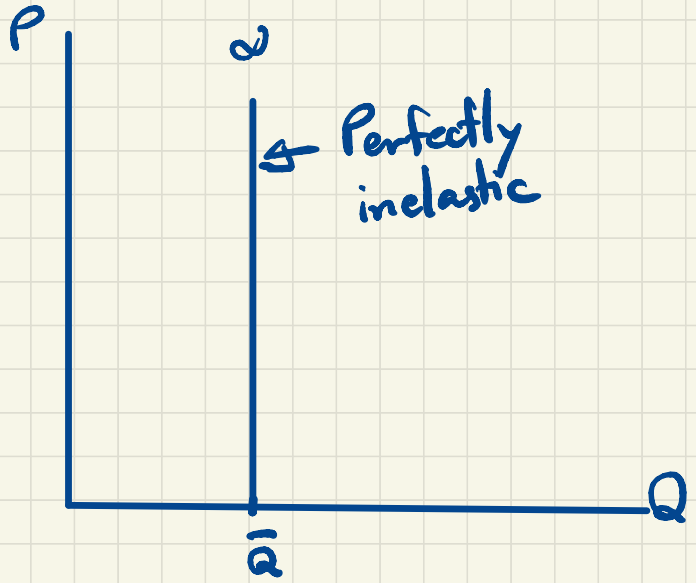


"Not necessary" - Luxury

Examples - Brand-name goods
- Cruise

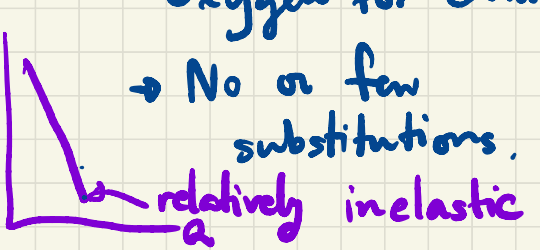


Vertical Demand



Ex: - Life-saving medicine
- Oxygen for covid-19.

→ No or few substitutions.



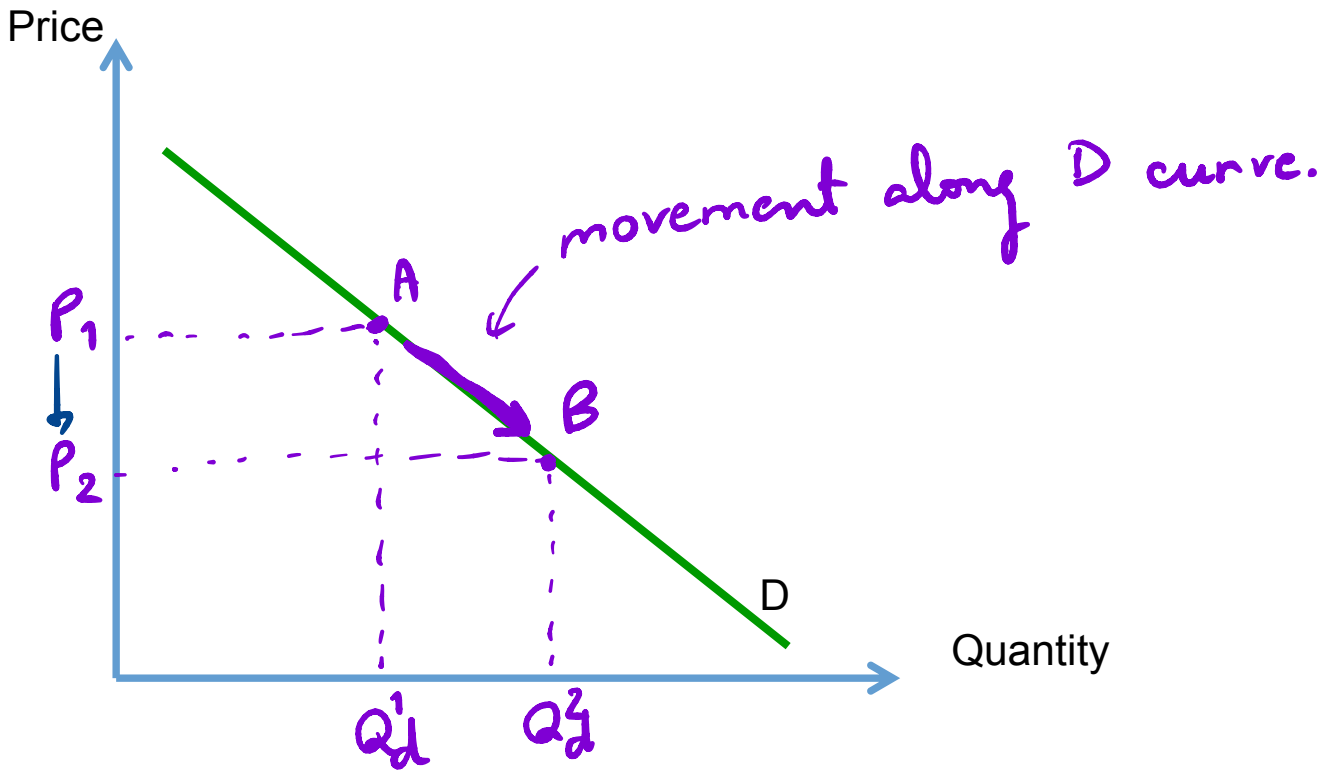
The Determinants of Demand

- *Price* (its own price) → movement along demand curve
- ✓Income
  - Higher income → more demand
- Taste
- ✓Price of other products
  - Substitutes
  - Complements
- Expectations

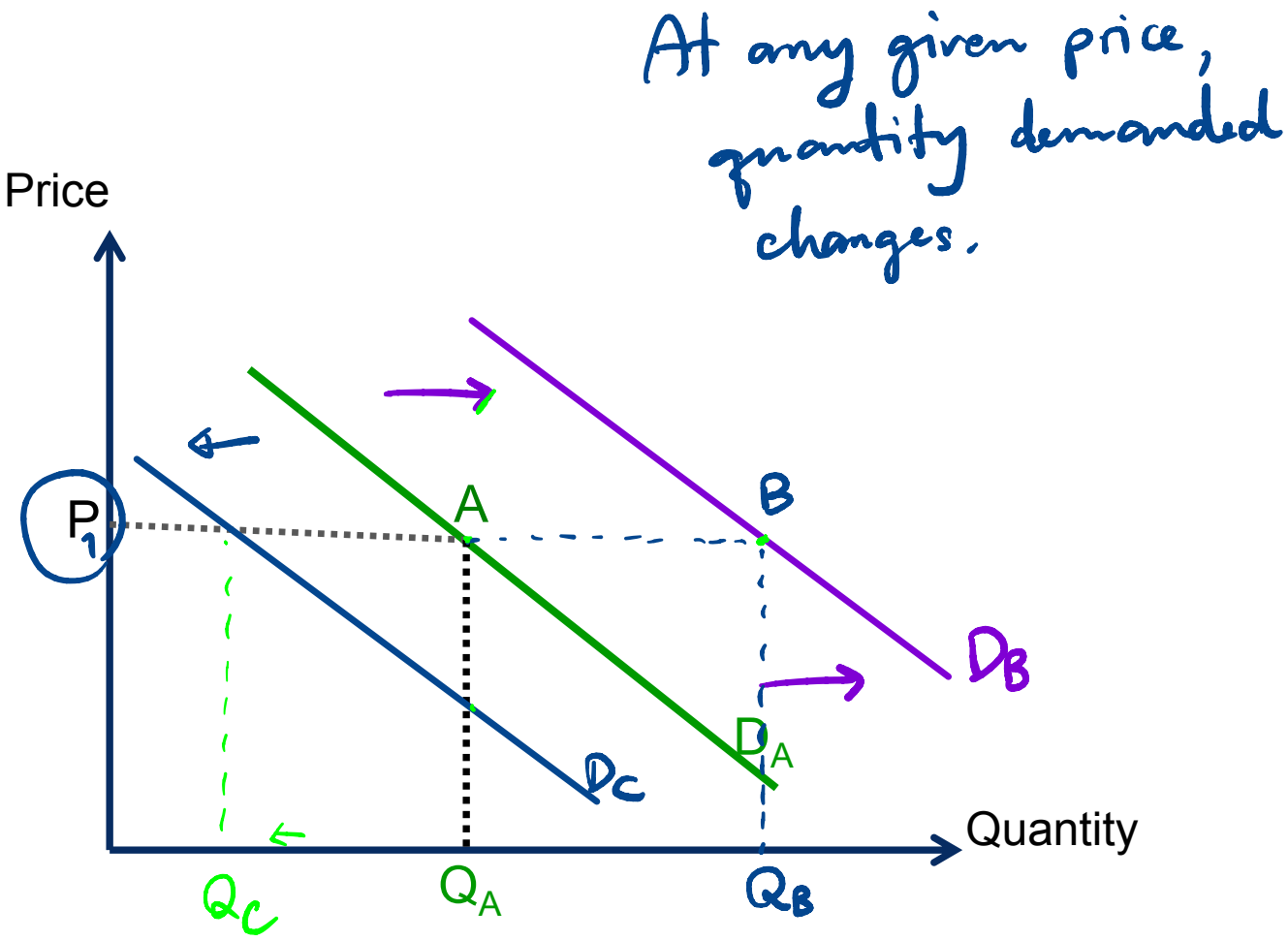
shift of demand curve.

Change in Quantity Demanded

(as a result of price change)

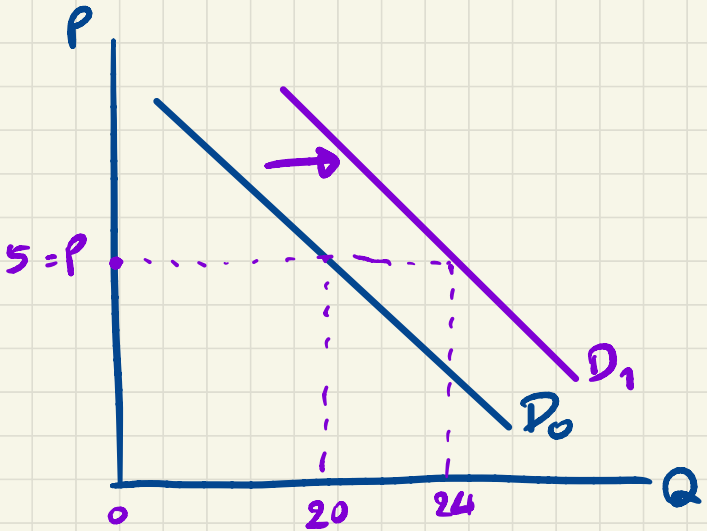


Change (or Shift) in Demand



① Demand Shifter : INCOME

Suppose income increases

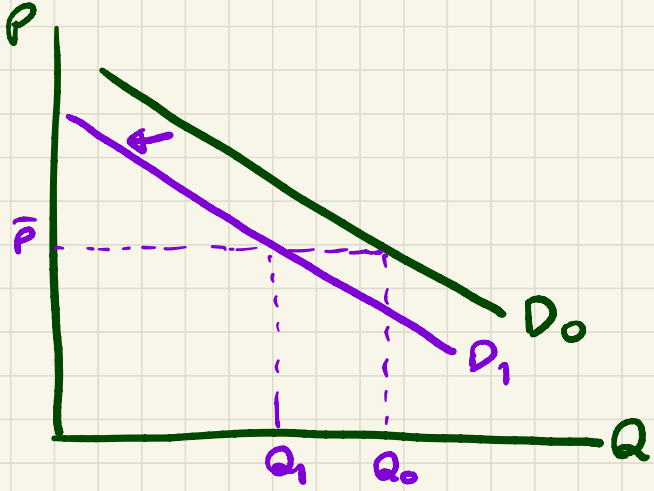


$I_0 = 100$, $P_5 \Rightarrow Q_d^0 = 20$

$I_1 = 120$, $P_5 \Rightarrow Q_d^1 = 24$

"Normal goods" : $I \uparrow \Rightarrow Q_d \uparrow$

Cases when income ↑ (1), Q_d is lower?



"Inferior goods" : $I \uparrow \Rightarrow Q_d \downarrow$

e.g. noodles, potatoes

② Demand Shifter : Price of related goods

substitution complements.

- Substitutes : goods that can be used in place of another goods.

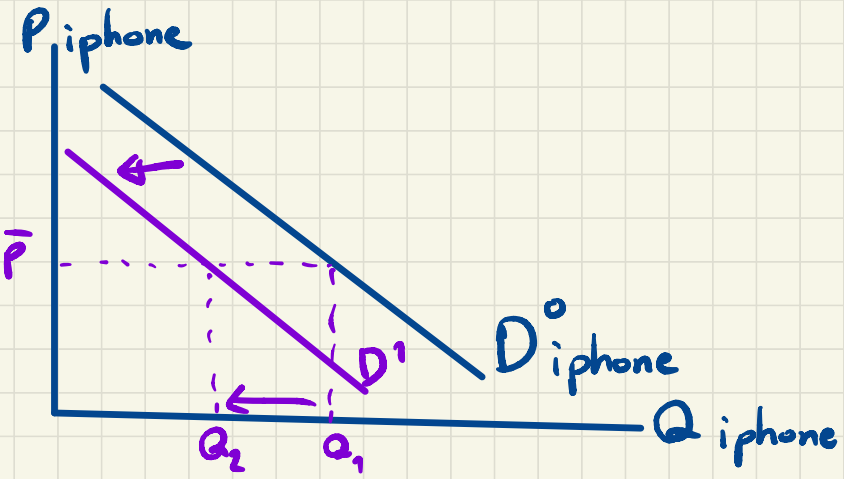
  Ex . Iphone & Samsung phone
  . Coke & Pepsi
  . Sara & Tylenol

- Complements : goods that are consumed together.

  Ex . Apple pencil & Ipad
  . Keyboard & computer
  . car & gasoline.

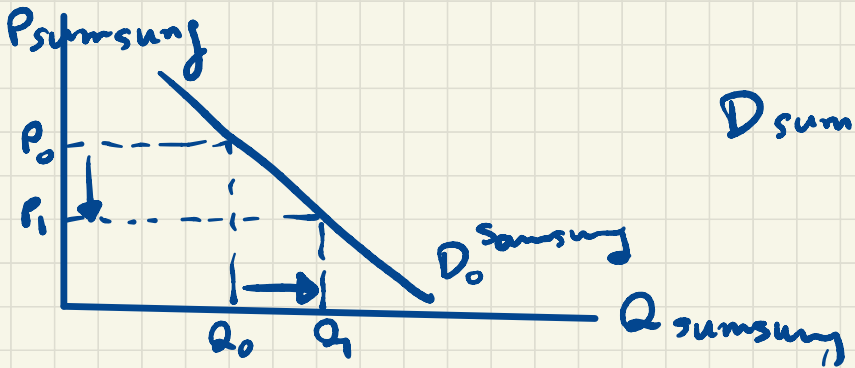
2.1 Price of substitute

- If price of samsung mobile phones decreases, what happen to demand of an Iphone? (price of Iphone is constant.)



Price of substitute ↓ (↑)

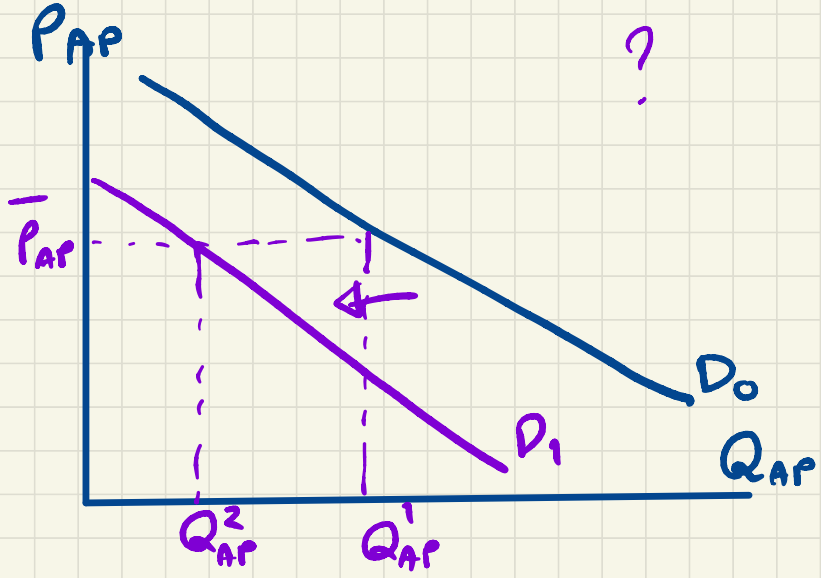
⇒ D shifts left. (right)

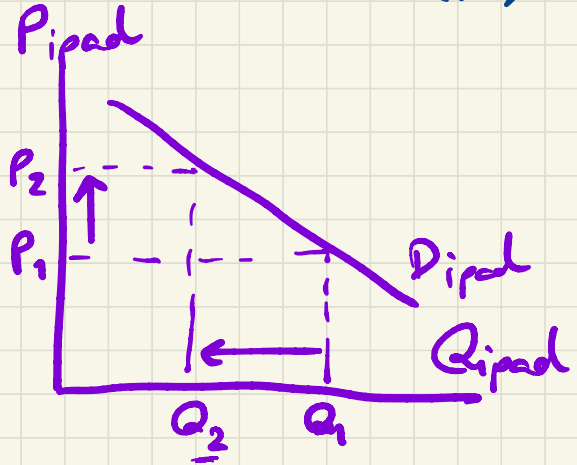


D samsung ↑

2.2 Price of complements

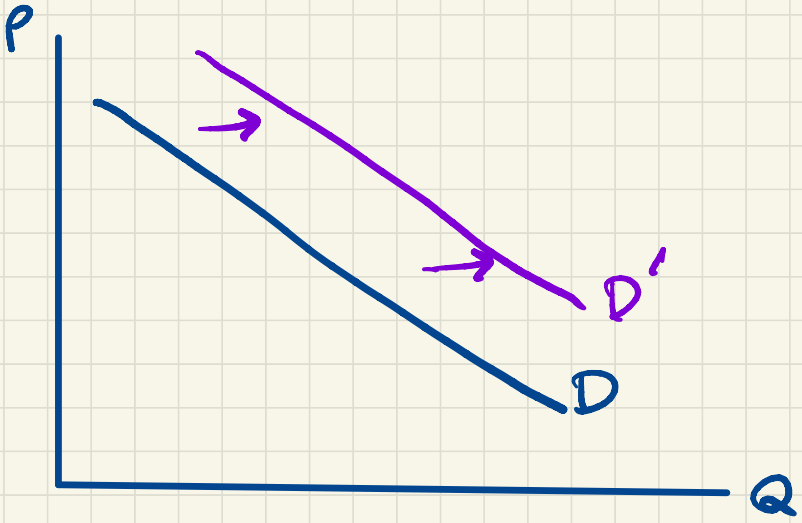
- Suppose Price of iPad ↑, what happens to Dapple pencil (AP)?





3. Expectation

Ex. Suppose People expect that there 'll be another variant of Covid-19 called "Omega". What would happen to demand for Covid-19 vaccine?



II. Supply: Sellers' Behavior

- **Supply** is the relationship between price (P) and quantity supplied (Q_s) that the producer(s) is willing and able to sell.
  - Quantity supplied is the amount of a good or service that producers wish to sell during some time period.

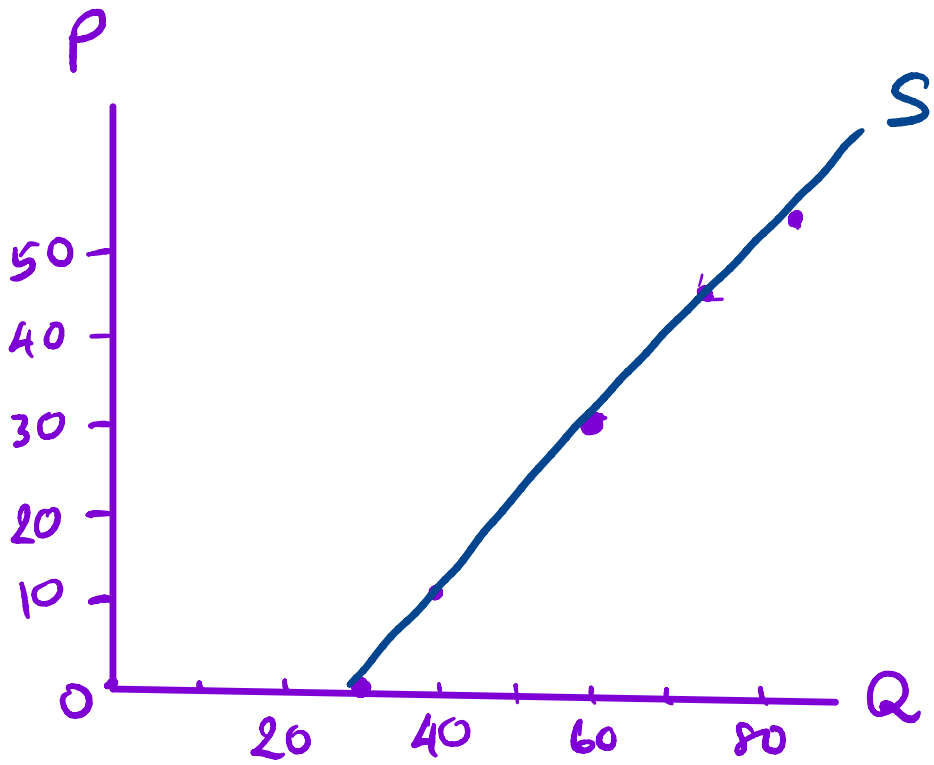
- **Law of Supply**:

"Given all factors being constant, if the price increases, then the quantity supplied will increase."

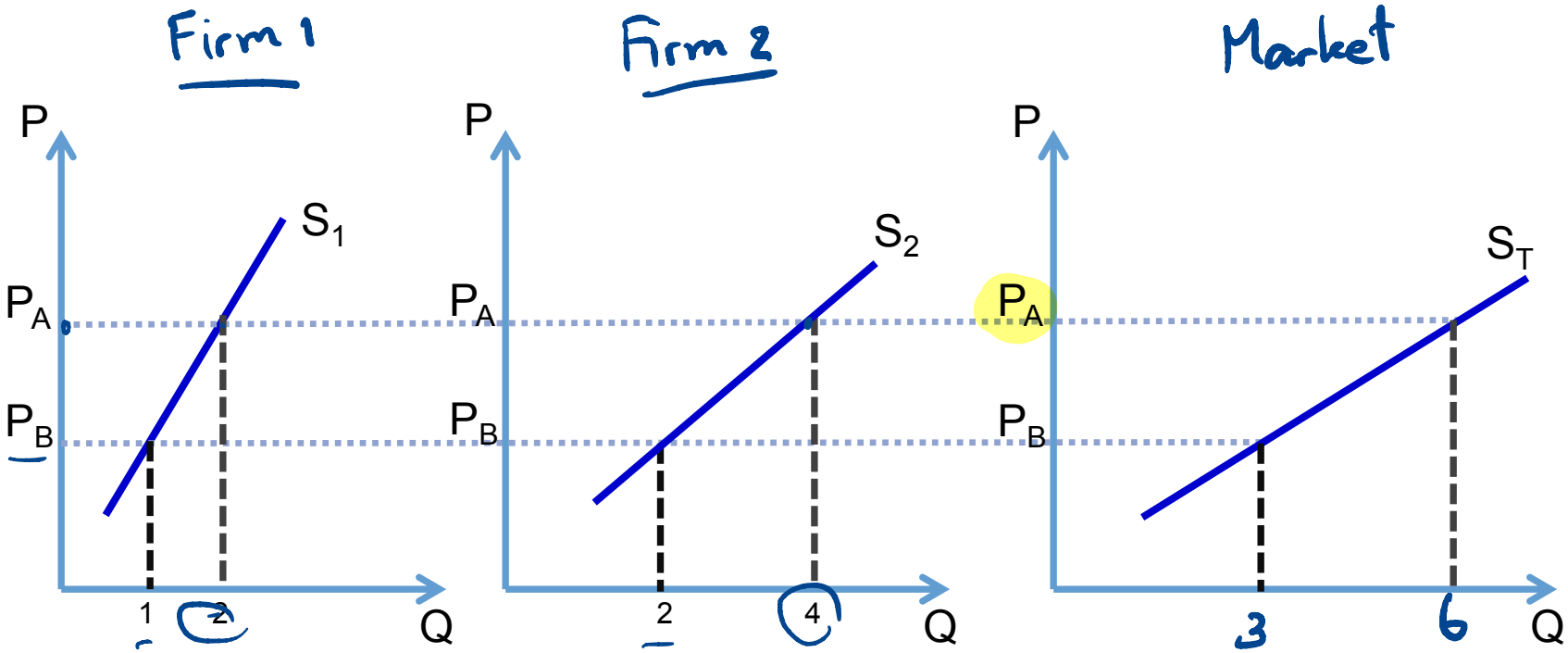
  - Price and quantity supplied have a direct relationship.
  - Slope of supply is positive.

Example

Price	Quantity
0	30
10	40
20	50
30	60
40	70
50	80

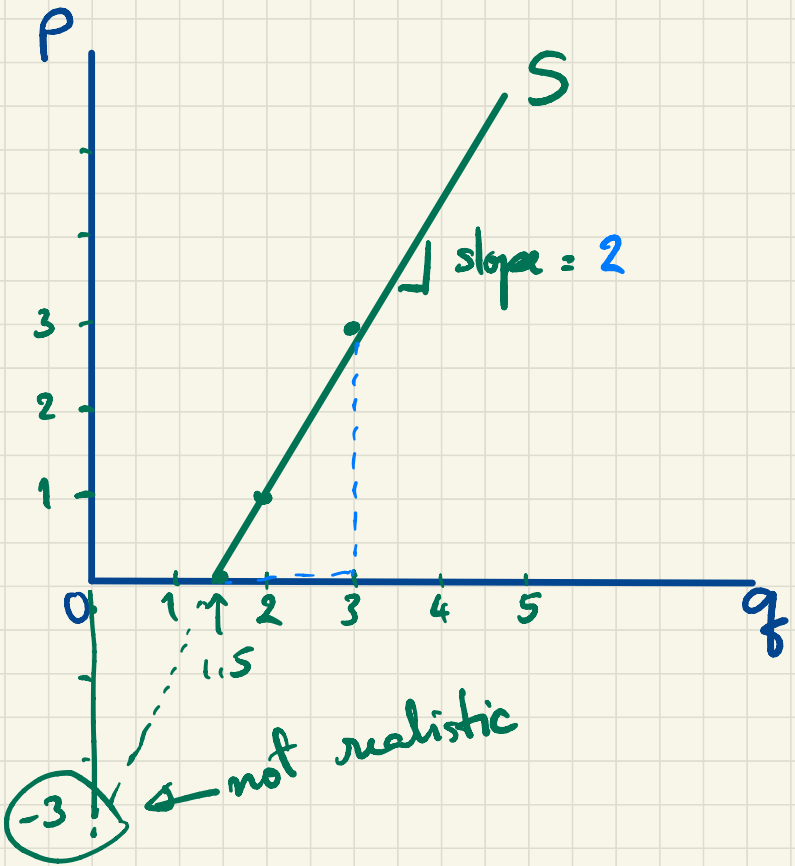


Firm and Market Supplies



Ex Suppose there are 4 identical sellers, and their supply curve is: $P = -3 + 2q$ (q is a firm's supply).

Derive the market supply.



$P = -3 + 2q$

$P = 0 \Rightarrow 0 = -3 + 2q$

$q = 1.5$

$P = 1 \Rightarrow 1 = -3 + 2q$

$q = 2$

$P = 3 \Rightarrow 3 = -3 + 2q$

$q = 3$

slope $= \frac{\Delta P}{\Delta q} = \frac{3}{1.5} = 2$

Market supply.

$P = 0 \rightarrow Q_m^S = 4 \times 1.5 = 6$ units

$P = 1 \rightarrow Q_m^S = 4 \times 2 = 8$ units

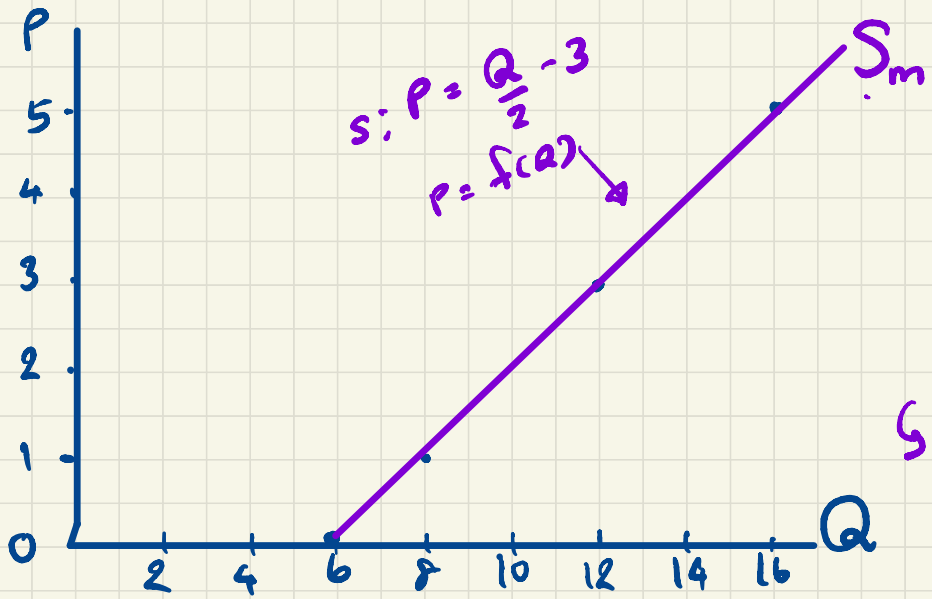
$P = 3 \rightarrow Q_m^S = 4 \times 3 = 12$ units

$P = 5 \rightarrow Q_m^S = 4 \times 4 = 16$ units.

$$Q_m^S = \sum_{i=1}^{4} q_i$$

$$= 4^2\left(\frac{P+3}{2_1}\right)$$

$$Q_m = 2P + 6$$



Firm's supply:

$P = -3 + 2q$

$2q = P + 3$

$q_i = \frac{P+3}{2}$.

$Q_m = 2P + 6$

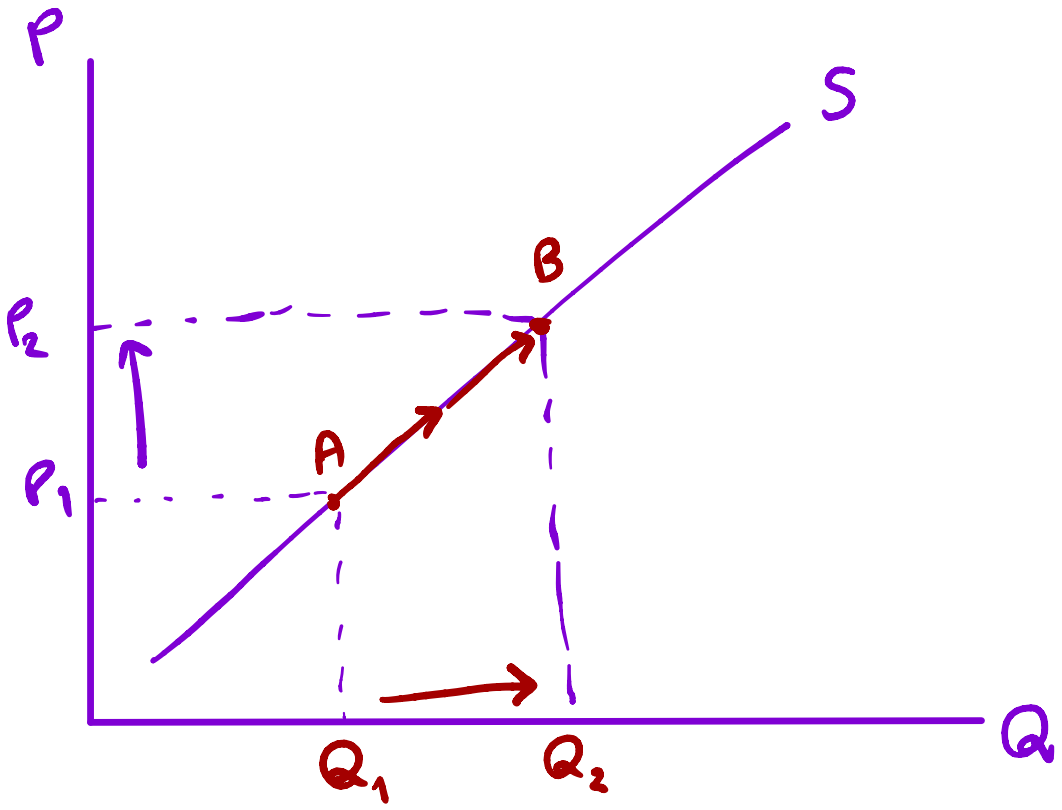
↳ Inverse function

$2P = Q_m - 6$

$P = \frac{Q_m}{2} - 3$

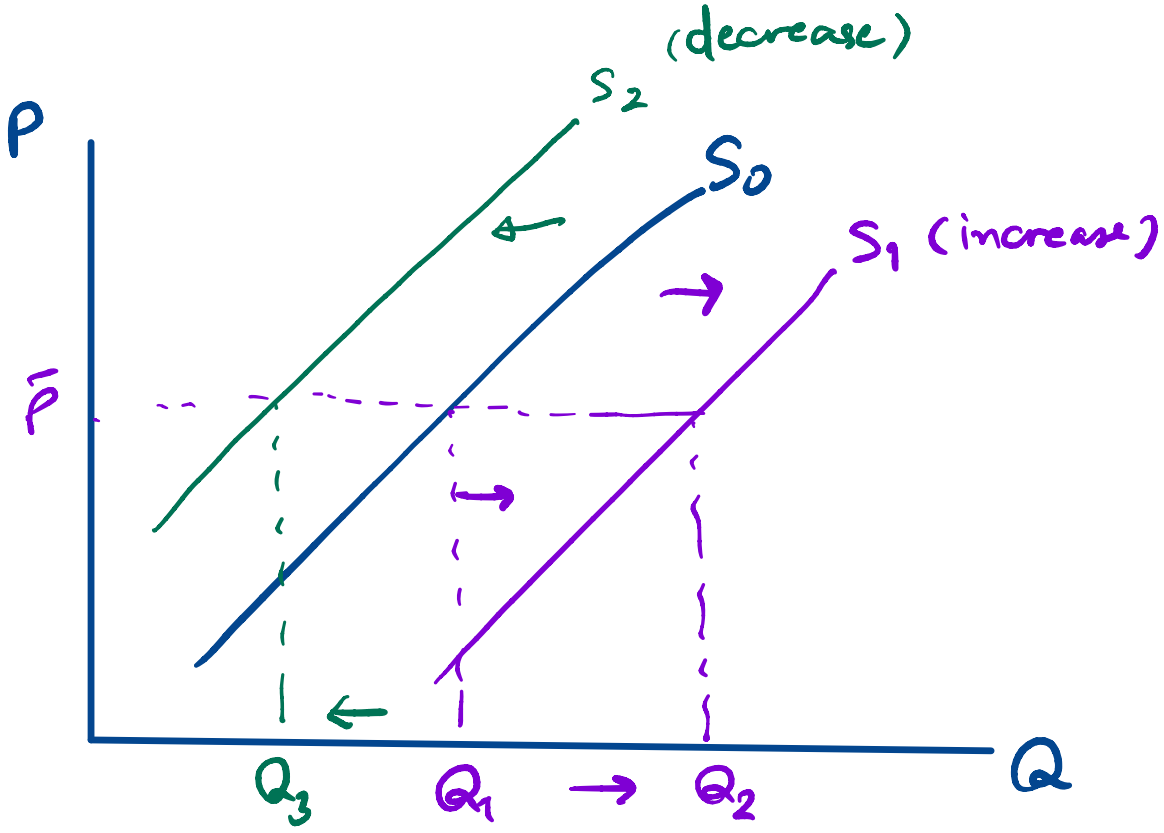
Change in Quantity Supplied

↳ movement along supply curve Q_S as a result price changes.



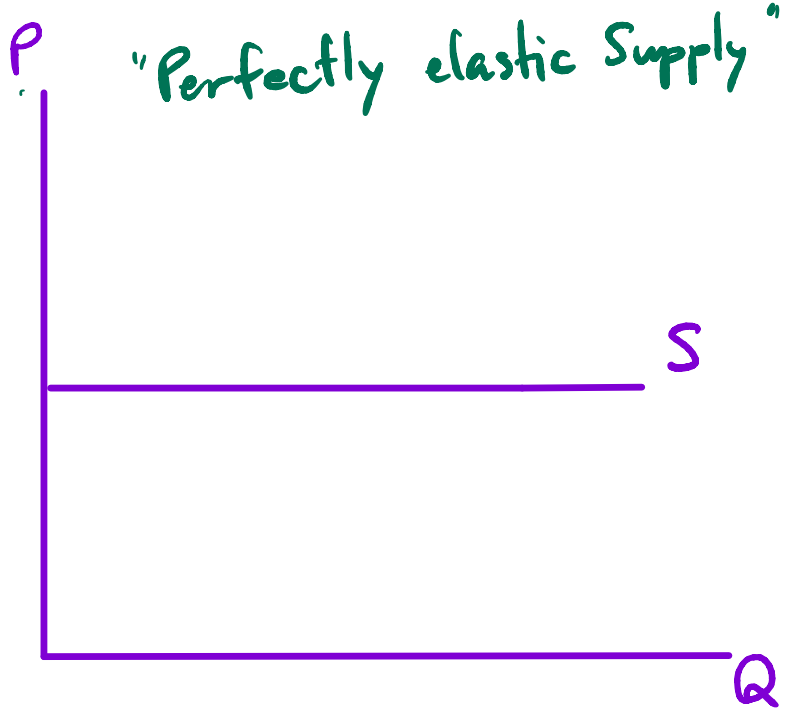
Change (or Shift) in Supply

at any given price



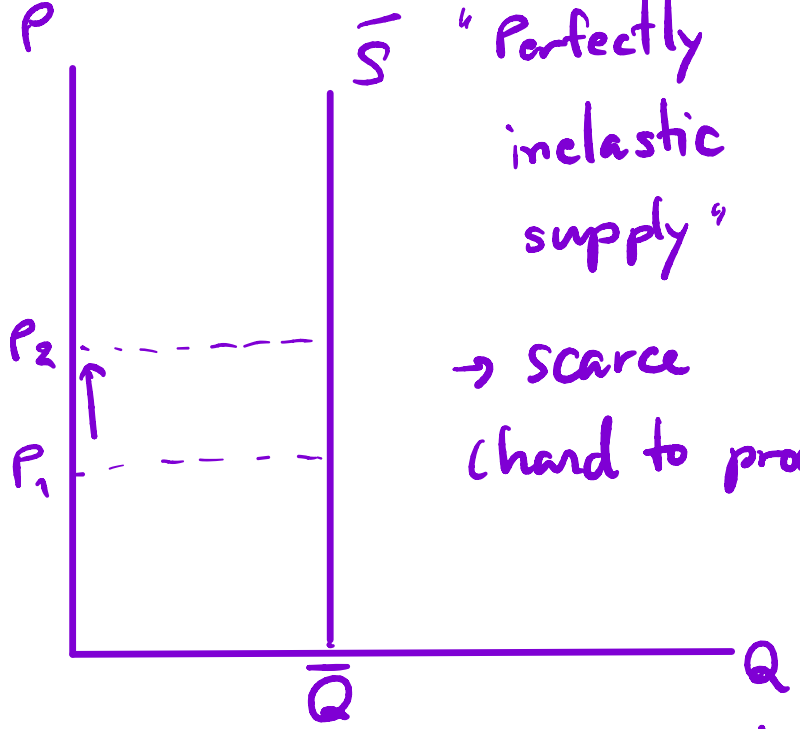
Extreme Cases of Supply

- Horizontal supply curve



→ easy to produce
"Youtube" video clips

- Vertical supply curve



- Goods that require LR production time period..
- Land

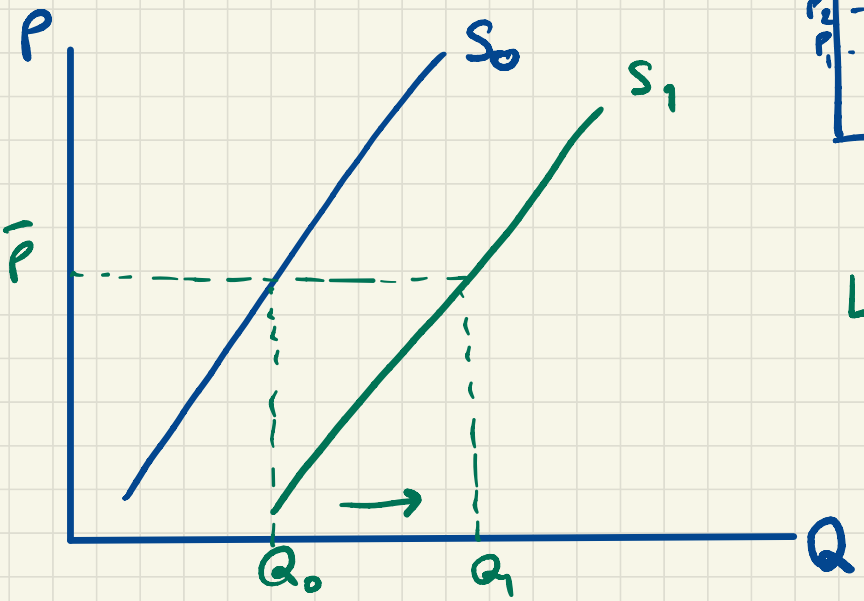
The Determinants of Supply

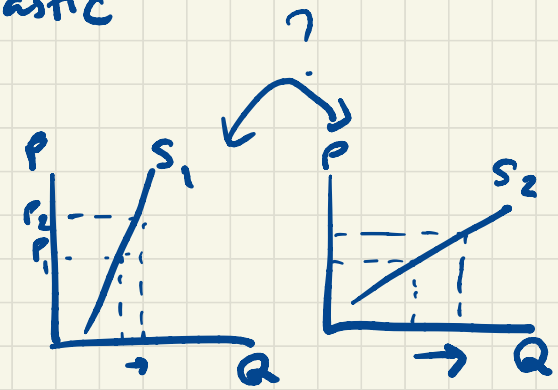
- *Price* → movement along the supply curve.
- Input costs
- Technology
- Number of sellers
- Expectation

} Supply shifters

Input cost → relatively inelastic

Ex Covid-19 Vaccine producers





✓

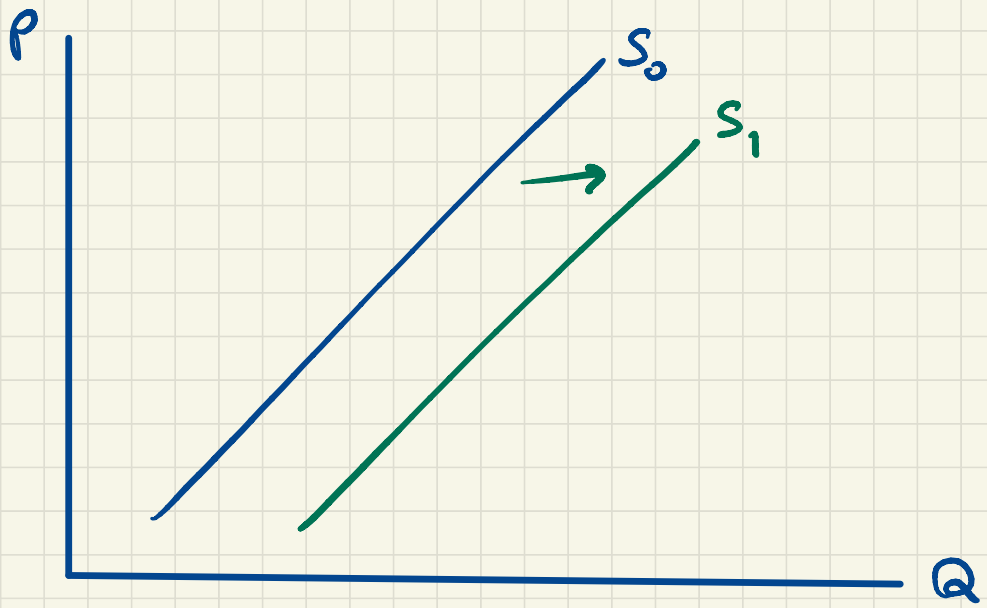
Lower cost.

⇒ ⇑ supply (shift to right)

Suppose the transaction costs of producing vaccine ↓.

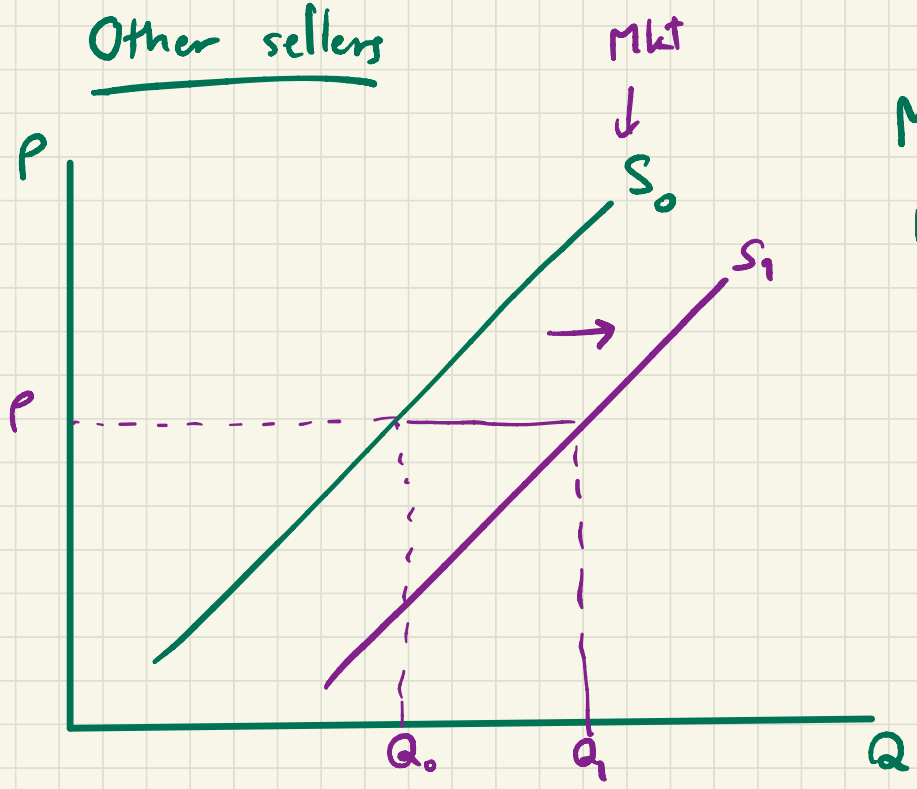
- transportation
- storage ; FDA approval cost less

Change in Technology



Suppose we have a new technology that can produce mRNA or viral vector vaccine at a cheaper price.

Other sellers



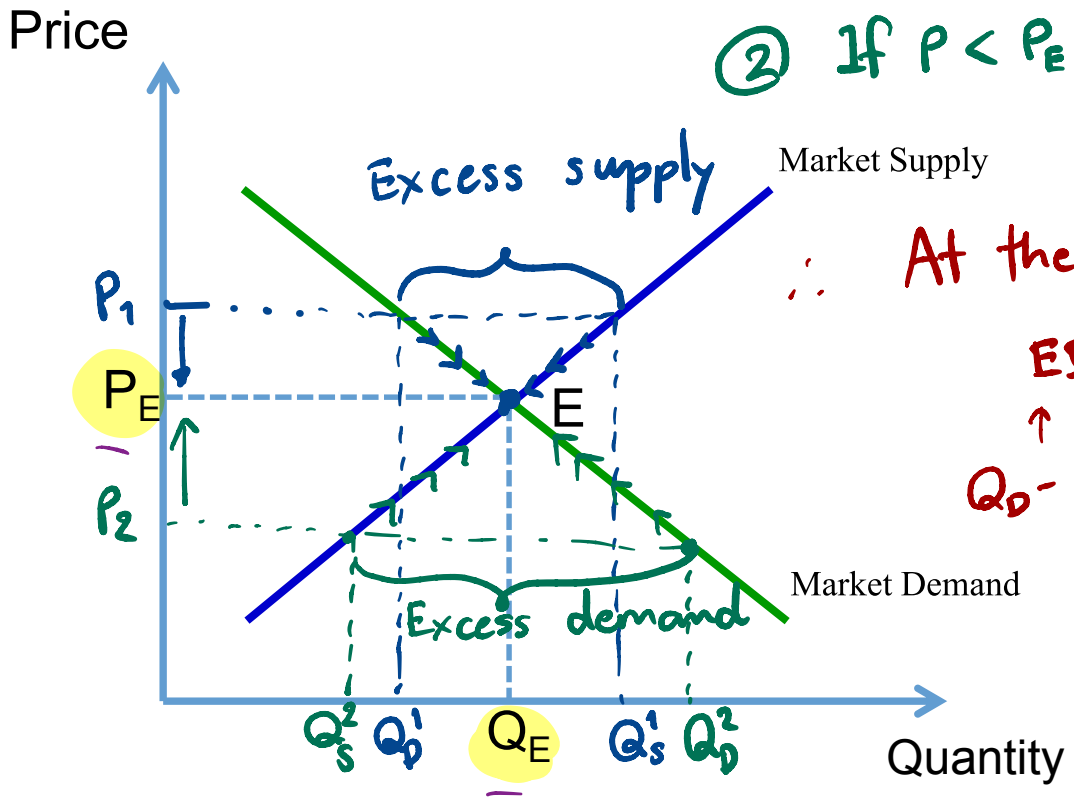
Astra Zeneca
Moderna
Pfizer.
Sputnik.
Sinovac.
Sinopharm
J & J.
Canadian vac.

Suppose there are 10 more producers (eg. Chula-vac, ...) in the market.

III. Market Equilibrium → No tendency to change

① If $P > P_E$, $Q_S > Q_D$: "Excess supply" (ES)

② If $P < P_E$, $Q_D > Q_S$: "Excess demand" (ED)



∴ At the equilibrium,

$ED = 0$ & $ES = 0$

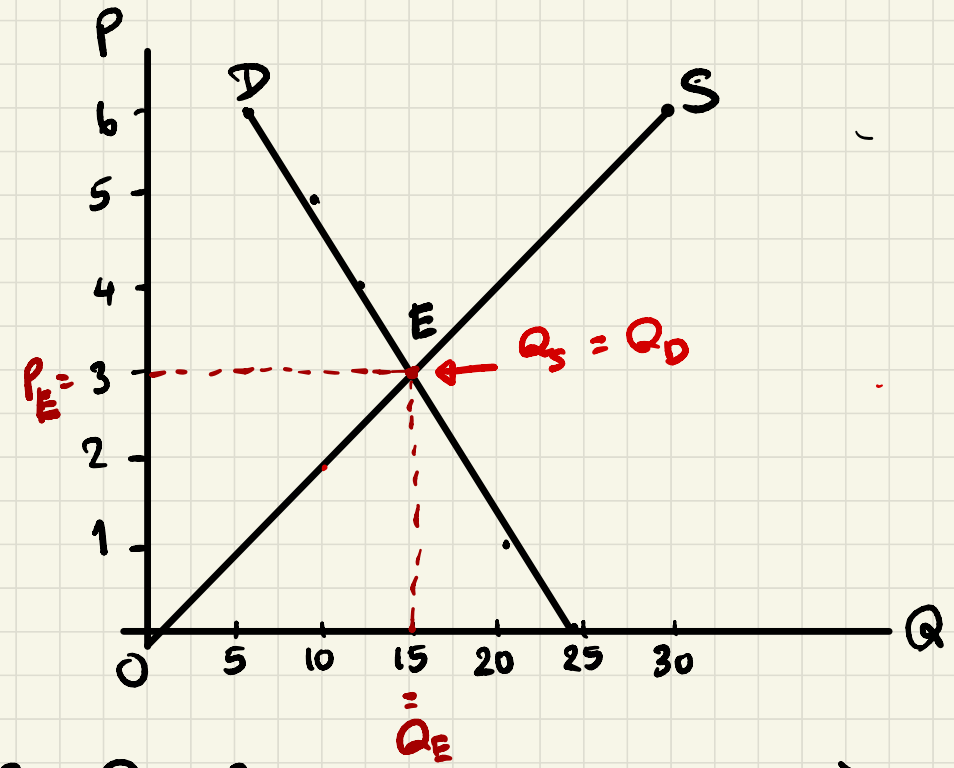
$Q_D - Q_S = 0$ $\quad$ $Q_S - Q_D = 0$

$Q_S = Q_D = Q_E$

Ex

P	Q^D	Q^S
$0	24	0
1	21	5
2	18	10
3	15	15
4	12	20
5	9	25
6	6	30

Draw D & S curves and determine mkt equilibrium $(P^*, Q^*) = ?$



At $P = 4$, $Q_D = 12$, $Q_S = 20$ $\Rightarrow Q_S > Q_D$; $ES = 8 > 0$

At $P = 2$, $Q_D = 18$, $Q_S = 10$ $\Rightarrow Q_D > Q_S$; $ED = 8 > 0$

Shocking the Equilibrium and Adjustments

- When demand curve shifts.
  - E.g. Income changes, price of related products changes
    complement substitute.
- When supply curve shifts
  - E.g. Technology improves. → input cost is lower.
    . Number of sellers change
- When both demand and supply curve shift.

Changes in Market Equilibrium

For any change (shock or event),

* 1. Decide whether the event shifts D curve or S curve, or both.

2. Decide in which direction the curve(s) in #1 shifts.

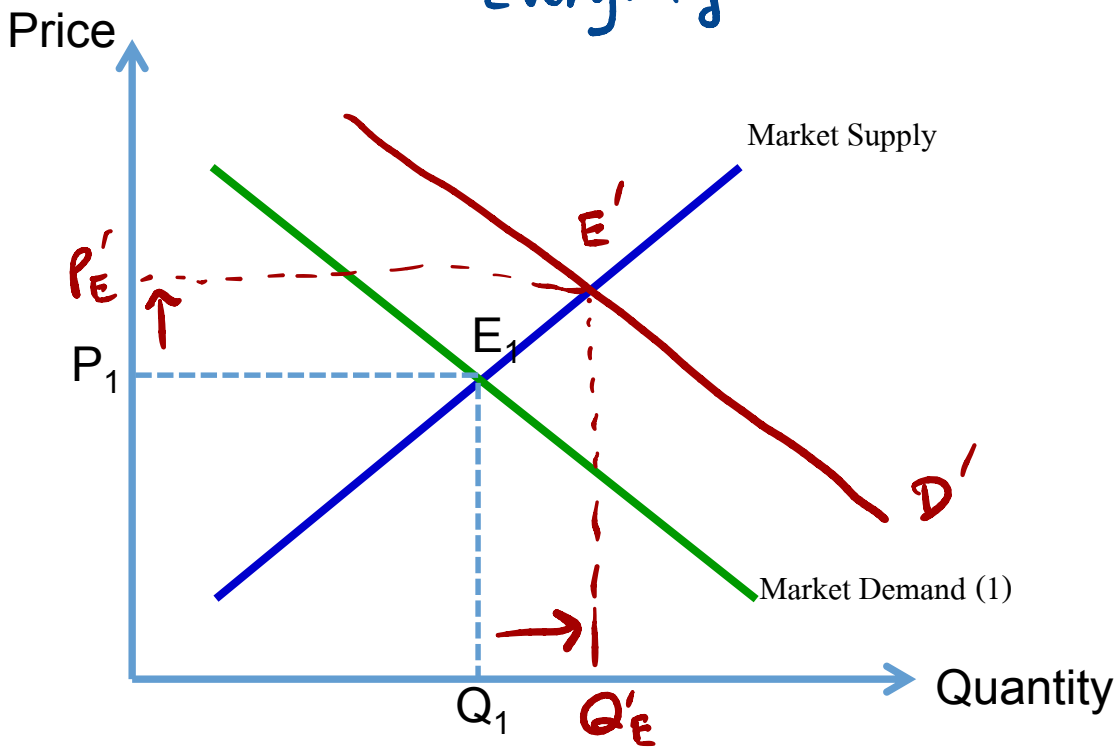
3. Use the demand-supply diagram to see how the shift changes P_E and Q_E.

Market Equilibrium: When Demand Curve Shifts

$D \uparrow \Rightarrow P_E \uparrow$ & $Q_E \uparrow$

- Suppose the consumers' income increase.

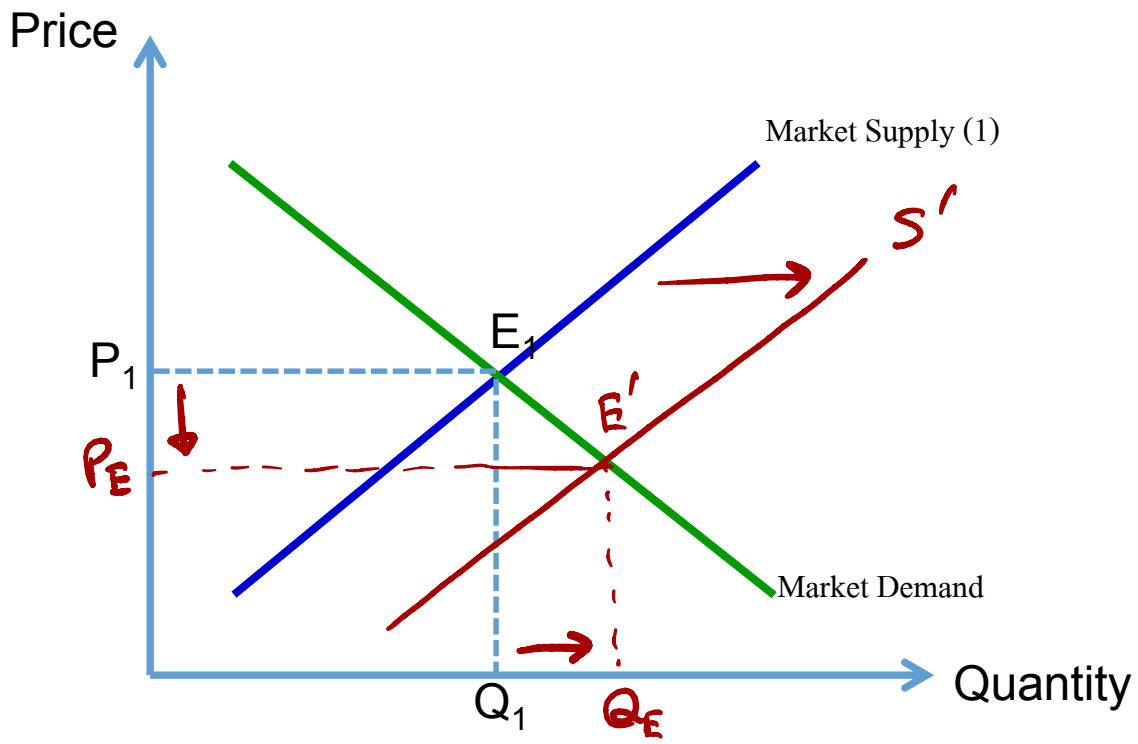
everything else constant.



Market Equilibrium: When Supply Curve Shifts

- Suppose the price of input decreases.

$S \uparrow \Rightarrow P_E \downarrow \& Q_E \uparrow$

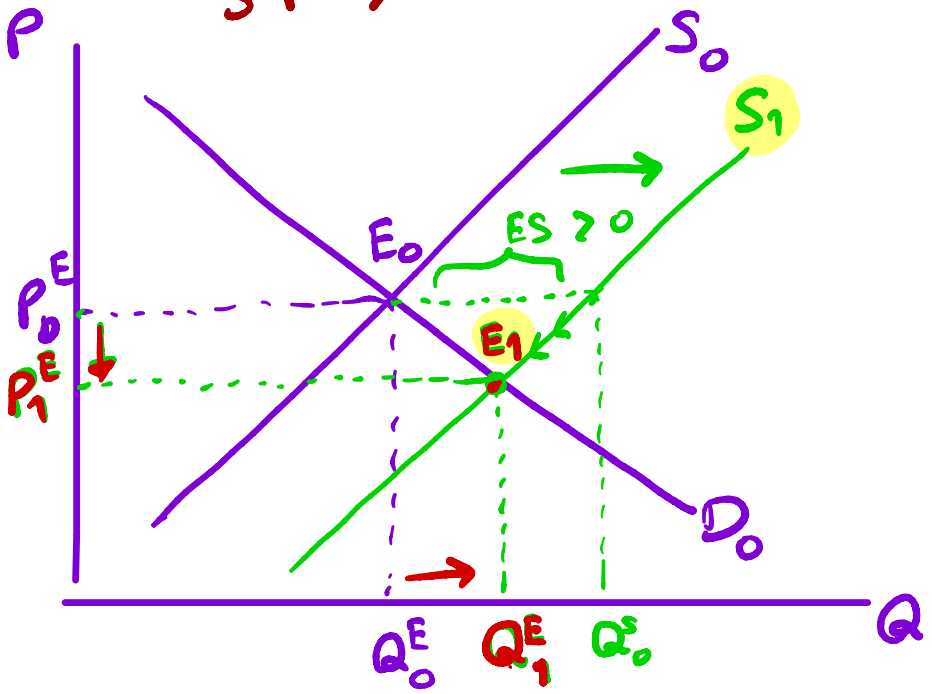


Market Equilibrium: When Both Demand and Supply Shift.

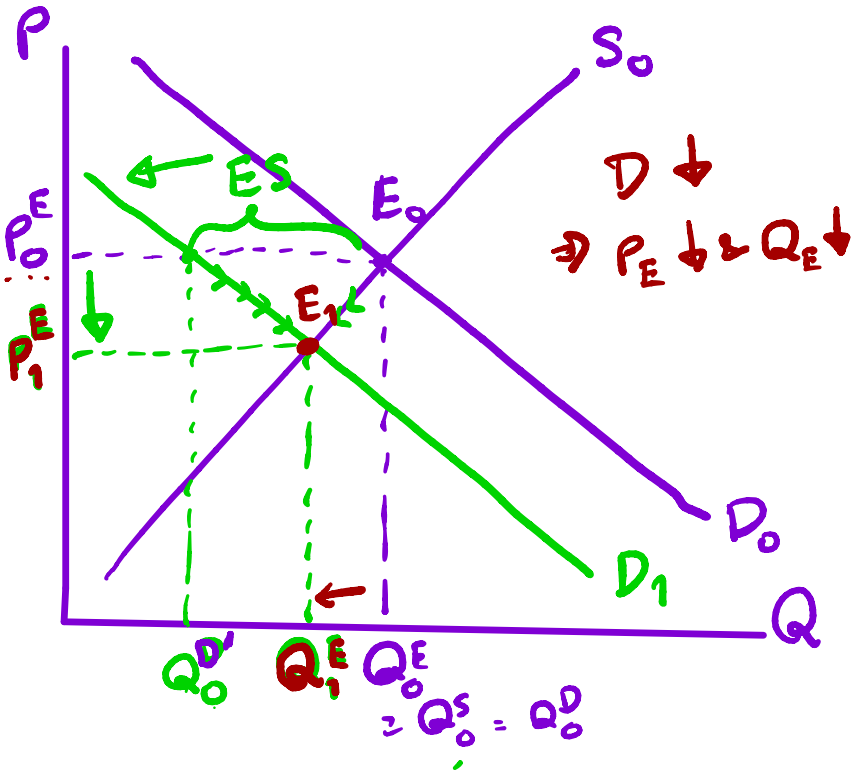
Consider Covid-19 mRNA vaccine market.

① More mRNA vaccine producers

$S \uparrow \Rightarrow P_E \downarrow$ & $Q_E \uparrow$



② New & effective inhaled vaccine that can be used instead of mRNA vaccine. Substitute for mRNA

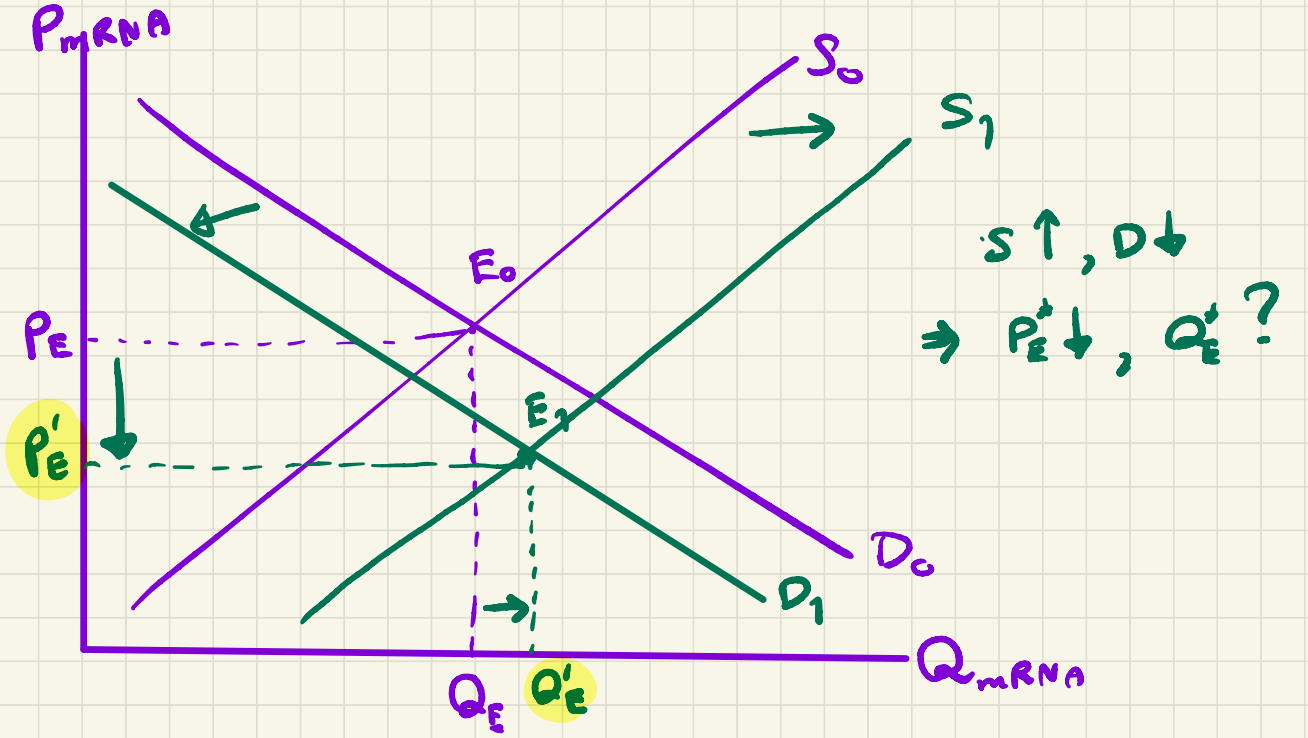


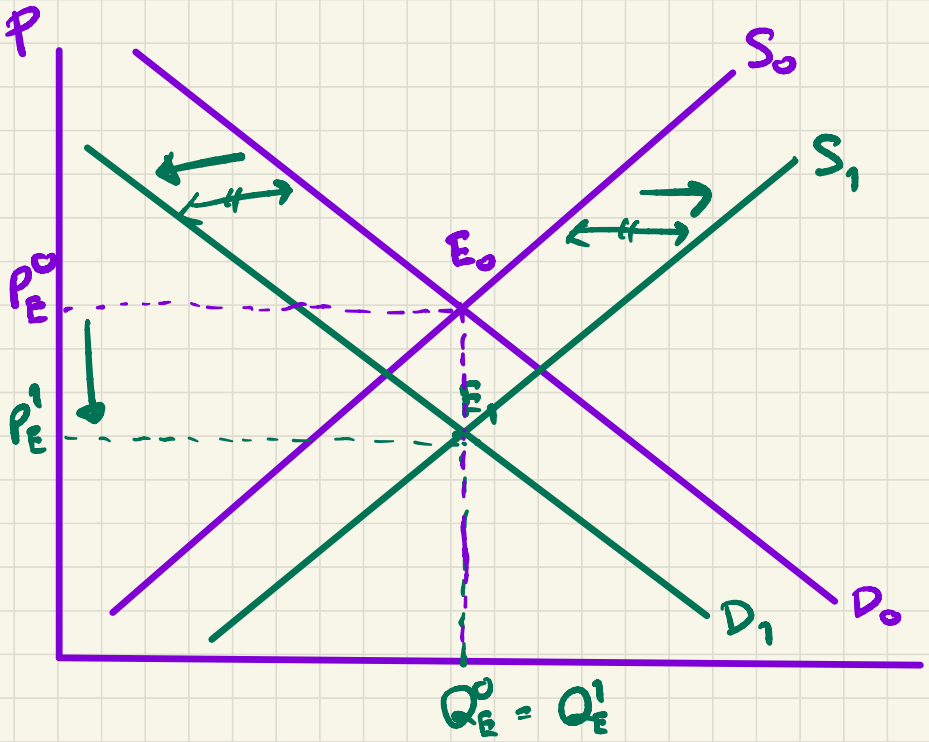
"mRNA vaccine market".

① There are more mRNA vaccine producers

② There is a new & effective inhaled Covid-19 vaccine.

What happens to the eqm in the mRNA vaccine mkt?





S ↑, D ↓

⇒ P_E ↓

Q_E is unchanged

(b/c ΔS = ΔD)

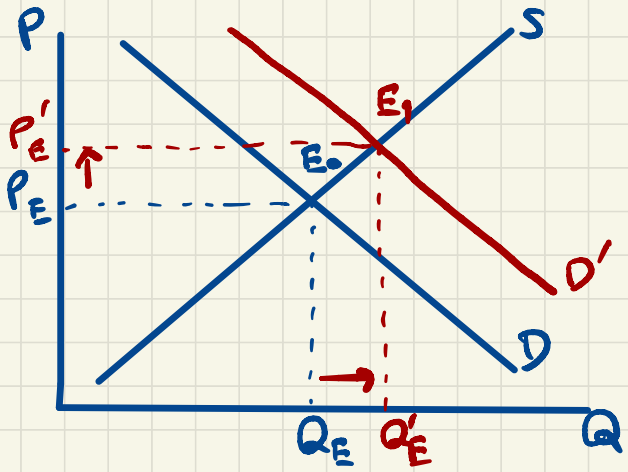
↑ ↑

Q_E ↑ Q_E ↓

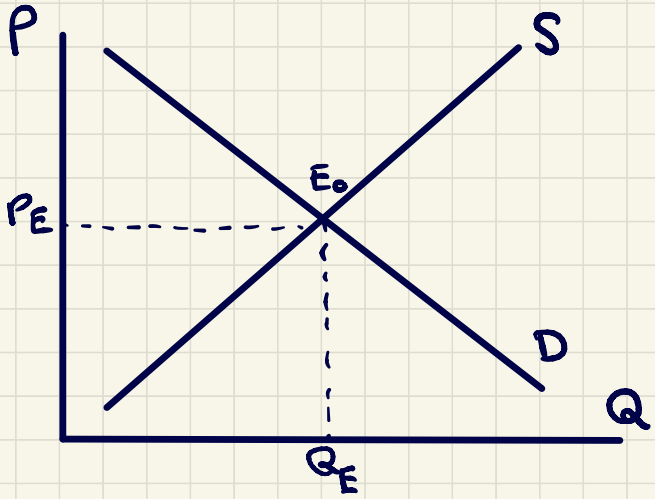
Try the case where Δ quantity supplied is less than Δ in quantity demanded.

EXERCISES

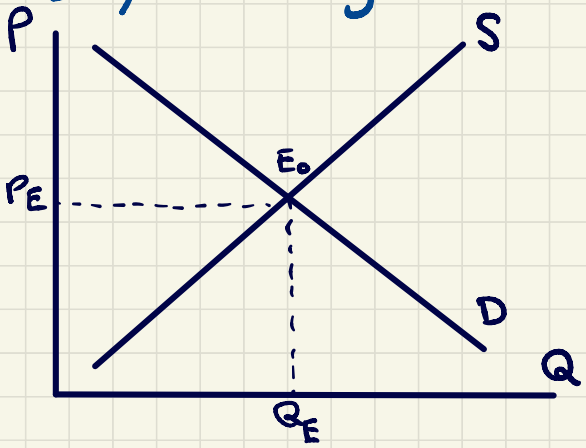
① D↑, no change in S



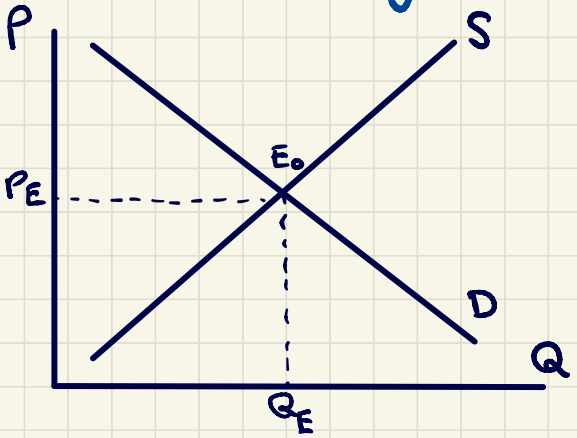
② D↓, no change in S.



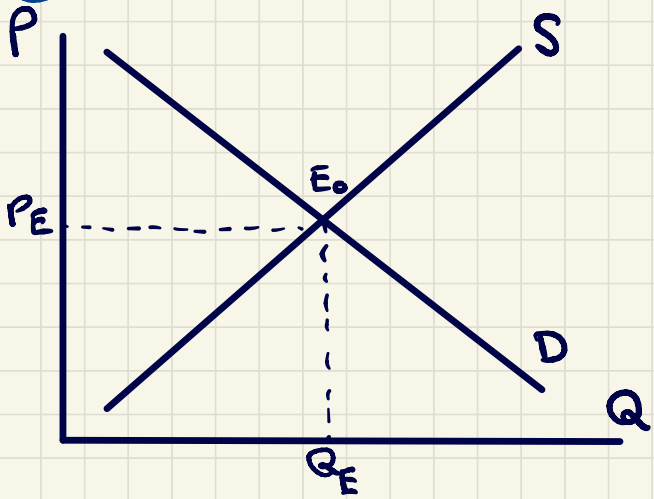
③ S↑, no change in D



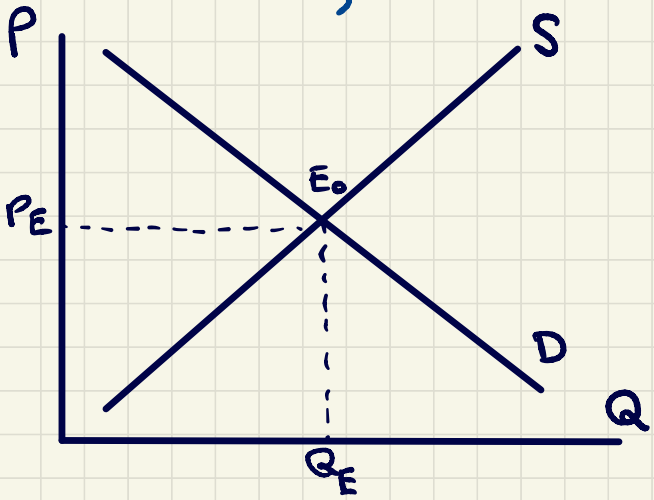
④ S↓, no change in D.



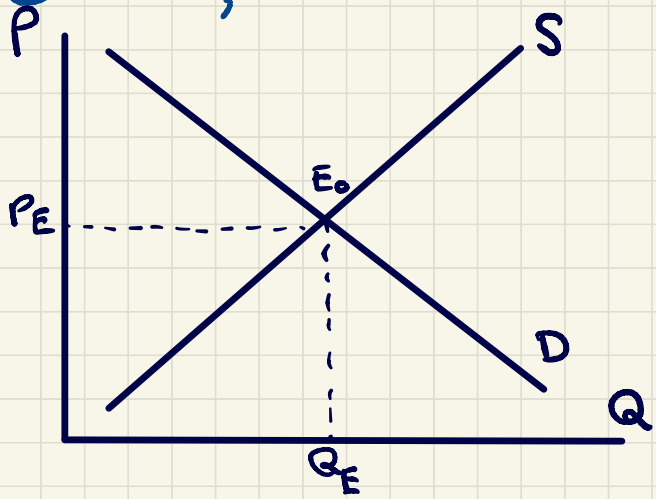
(5) D↑, S↑



(6) D↑, S↓



(7) D↓, S↑



(8) D↓, S↓