

# MODULE 3

Supply, Demand, Equilibrium

# SUPPLY AND DEMAND MODEL

- What is the relationship between quantity and:
  - Maximum willingness to pay (price to consumers)
  - Minimum willingness to accept (price to producers)
- How do real world scenarios change the price and quantity of goods/services sold in an economy?
- Why do stores (most of the time) have the goods you want?
- What was up with last years “shortages”?
- How does GenAI affect the incentives to recycle plastic?

# WHAT IS DEMAND?

## Demand for Goods and Services

- **Answers the question:** At a given price, how many units of a good would I buy?
  - Describes all such pairs of variables (P,Q)



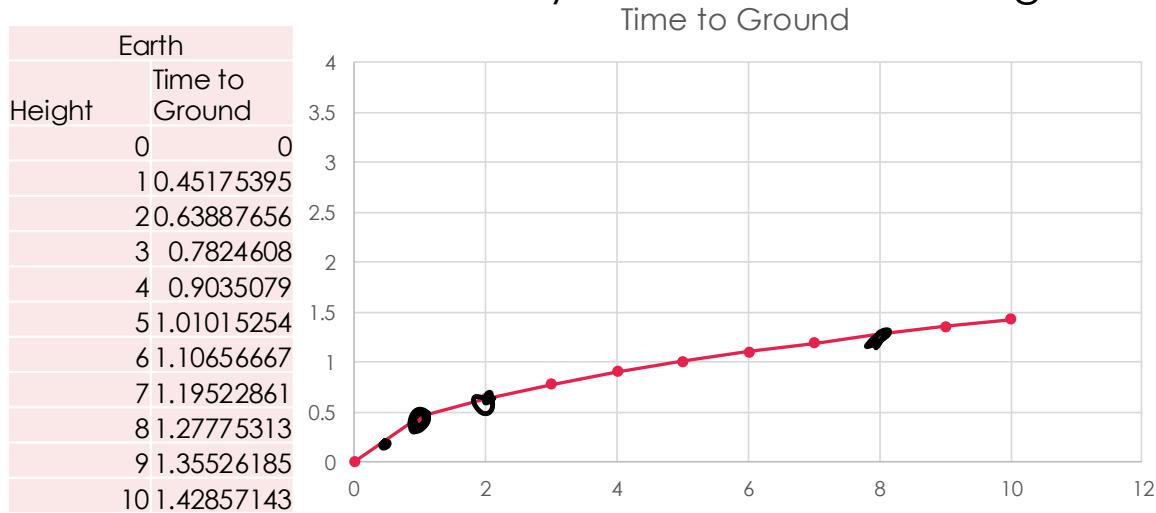
# WHAT IS DEMAND?

## Demand for Goods and Services

- **Demand:** the *relationship* between the price of a certain good or service and the quantity of that good or service someone is willing and able to buy.
- **Price:** what a buyer pays for a unit of the specific good or service.
- **Quantity Demanded( $Q_d$ ):** the total *number* of units of a good or service consumers wish to purchase at a given price.

# DEMAND VS. QUANTITY DEMANDED

- Relationship vs. Variable
- Ex: Gravity
  - Variables: Drop height, Time to ground
  - Relationship: If I drop from X meters on Earth in a vacuum, how many Y seconds to hit the ground?

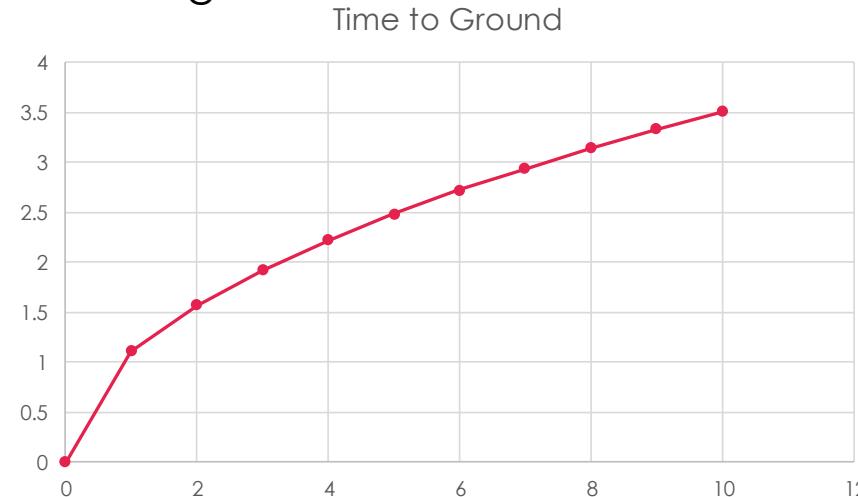


- Can change variables without changing relationship
  - Drop the ball from 2 meters
  - Drop the ball from 10 meters
- What would change the **relationship**?

# DEMAND VS. QUANTITY DEMANDED

- Relationship vs. Variable
- Ex: Gravity
  - Variables: Drop height, Time to ground
  - Relationship: If I drop from X meters on the Moon in a vacuum, how many Y seconds to hit the ground?

Moon		Earth	
Height	Time to Ground	Height	Time to Ground
0	0	0	0
1	1.111111111	1	0.45175395
2	1.5713484	2	0.63887656
3	1.9245009	3	0.7824608
4	2.222222222	4	0.9035079
5	2.48451997	5	1.01015254
6	2.72165527	6	1.10656667
7	2.93972368	7	1.19522861
8	3.14269681	8	1.27775313
9	3.333333333	9	1.35526185
10	3.51364184	10	1.42857143





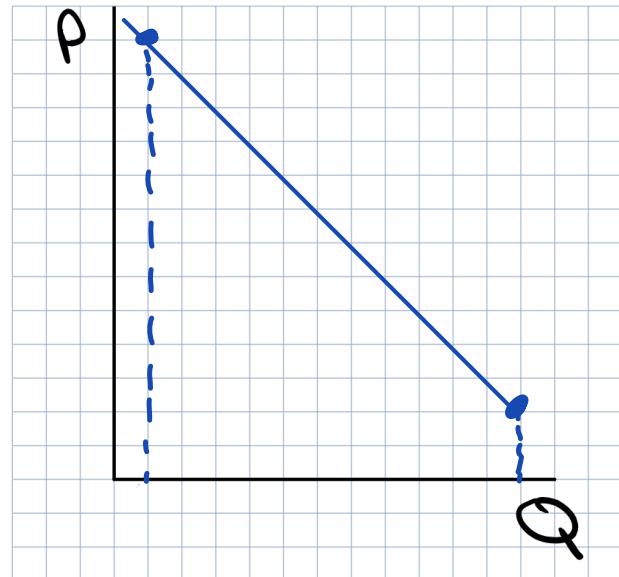
# WHAT IS DEMAND?

## Demand for Goods and Services

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- **Quantity Demanded:** the total *number* of units of a good or service consumers wish to purchase at a given price.
- What does this relationship look like?

- Diminishing Marginal Utility: As we consumer more of a good, each marginal unit is less satisfying
- Price and Quantity demanded have an inverse relationship
- Negative slope
- **D** in Demand for Down

Price per Unit  
↓ DEMAND



# WHAT IS DEMAND?

## Demand for Goods and Services

- **Law of Demand:** the common relationship that a higher price leads to a lower quantity demanded of a certain good or service and a lower price leads to a higher quantity demanded, while all other variables are held constant.

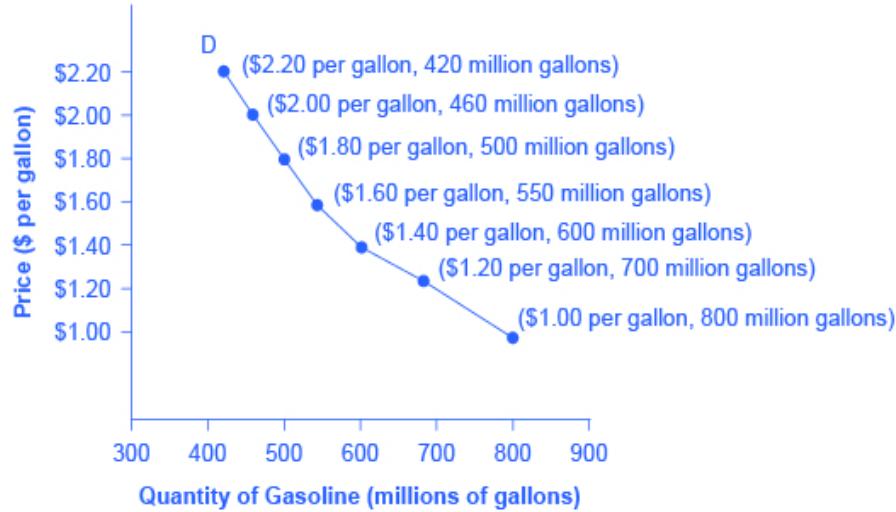
# WHAT IS DEMAND? (CONT.)

**Demand Schedule:** a table that shows the quantity demanded for a certain good or service at a range of prices.

- **Example:** Price is measured in dollars per gallon of gasoline. The quantity demanded is measured in millions of gallons over some time period and over some geographic area.

Price (per gallon)	Quantity Demanded (millions of gallons)
\$1.00	800
\$1.20	700
\$1.40	600
\$1.60	550
\$1.80	500
\$2.00	460
\$2.20	420

# WHAT IS A DEMAND CURVE?



Price (per gallon)	Quantity Demanded (millions of gallons)
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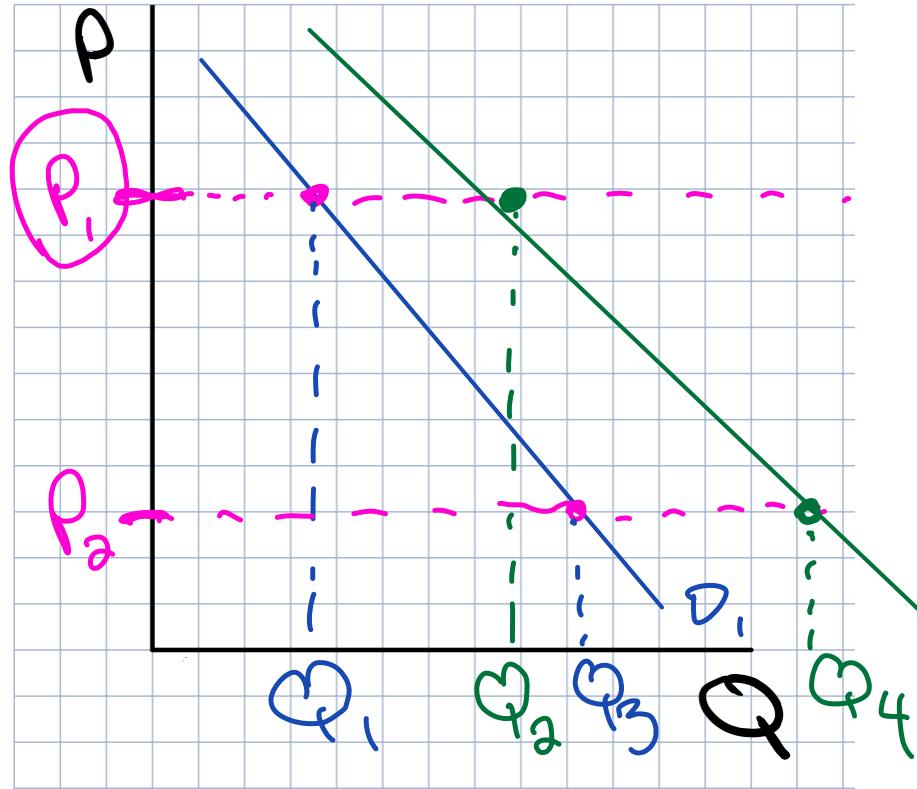
# WHAT IS ASSUMED IN A DEMAND CURVE?

**Ceteris Paribus:** a Latin phrase meaning “other things being equal.”

- Any given demand or supply curve is based on the *ceteris paribus* assumption that all else is held equal.
- When changing one variable in a function (e.g. price for some product), we assume everything else is held constant
  - How you feel about the good cannot change, just the price you pay and the way you change your quantity bought are observed
- A demand curve or a supply curve is a relationship between **two, and only two, variables (Price and quantity)** when *all other variables are held equal*. If all else is not held equal, then the laws of supply and demand will not necessarily hold.

# WHAT MAY CHANGE THE RELATIONSHIP

- Increase  
Willing to  
buy more  
@ the given  
Price



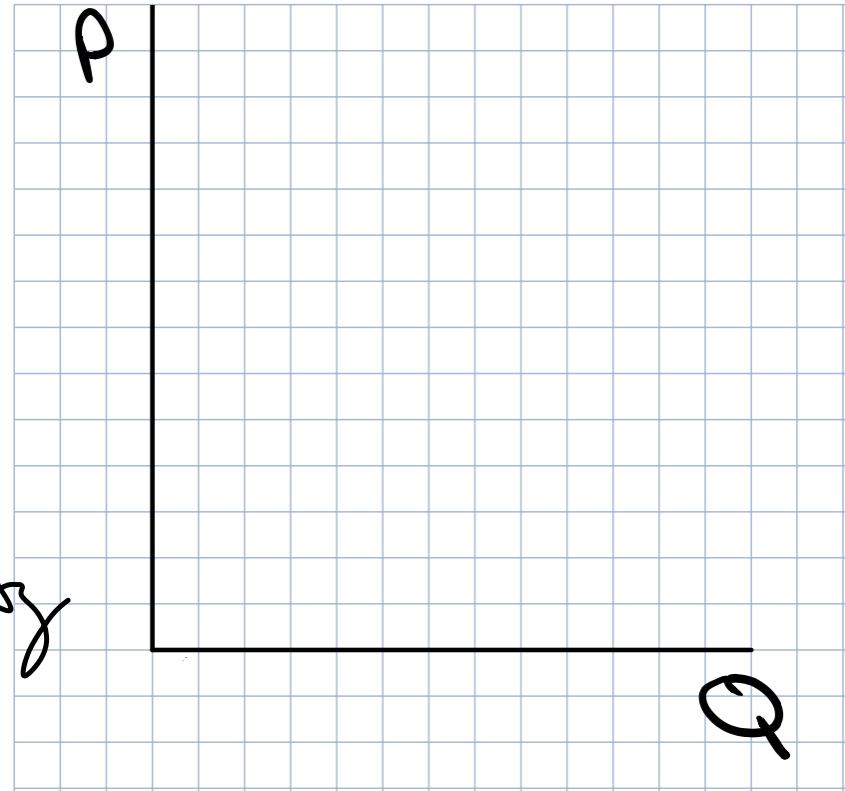
Rightward  
Outward  
Shift

Do Not  
Say

UP

# WHAT MAY CHANGE THE RELATIONSHIP

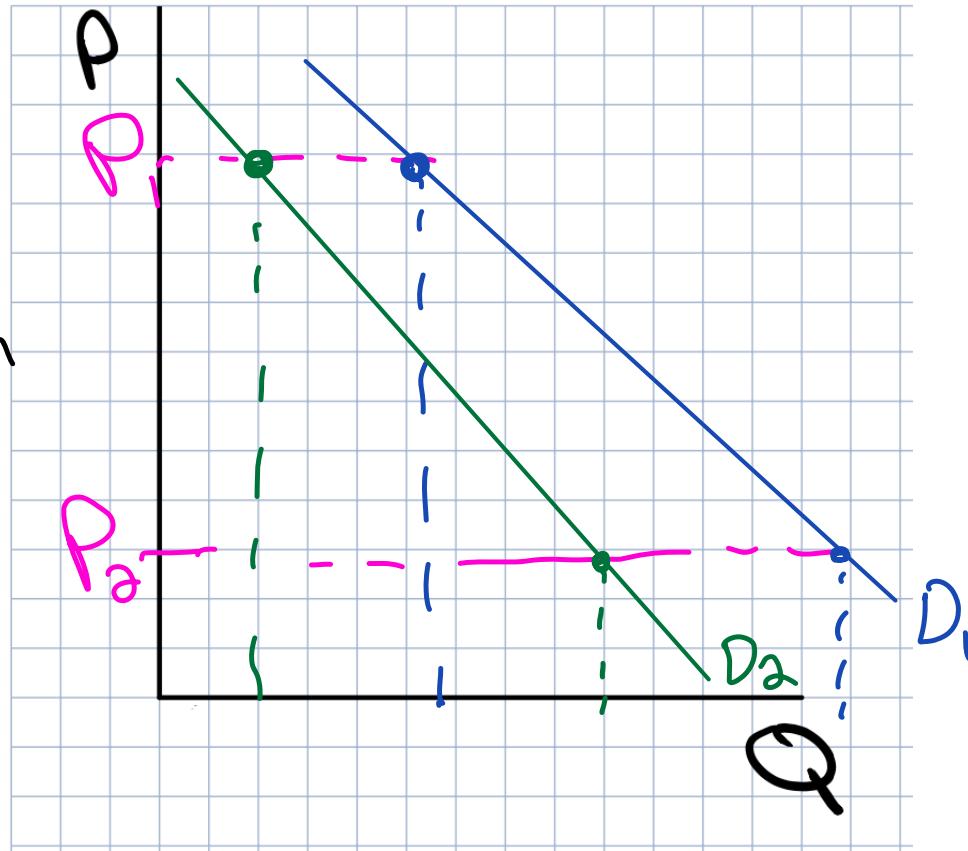
- Increase  
Willing to  
Pay more  
for a  
given  
Quantity



# WHAT MAY CHANGE THE RELATIONSHIP

Leftward Inward Shift

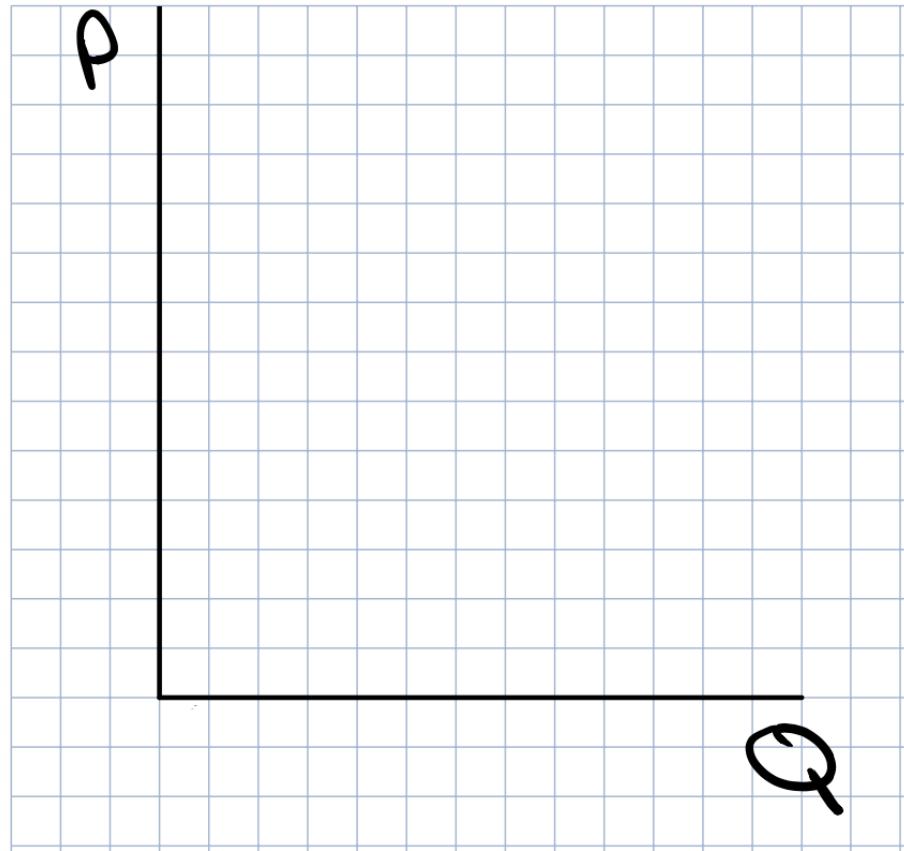
- Decrease Willing to Buy Less @ a Given Price



# WHAT MAY CHANGE THE RELATIONSHIP

- Decrease

willing to  
pay less  
for a  
given Q

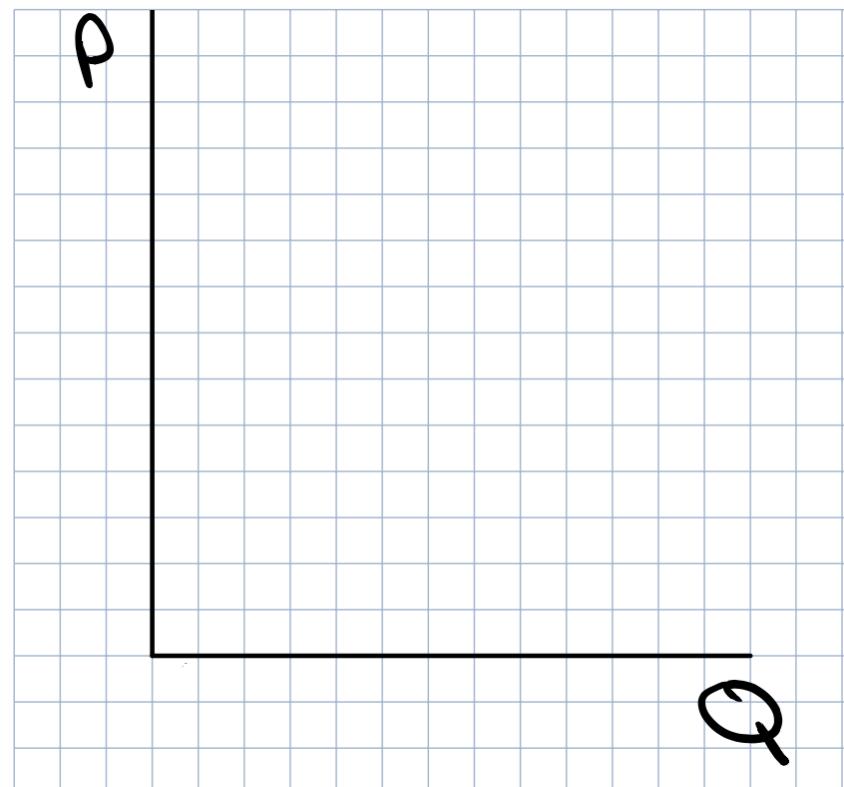




# WHAT MAY CHANGE THE RELATIONSHIP?

- Pick a good
- What may decrease your demand for

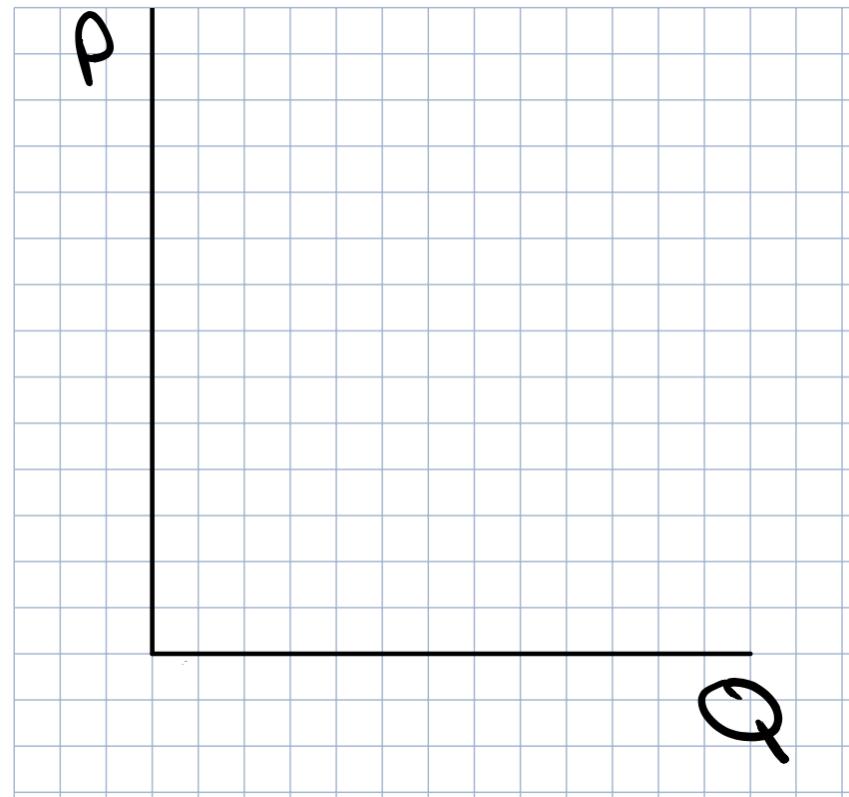
Chipotle Bowl Double  
Chicken





# WHAT MAY CHANGE THE RELATIONSHIP?

- Pick a good
- What may increase your demand for



# FACTORS AFFECTING DEMAND(NON-PRICE DETERMINANTS)

**Shift in demand** happens when a change in some economic factor (other than price) causes a different quantity to be demanded at every price.

# FACTORS AFFECTING DEMAND(NON-PRICE DETERMINANTS)

**Shift in demand** happens when a change in some economic factor (other than price) causes a different quantity to be demanded at every price.

- changing tastes or preferences
- changes in income
- changes in the composition of the population
- changes in the prices of related goods
- changes in expectations about future prices

# CHANGES IN INCOME

- Normal Goods:

$I \uparrow$

$D \uparrow$

$I \downarrow$

$D \downarrow$

- Inferior Goods:

$I \uparrow$

$D \downarrow$

$I \downarrow$

$D \uparrow$

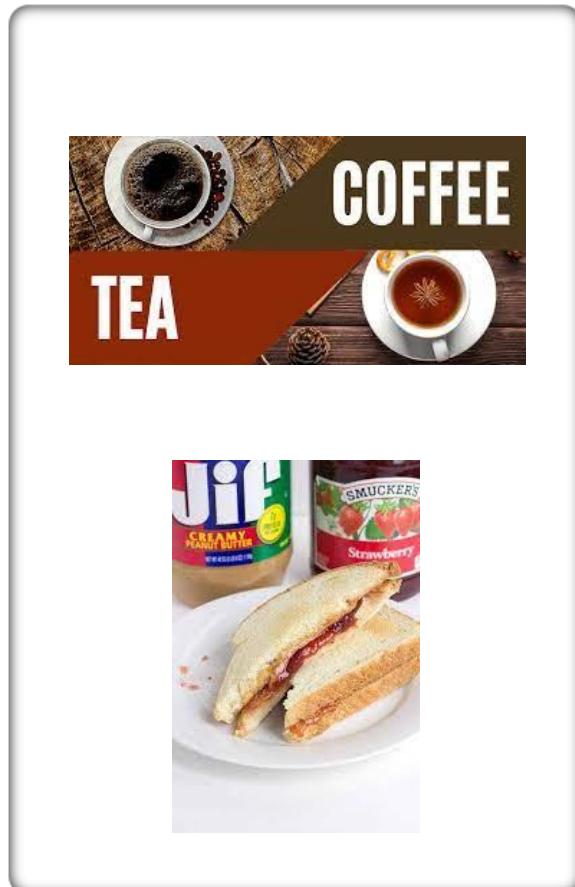
# CHANGES IN INCOME

- Normal Goods: When your income goes up (down) your demand for a normal good increases (decreases)
- Inferior Goods: When your income goes up (down) your demand for an inferior good decreases (increases)



# PRICES OF RELATED GOODS

- Substitutes(in consumption): Can consume "in place" of each other.
- Compliments(in consumption): Tend to consume together



# PRICES OF RELATED GOODS

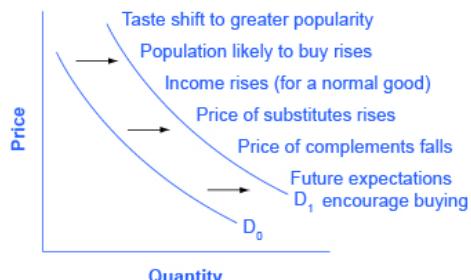
- Substitutes (in consumption): When the price of a substitute good increases (decreases) your demand for the other good increases (decreases)
- Compliments (in consumption): When the price of a compliment good increases (decreases) your demand for the other good decreases (increases)



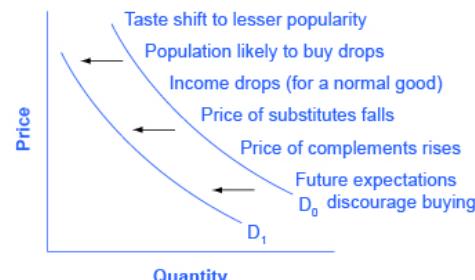
# FACTORS AFFECTING DEMAND: SIX FACTORS

## Factors Shifting Demand Curves

- Six factors that can shift demand curves are summarized in the charts above.
- The direction of the arrows indicates whether the demand curve shifts represent an increase in demand or a decrease in demand.



(a) Factors that increase demand



(b) Factors that decrease demand

# WHAT IS SUPPLY?

## Supply of Goods and Services

- **Supply:** the relationship between the price of a certain good or service and the quantity of that good or service producers are willing to offer for sale.
- **Quantity Supplied( $Q_s$ ):** the total number of units of a good or service producers are willing to supply at a given price.

# SHAPE OF SUPPLY



# WHAT IS SUPPLY?

## Supply of Goods and Services

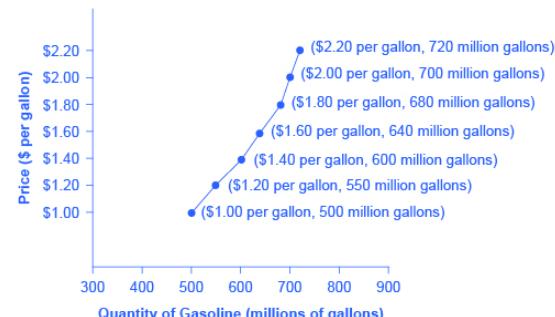
- **Increasing Marginal Cost**
- **Law of Supply:** the common relationship that a higher price leads to a higher quantity supplied of a certain good or service and a lower price leads to a lower quantity supplied, while all other variables are held constant.

# WHAT IS A SUPPLY SCHEDULE OR CURVE?

**Supply Schedule:** a table that shows the quantity demanded for a certain good or service at a range of prices.

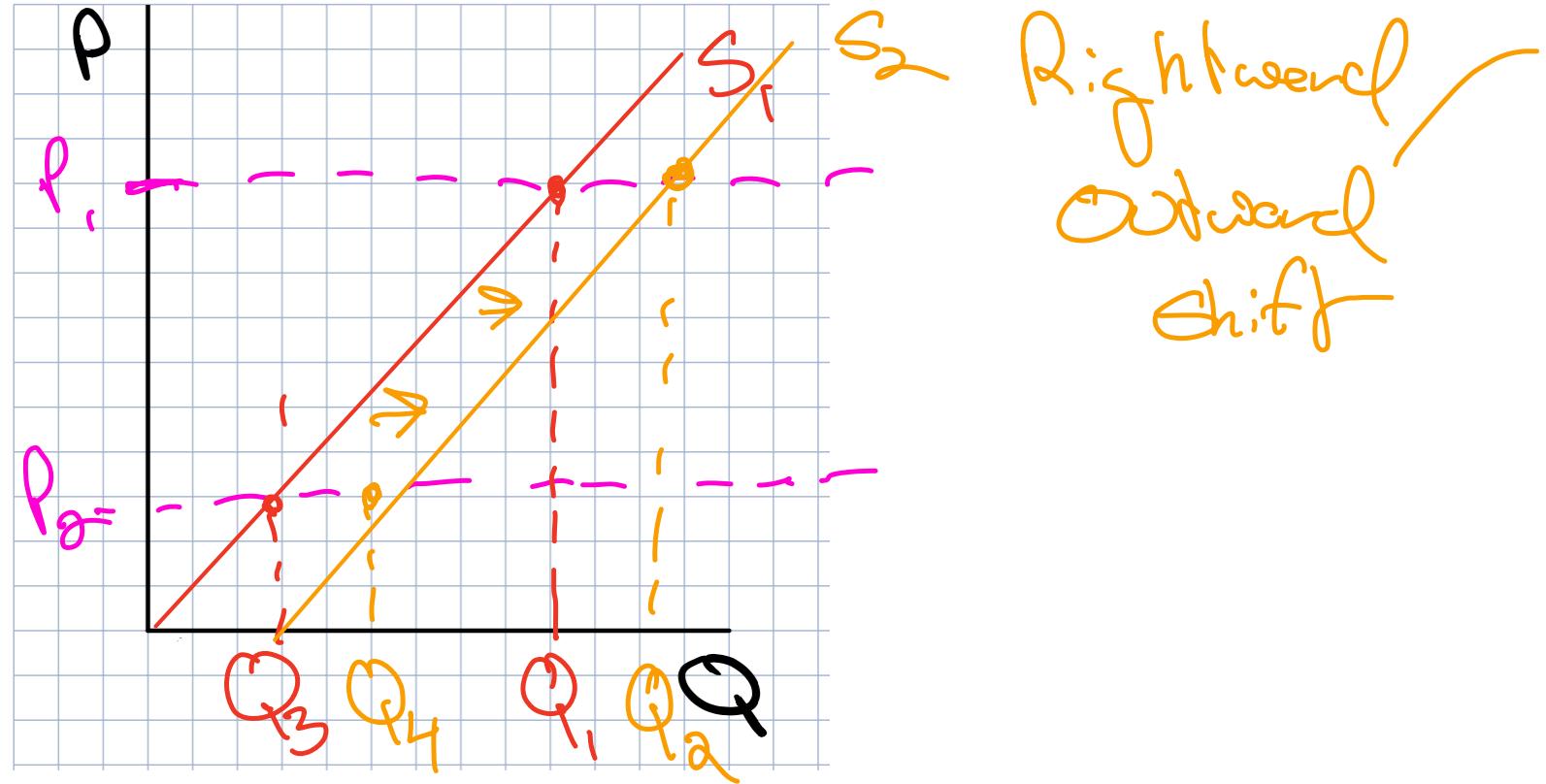
Price (per gallon)	Quantity Supplied (millions of gallons)
\$1.00	500
\$1.20	550
\$1.40	600
\$1.60	640
\$1.80	680
\$2.00	700
\$2.20	720

**Supply Curve:** a graphic representation of the relationship between price and quantity supplied of a certain good or service, with price on the vertical axis and quantity on the horizontal axis.



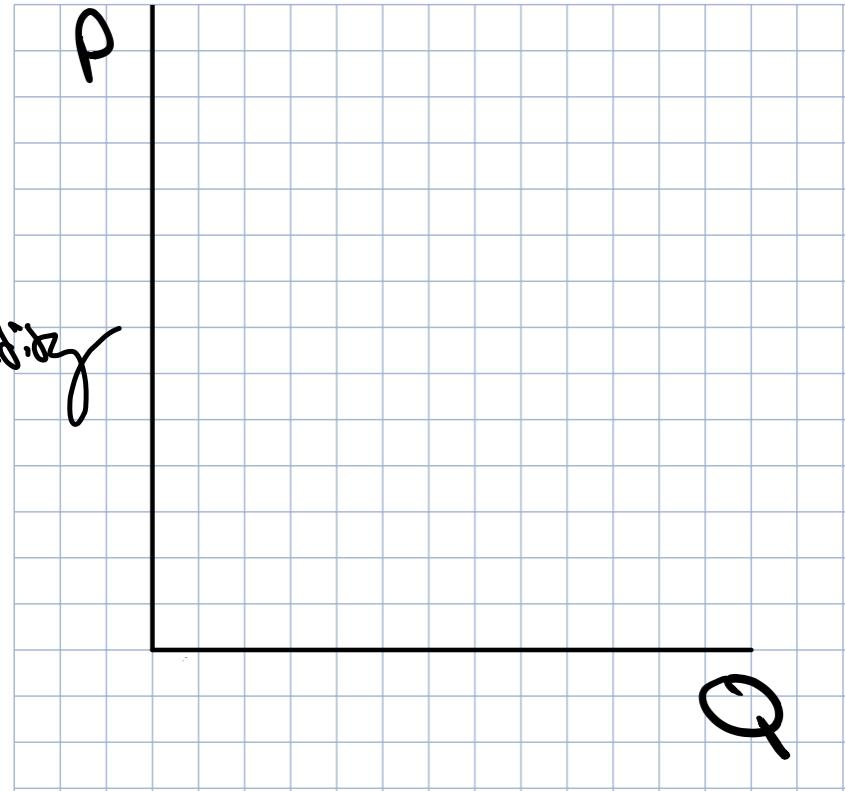
# WHAT MAY CHANGE THE RELATIONSHIP

- Increase  
Willing to  
sell more  
units @  
given price



# WHAT MAY CHANGE THE RELATIONSHIP

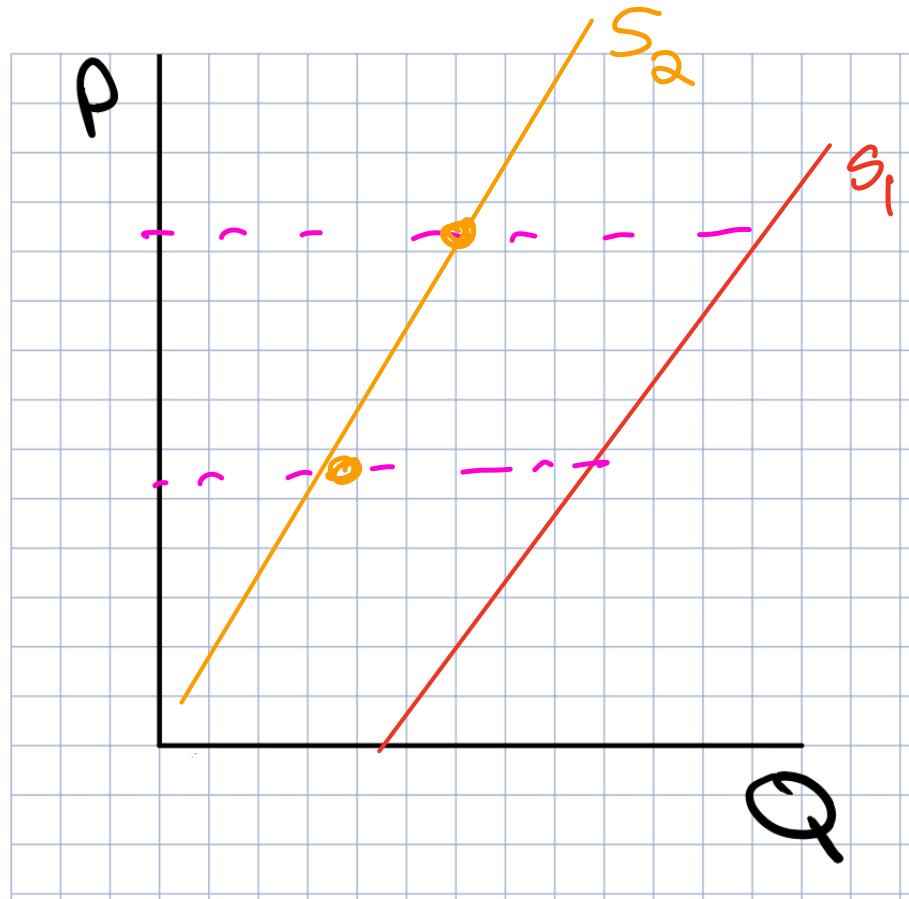
- Increase  
Willing to  
sell or  
given quantity  
@ lower  
price



# WHAT MAY CHANGE THE RELATIONSHIP

- Decrease

Willing to sell fewer @ given price

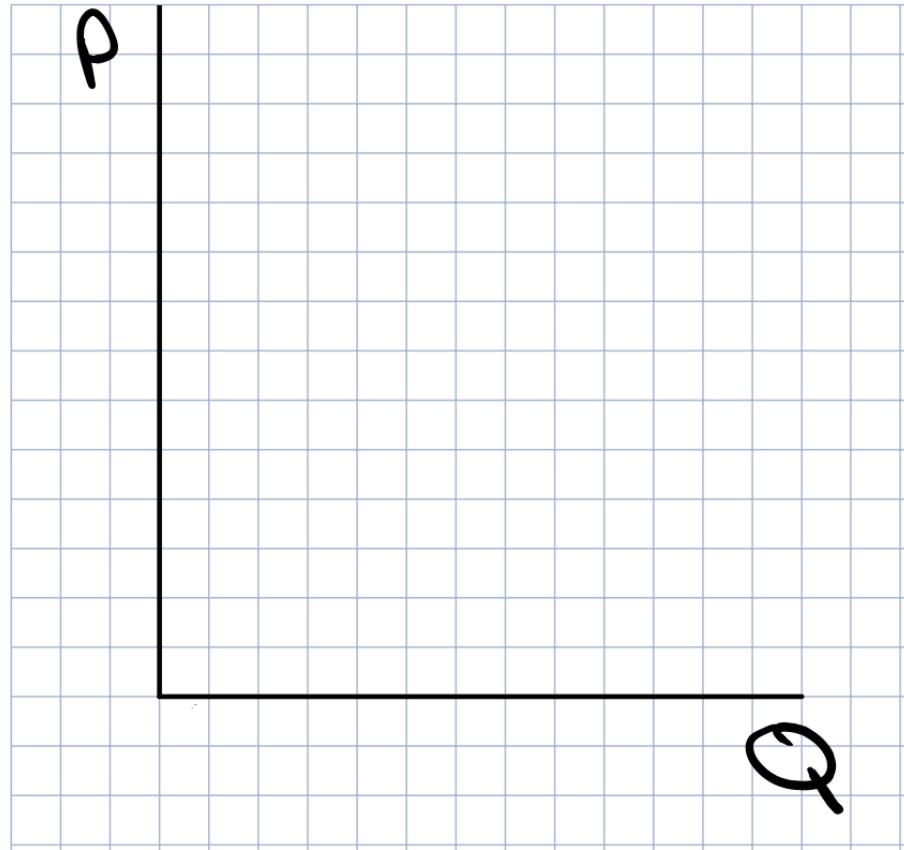


Inward /  
leftward

# WHAT MAY CHANGE THE RELATIONSHIP

- Decrease

Want a  
higher  
 $P$  for  
a given  
 $Q$





# WHAT COULD CHANGE SUPPLY?

Coffee

## FACTORS AFFECTING SUPPLY(NON-PRICE DETERMINANTS)

- Technology *Irrigation*
- Prices of inputs
  - Taxes and Subsidies
- Expectations *(Feds / Influencers)*
- Related goods
  - Complements/Substitutes ***in production***
- Number of sellers
- Tastes/Preferences of Producers
  - Saran Wrap

# RELATED GOODS

- Complements/Substitutes **in production**
- Complements: Two goods/services that tend to be produced together
  - If you are going to make one, Another comes along for the ride

Cheese  $\hat{}$  Whey

$P_C \uparrow$   $Q_{SC} \uparrow$   $S_w \uparrow$

- Substitutes: Goods/services a producer could easily pivot between
  - If I decide not to make A, I can easily make B with my inputs and knowhow

Milk  $\hat{}$  Cheese

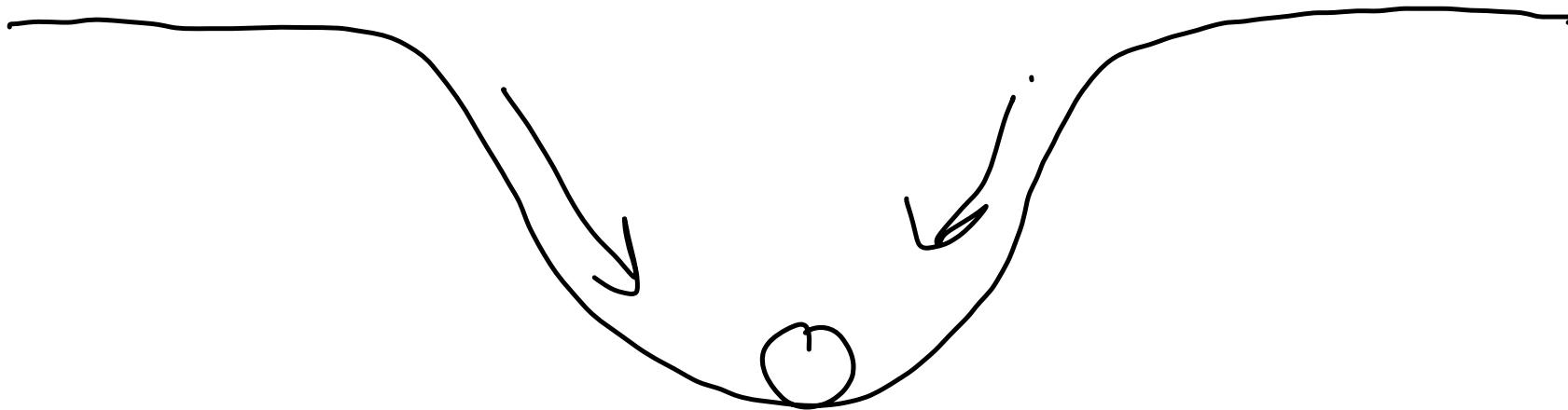
$P_C \uparrow$   $Q_{SC} \uparrow$   $S_m \downarrow$

# RELATED GOODS

- Complements/Substitutes ***in production***

# EQUILIBRIUM

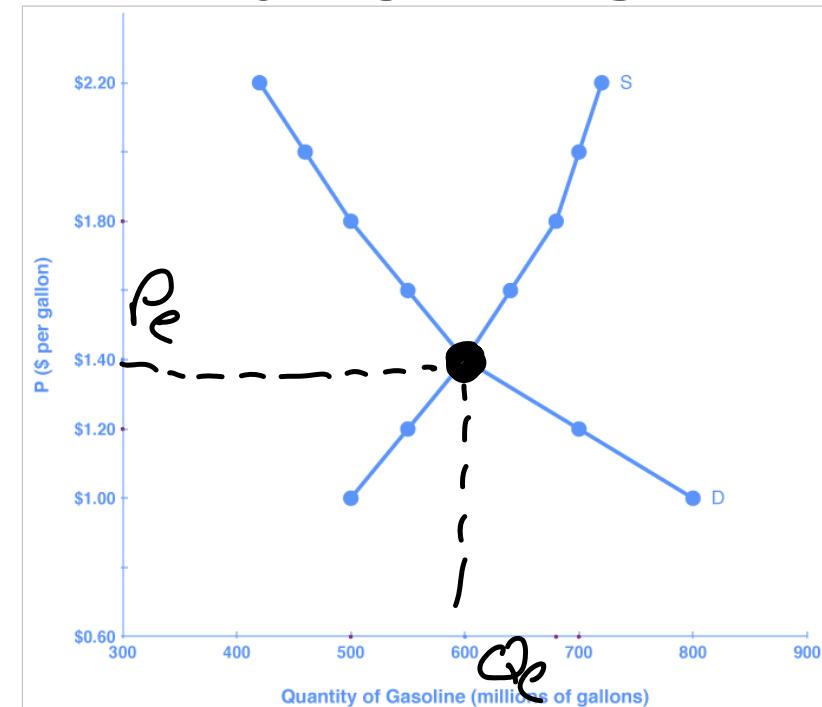
- A state of rest or balance due to the equal action of opposing forces. equal balance between any powers, influences, etc.



# EQUILIBRIUM, SURPLUS, AND SHORTAGE

## Demand and Supply

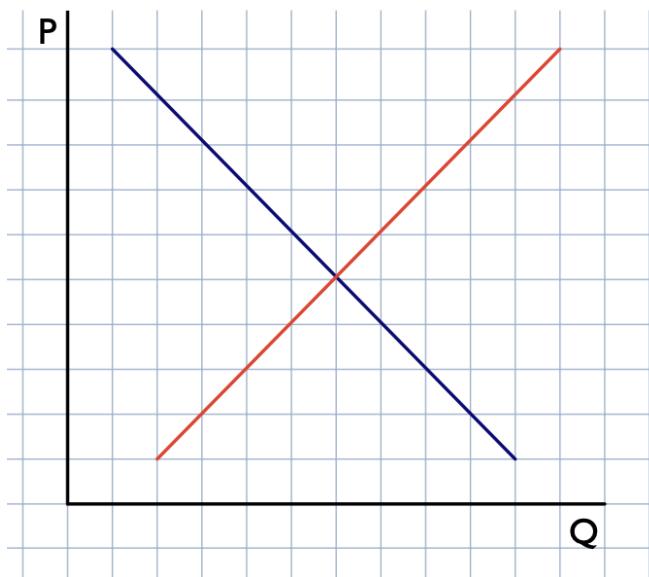
- Graphs for demand and supply curves both have price on the vertical axis and quantity on the horizontal axis, the demand curve and supply curve for a particular good or service can appear on the same graph.
- Together, demand and supply determine the price and the quantity that will be bought and sold in a market.
  - **Equilibrium:** price and quantity combination where supply equals demand.
  - **Equilibrium Price:** the (only) price where the quantity supplied in a market equals the quantity demanded.
  - **Equilibrium Quantity:** the quantity both supplied and demanded at the equilibrium price.



# EQUILIBRIUM

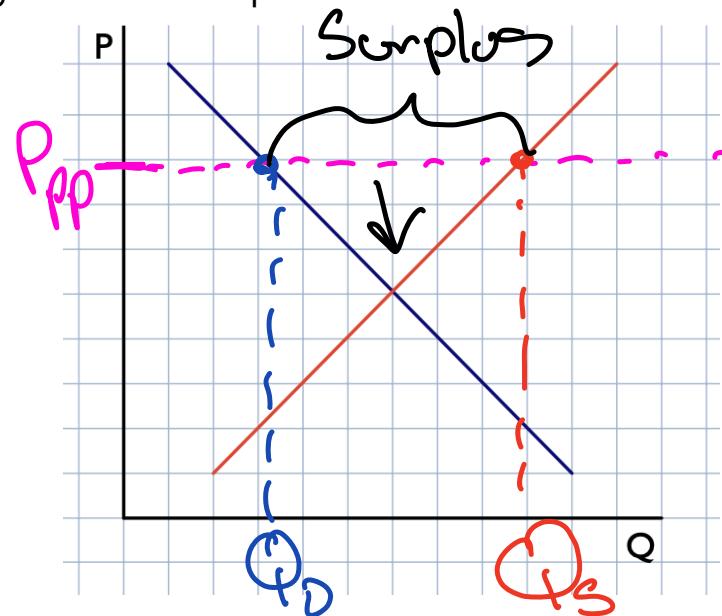
- Market clearing condition
  - Price where  $Q_d = Q_s$
- Where things “settle”
  - Deadweight losses
    - Shortage
    - Surplus

DWL : Loss that  
benefits no  
one



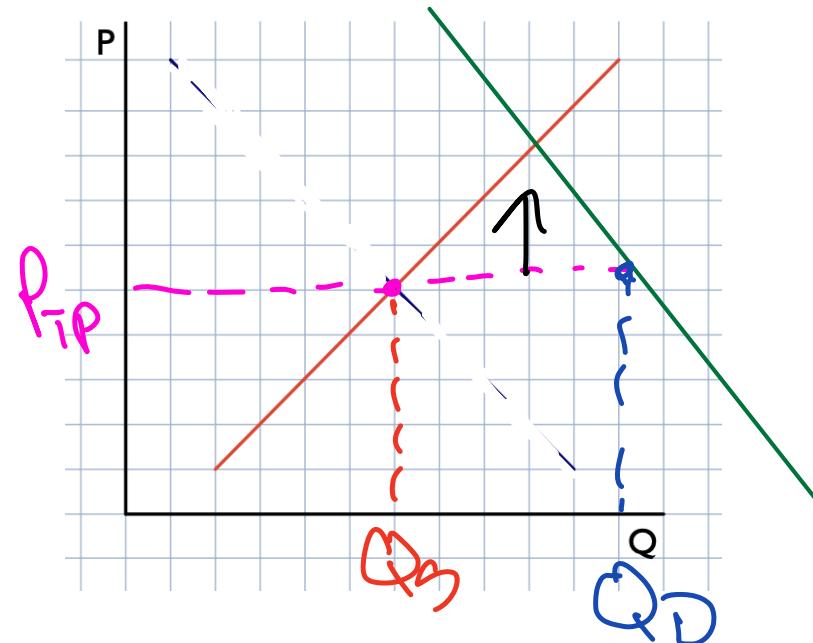
# EQUILIBRIUM MECHANISM

- Set price of Paw-paws higher than equilibrium
  - Surplus ( $Q_s > Q_d$ )
  - Rotten Paw-paws



# EQUILIBRIUM MECHANISM

- Leave price of toilet paper the same
  - Pandemic Hits
    - Expectations of buyers
  - Shortage of toilet paper

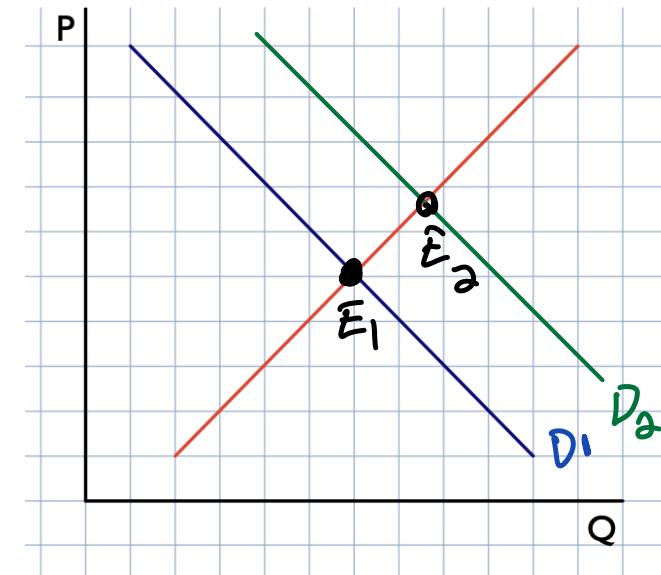




# CHANGES IN EQUILIBRIUM

- Demand Increases

$$P_E \uparrow \quad Q_E \uparrow$$

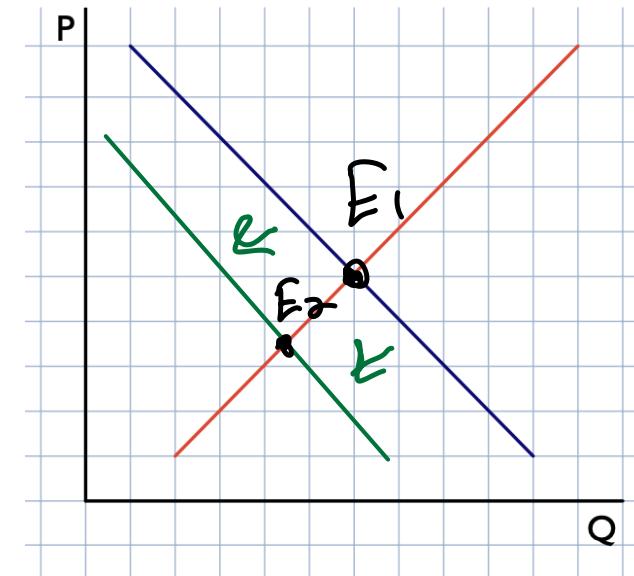




# CHANGES IN EQUILIBRIUM

- Demand Decreases

$$P_E \downarrow \quad Q_E \downarrow$$

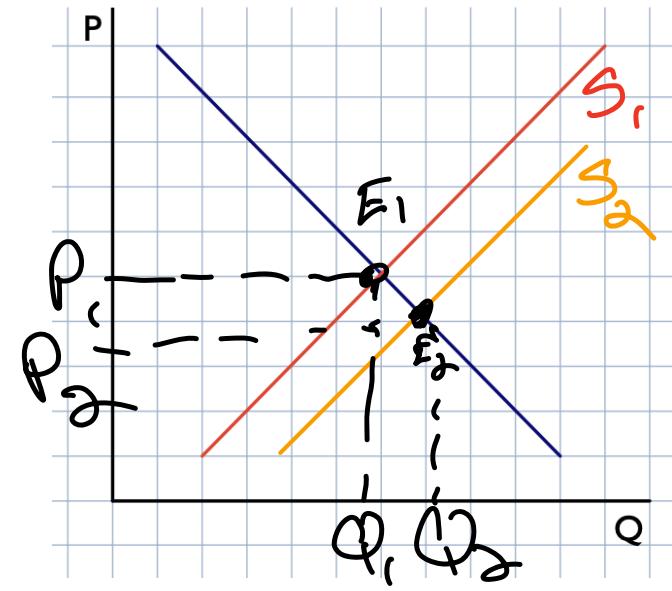




# CHANGES IN EQUILIBRIUM

- Supply Increases

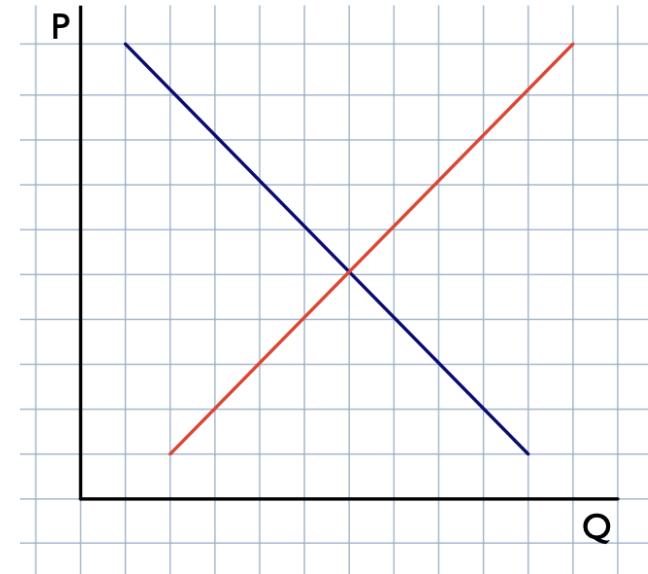
$P \downarrow$





# CHANGES IN EQUILIBRIUM

- Supply Decreases





# CHANGES IN EQUILIBRIUM

- Demand increases:  $Q_e \uparrow$   $P_e \uparrow$
- Demand decreases:  $Q_e \downarrow$   $P_e \downarrow$
- Supply increases:  $Q_e \uparrow$   $P_e \downarrow$
- Supply decreases:  $Q_e \downarrow$   $P_e \uparrow$

