

$$C = \frac{6000}{9} - 6f$$

$$C = \frac{200}{3} - 0.6f$$

if the economy produces all cloth for
domestically $(0, \frac{200}{3})$

if the economy sells all with then
the pt is $(111.11, 0)$

$$\frac{200}{3} - 0.6 \left(\frac{200}{3} \right)$$

Thus reqd line will be the

CPF in this case

(see BD and A'D')

$$\frac{200}{3} \times 0.4$$

$$\frac{200}{3} \times \frac{2}{5}$$

$$0.6f = \frac{200}{3}$$

$$f = \frac{200}{3} \times \frac{10}{6}$$

$$= 111.11$$

Q4:

Demand

Demand is desire backed by ability

The quantity demanded of any good is the amount of the good that the buyers are willing and able to buy

D_n of (P_n)

ceteris paribus

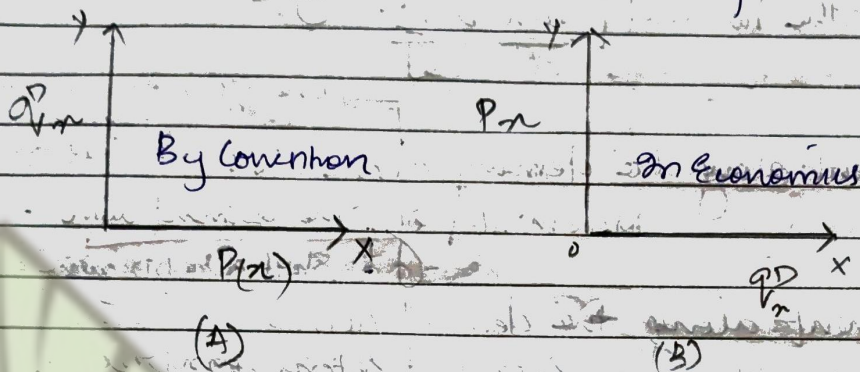
↓
Qty demanded

↗ Price

↓
dependent variable

↓
Independent variable

By Convention of graphs, the graph must be having axes in the format (a) but in economics for better understanding (to avoid reverse causality we use Marshallian ~~coner~~ axiom) we take the reverse format (b).

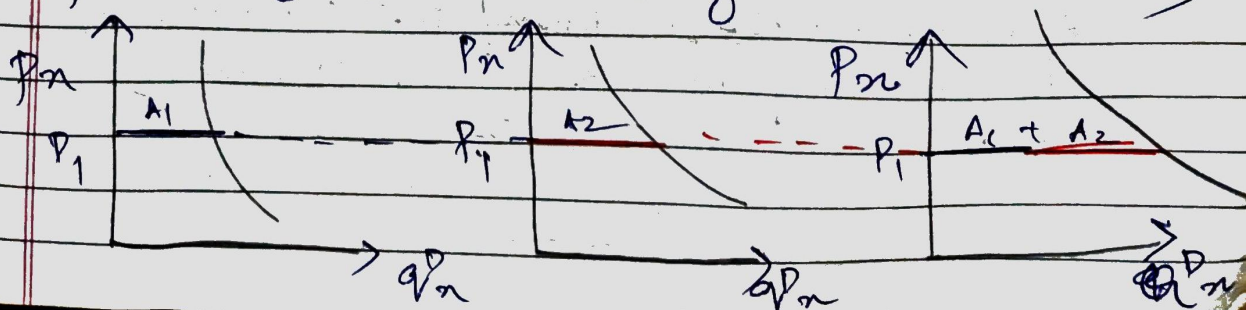


Demand is not only affected by price (P) but by income (Y), taste (T), price of related commodities (P_R) etc. But in order to show demand as a fun of price, we keep other things constant to get a clear picture i.e. ceteris paribus.

Qty demanded changes inversely in relation to price. Why? If price increases, though the nominal income (₹) is not affected, a consumer's real income (command over real goods & services) decreases, thus the consumer moves away from the consumption of that good.

Market demand

It is the sum of all individual demands for a particular good or service. (through horizontal summation)

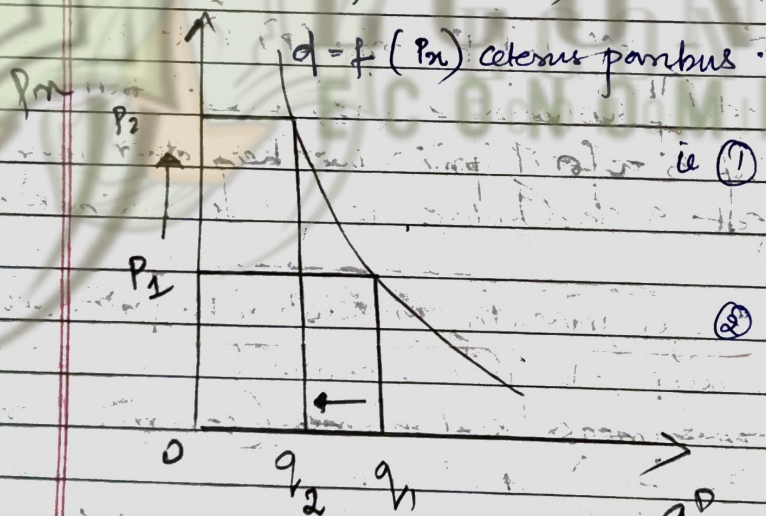


* Note:-

When we say demand of say, household, we say how much the household wants to buy and not what the household buys or not what the household can buy.

Movement along the demand curve Vs Movement of the demand curve.

Change in qty demanded (Extension & Contraction)
 $\rightarrow$ Shift of the DD curve or
 Movement along the demand curve indicates change in price (ΔP_n), ceteris paribus demand
 $\uparrow$ in DD $\rightarrow$
 $\downarrow$ in DD $\leftarrow$



i.e. ① $P_n = P_1$

$Q = q_1$

$\bar{P}_n, \bar{T}, \bar{Y}$

② $P_n = P_2$

$Q = q_2$

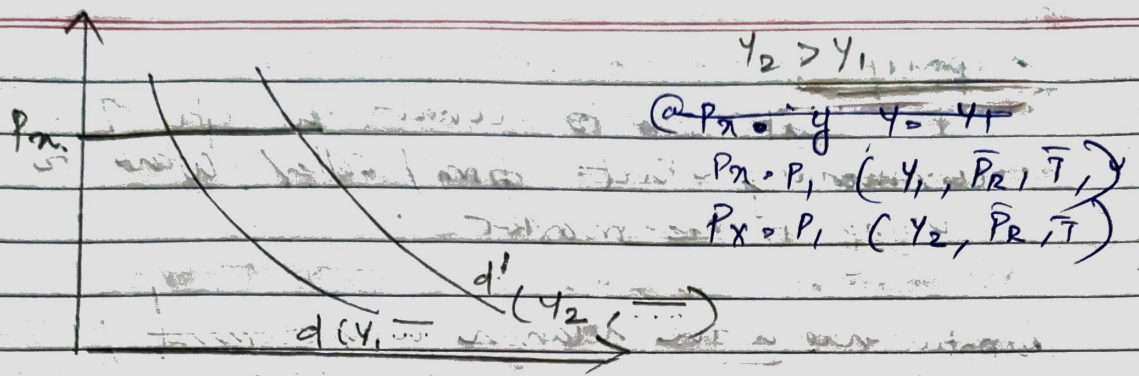
$\bar{P}_n, \bar{T}, \bar{Y}$

$P_2 > P_1$

$Q_1 > Q_2$

Suppose the price is fixed and another determinant say income (Y) changes.

If income increases, the demand for commodity (say n) by a household increases for all price level of n .



Some other determinants other than income which exert a shift in demand include price of related goods, tastes, expectations, no. of buyers etc.

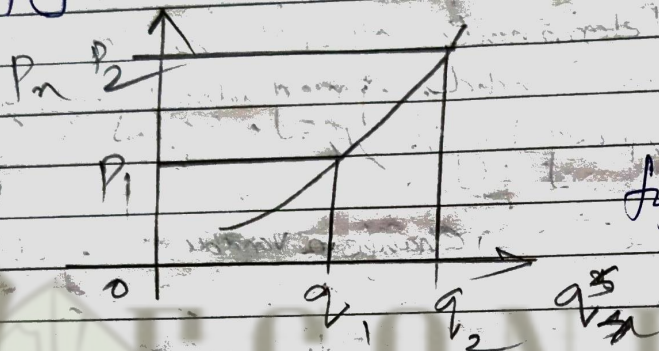
Variable	Change in Variable	Change in demand
Price	↑	↓
Price	↓	↑
Income } normal	↑	→
Income } Good	↓	←
Income } inferior	↑	↑
Income } Good	↓	↓
Price of Substitute	↑	↑
Price of Substitute	↓	↓
Price of Compl.	↑	↓
Price of Compl.	↓	↑
Taste	change	shift
Expectations	high/low in future	↓/↑
No. of buyers	more/less	↑/↓

The same table applies in the reverse order in case of supply.

Supply

It refers to what the qty of commodity that firm/seller want to bring to the market.

Supply has a pos. relation with demand price
Ceteris paribus



Why sellers want to sell more if price of a good rises?

The motive of sellers is 'profit maximisation')

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

$$\pi = P_n \cdot q_n - C(q_n)$$

If price $\geq P_1$ and qty $= q_1$

$$\pi_1 = P_1 q_1 - C(q_1)$$

If price $= P_2$ where $P_2 > P_1$

$$\pi_2 = P_2 q_1 - C(q_1)$$

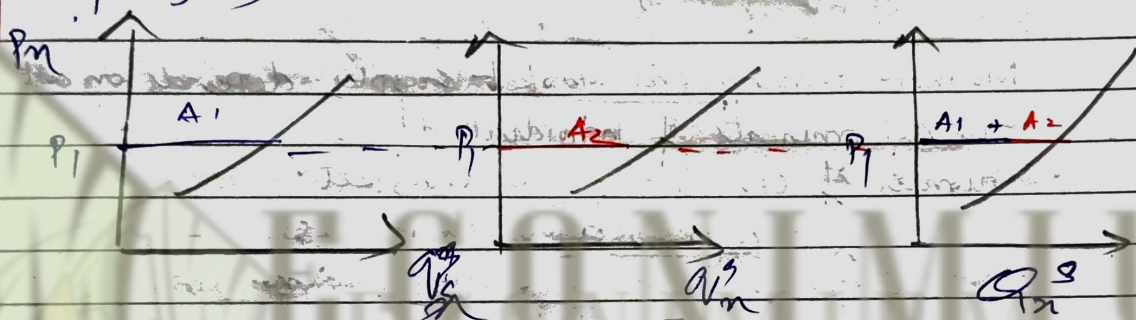
Clearly $\pi_2 > \pi_1$

π - profit
 P_n - price
 q_n - qty of commodity
 C - cost of prod.

but π_2 will be further greater if $q_2 = q_1$ when $q_2 > q_1$ if the new price $>$ addt cost incurred for an add'l unit.

Similar Movement along Market Supply

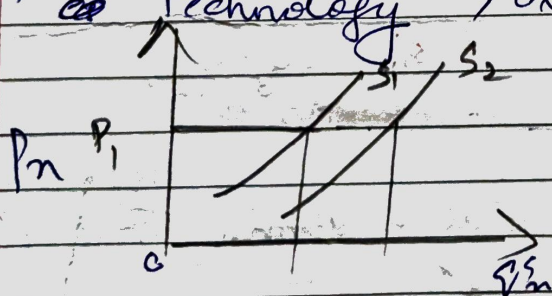
Supply of all firms in market
(refer Exp' of DD)



Movement along the Supply Curve vs
Movement of SS curve.

Movement along the curve is caused by price (refer fig 1)

Movement of supply curve (shift) is caused by other factors which are Income, Price of inputs, level of technology, expectations etc



Terminology :-

Change in qty demanded (supplied) due to change in price.
Change in demand (supply) due to change in other factors other than price.

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Equilibrium

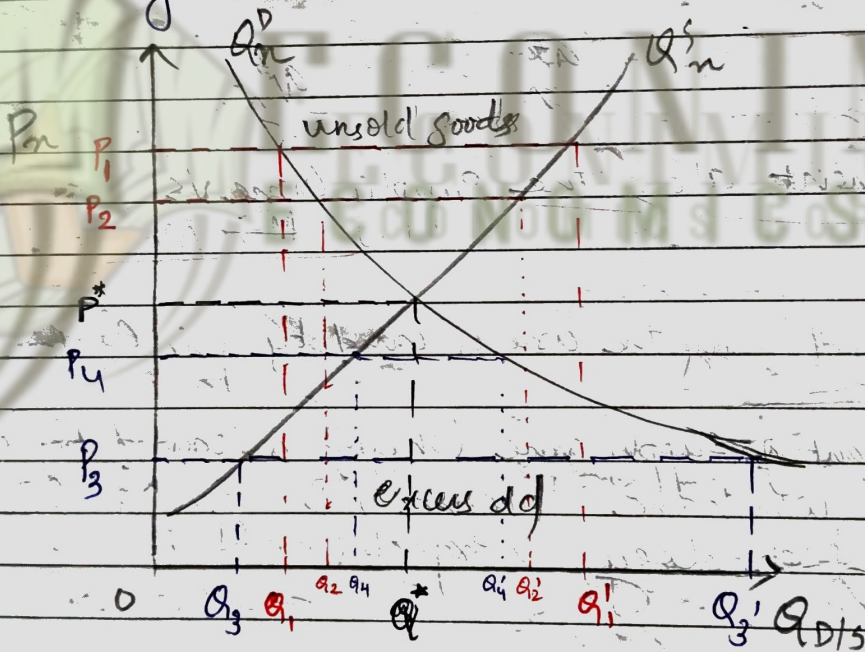
It is a system in state of rest i.e. when various forces are in balance.

Stability of equilibrium

If the system is off equilibrium, the forces within the system will drive the system to equilibrium (automatically).

Note that all equilibria are not stable.

Market demand and Market supply depends on all the determinants of individual d/s along with number of consumers in market.



Suppose
Case 1:- When economy is at equilibrium. Price - P^*
 Qty demanded - Q^*
 Qty supplied - Q^*
 Qty traded - Q^*

It is in a state of equilibrium i.e. both sellers and

buyers are satisfied as everybody is able to meet their needs nothing more nothing less. P^* is a market clearing price.

Case 2 :- Excess Supply

Suppose Price - P_1
 Qty demanded - Q_1
 Qty supplied - Q_1'
 Qty traded - Q_1 why? $Q_1' > Q_1$

There are excess amt of goods that the sellers want to sell than what buyers want to buy. Thus the price is bid down, thus demand ^{increases} and supply ~~increases~~ falls and changes in price (driven by economic agents) continue till the market reaches equilibrium.

Case 3 :- Excess demand

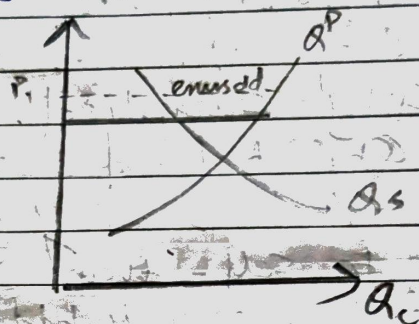
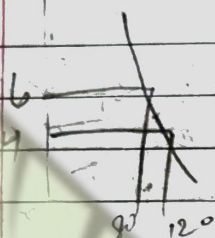
Suppose Price - P_3
 Qty demanded - Q_3'
 Qty supplied - Q_3
 Qty traded - Q_3 $Q_3' > Q_3$

There is a shortage of goods. Buyers want to buy more than what the sellers want to sell. Hence it tends to an upward push to the price (exerted by the economic agents) causing supply to rise and demand to fall. changes will continue till the economy reaches equilibrium.

In general -

- > At any price qty traded = $\min(Q^d, Q^s)$.
- > It is the behaviour of the economic agents that drives the price away from equilibrium automatically to equilibrium price.

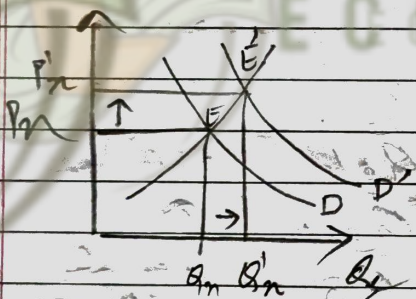
Consider



Changes in equilibrium (with movements of curves)

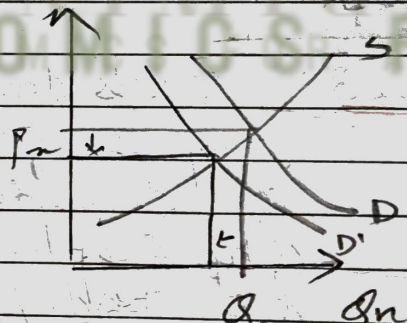
(Refer lecture note for expl of shift in one of the curves)

When demand $\rightarrow, \bar{D}$



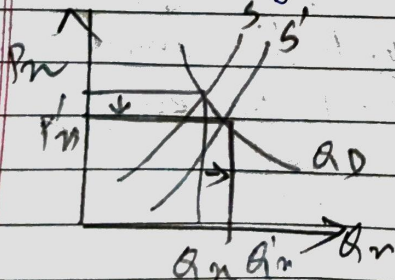
$P \uparrow, Q \uparrow$

When demand $\leftarrow, \bar{D}$



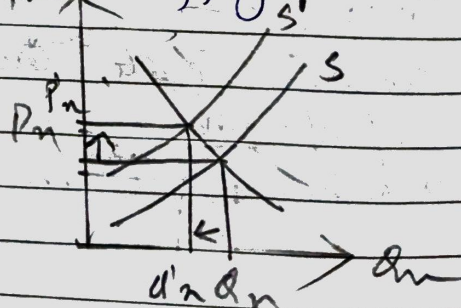
$P \downarrow, Q \downarrow$

When supply $\rightarrow, \bar{S}$

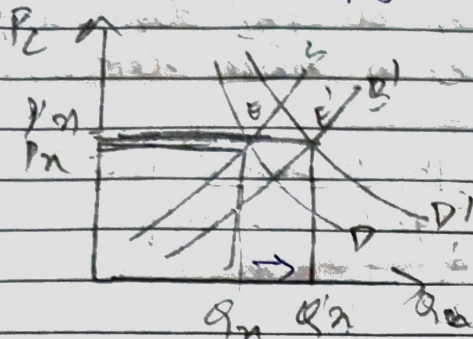
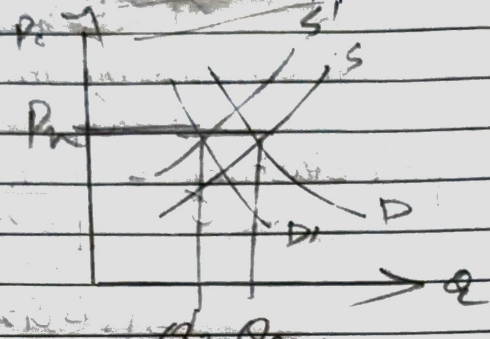


$P \downarrow, Q \uparrow$

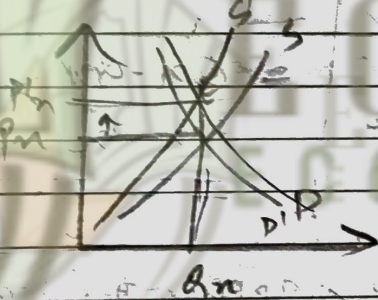
When supply $\leftarrow, \bar{S}$



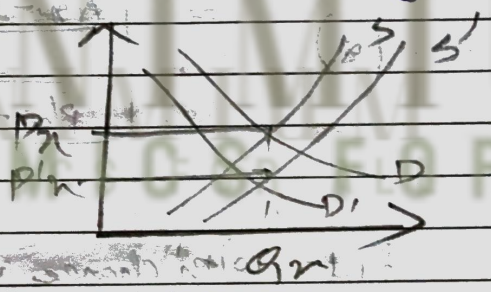
$P \uparrow, Q \downarrow$

Demand $\rightarrow$ Supply $\rightarrow$ Demand $\leftarrow$ Supply $\leftarrow$ 

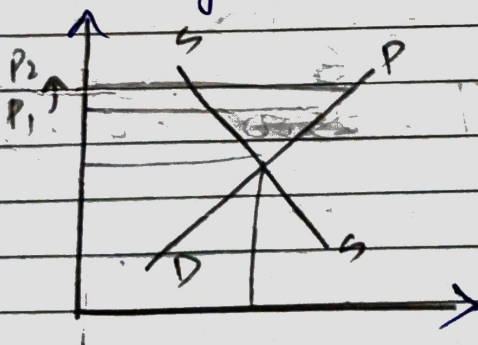
P ambiguous (it depends on extent of shift). (same price ambiguous)
 $Q \uparrow$ $Q \downarrow$

Demand $\rightarrow$ Supply $\leftarrow$  $P \uparrow$

Q ambiguous (it depends on the extent of the shift)

Demand $\leftarrow$ Supply $\rightarrow$  $P \downarrow$

An example of unstable equilibrium



When d_d is upward sloping and s_s is downward sloping.

Q. ^(price) Elasticity of demand - Responsiveness of qty demanded of a commodity to change in price, ceteris paribus

$$\text{price elasticity} = \left| \frac{\% \Delta \text{ in qty demanded}}{\% \Delta \text{ in price of comm}} \right|$$

$$(1) = \left| \frac{\frac{\Delta Q_d}{Q_d} \times 100}{\frac{\Delta P_n}{P_n} \times 100} \right| = \frac{\Delta Q_d}{\Delta P_n} \times \frac{P_n}{Q_d}$$

$$(2) = \left| \frac{\frac{Q_n - Q_n}{Q_n} \times 100}{\frac{P_n - P_n}{P_n} \times 100} \right| = \frac{Q_n - Q_n}{P_n - P_n} \times \frac{P_n}{Q_n}$$

But with change in direction, apply this formula gives us different results

A $P_1 = 4$ $QD_1 = 100$
B $P_2 = 6$ $QD_2 = 75$

~~A to B~~ $\left| \frac{2}{-25} \times \frac{4}{100} \right| = \frac{8}{2500} = \frac{2}{625}$

B to A $\frac{2}{25}$

A to B

$$C_D = \left| \frac{25}{2} \times \frac{2}{100} \right| = 0.5 //$$

B to A

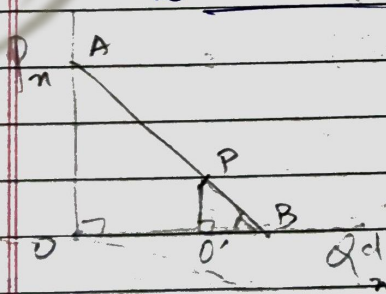
$$C_D = \left| \frac{25}{2} \times \frac{2}{25} \right| = 1 //$$

We use a modified using midpt method

$$C_D = \left| \frac{\Delta Q_n}{\Delta P_n} \times \frac{P_n + P'_n}{Q_n + Q'_n} \right| //$$

$$(3) C_D = \left| \frac{\Delta Q_n}{\Delta P_n} \times \frac{P_n + P'_n}{Q_n + Q'_n} \right| //$$

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$$C_D = \frac{BP}{AP} \text{ why?}$$

Consider $\triangle AOB$ and $\triangle POB$.

$$\angle O = \angle O' (90^\circ)$$

$\angle B = \angle B$ (Common)

$\Rightarrow \triangle AOB \sim \triangle POB$ (AA prop)

$$\Rightarrow \frac{AO}{PO'} = \frac{OB}{O'B} = \frac{BA}{BP}$$

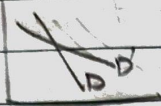
$$\frac{P_n}{\Delta P_n} = \frac{Q_n}{\Delta Q_n} = \frac{BA}{BP}$$

$$\frac{P_n \cdot \Delta Q_n}{\Delta P_n \cdot Q_n} = \frac{BA}{BP}$$

$$\text{i.e. } \frac{\Delta Q_n}{\Delta P_n} \cdot \frac{P_n}{Q_n} = \frac{BA}{BP}$$

$$\Rightarrow C_D = \frac{BA}{BP}$$

Note: - There is no unique elasticity for a demand curve as elasticity is defined at points on the demand curve. A straight line demand curve can have different elasticities at different points.



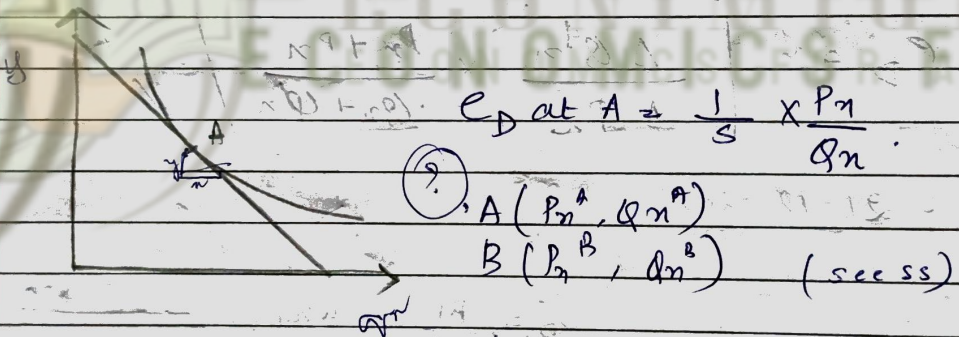
It is wrong to say: -

"D' is more elastic than D."

Consider the eqn (1) of e_D i.e. $e_D = \frac{\Delta Q_D}{\Delta P_D} \times \frac{P_D}{Q_D}$

$$\frac{\Delta Q_D}{\Delta P_D} = \left(\frac{1}{\text{slope}} \right) = \left(\frac{1}{S} \right)$$

$$(A) \quad e_D = \left(\frac{1}{S} \times \frac{P_D}{Q_D} \right) //$$

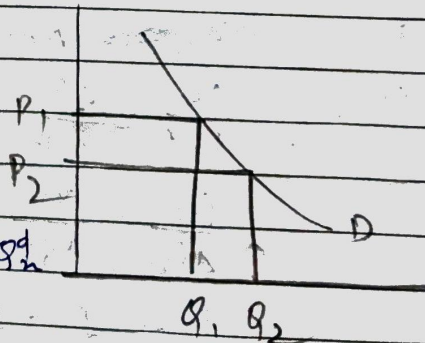


Relationship b/w Total rev(exp) and elasticity of demand

Revenue - $P_D \cdot Q_D$

More elastic be the demand then

(i.e. $\uparrow$ in $P_D \Rightarrow$ more than $1\uparrow$ in Q_D)



9

$P \uparrow \Rightarrow Q \downarrow \Rightarrow TR \uparrow$
 $P \downarrow \Rightarrow Q \uparrow \Rightarrow TR \downarrow$

2s $\uparrow P_n \rightarrow \downarrow Q_n \Rightarrow \downarrow TR_n$ - holds for very small change in P_n

P_n	100 $\xrightarrow{10\% \uparrow}$ 110	100 $\xrightarrow{10\% \uparrow}$ 110	100 $\xrightarrow{10\% \uparrow}$ 110
Q_n	50 $\xrightarrow{20\% \downarrow}$ 40	50 $\xrightarrow{5\% \downarrow}$ 47.5	50 $\xrightarrow{10\% \downarrow}$ 45
R_n	5000 $>$ 4400	5000 $<$ 5225	

(elastic dd)

(inelastic dd)

- If 2 pts given use avg formula
 More info - 1 formula

- when demand is inelastic ($e_d < 1$) price and TR move in the same direction
- when demand is elastic ($e_d > 1$) price and TR move in opposite direction
- when demand is unit elastic ($e_d = 1$), TR remains constant when the price changes

22-12-2021

$P \uparrow \Rightarrow Q \downarrow \Rightarrow TR \uparrow$ if $e_d < 1$
 $P \downarrow \Rightarrow Q \uparrow \Rightarrow TR \downarrow$ if $e_d > 1$
 $P \uparrow \Rightarrow Q \downarrow \Rightarrow TR$

Proof

$$TR = P \cdot Q$$

$$\frac{dTR}{dQ} = P + Q \cdot \frac{dP}{dQ}$$

$$\frac{dTR}{dQ} = P + \frac{P}{\frac{dQ}{dP} \cdot \frac{P}{Q}}$$

$$= P + \frac{P}{-e_d}$$

$$\frac{dTR}{dQ} = P \left(1 - \frac{1}{e_d} \right)$$

$$MR = \frac{P}{e_d} \left(1 - \frac{1}{e_d} \right)$$

If $e_d = 1$, $RHS = 0$
 If $e_d > 1$, $RHS > 0$
 If $e_d < 1$, $RHS < 0$

Income elasticity

It is the responsiveness of qty demanded w.r.t to the income of consumer.

$$e_m = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in } M} = \frac{\Delta Q_d}{\Delta M} \times \frac{M}{Q_d}$$

Cross price elasticity

It is the responsiveness of qty demanded w.r.t change in price of related commodities.

$$e_y = \frac{\% \Delta \text{ in } Q_d \text{ of } Y}{\% \Delta \text{ in } P_x} = \frac{\Delta Q_d^Y}{\Delta P_x} \times \frac{P_x}{Q_d^Y} \quad (\text{no 1st sign})$$

the others.

Note

- ① In case of income elasticity:
- $e_m > 0$ for normal goods
 - $e_m < 0$ for inferior goods (goods with superior substitutes)

- ② In case of cross price elasticity:
- If they are substitutes (goods which can be used in place of another with same utility)

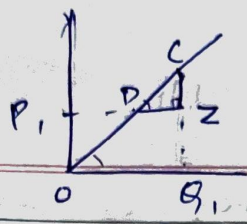
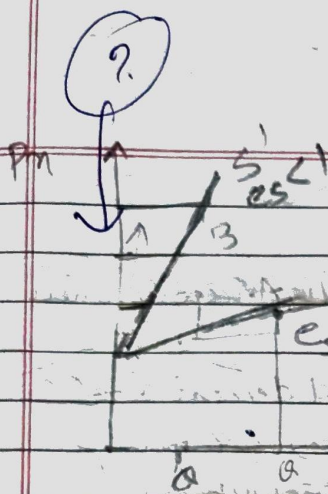
$$e_y > 0.$$

$$[\because P_y \uparrow \Rightarrow Q_d^Y \downarrow \Rightarrow Q_d^X \uparrow]$$

If they are complementary (goods which are used together for consumption)

$$e_y < 0$$

$$[\because P_x \uparrow \Rightarrow Q_d^X \downarrow]$$



$$e_s = \frac{\% \Delta \text{in } Q_s}{\% \Delta \text{ in } P_n}$$

$$= \frac{DZ/OQ_1}{CZ/O.P_1}$$

$$= \frac{DZ}{CZ} \times \frac{O.P_1}{OQ_1}$$

$$\frac{DZ}{OQ_1} = \frac{CZ}{O.P_1} = e_s$$

Elasticity of Supply

On similar term we have

e_s (wrt ΔP_n)

$$= \frac{\% \Delta \text{ in } Q_n^s}{\% \Delta \text{ in } P_n}$$

$$= \frac{\Delta Q_n^s}{\Delta P_n} \times \frac{P_n}{Q_n^s}$$

$$\frac{DZ}{CZ} = \frac{OQ_1}{O.P_1} = 1$$

22-12-2021

Applications of elasticity

1] Let us take 'Foodgrain Market'

It is a 'broad' classification thus there's no substitutes for 'foodgrains' [e.g. if we said wheat, we can say rice is sub but here all these come under foodgrains].

Thus $e_s^q < 1$

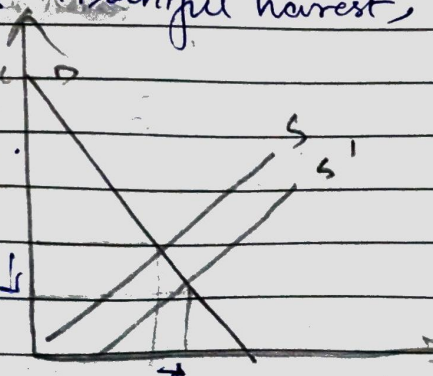
$$\% \Delta Q_d < \% \Delta \text{ in } P_n$$

If there was good rainfall and thus a beautiful harvest, then $Q \uparrow$, $P \downarrow \rightarrow TR \downarrow$

This seems like a beautiful harvest

leads to worse off? Paradox?

Here is where MSP comes to play. $\downarrow$



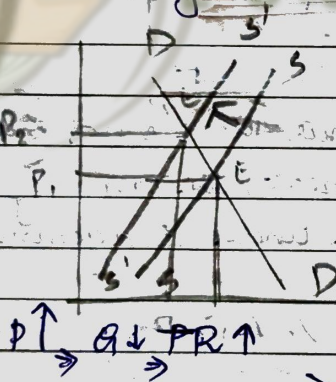
any

2] OPEC's future

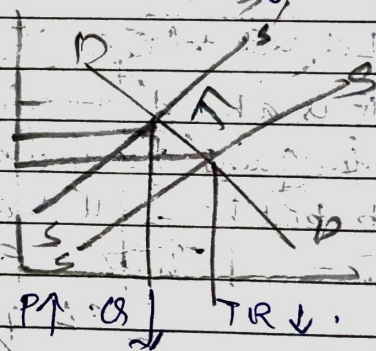
When supply of oil changes, its responsiveness depends on time period.

In short run, supply and demand are inelastic (because of very few substitutes). Suppose if supply shifts leftwards, then equilibrium price increases and qty sold $\downarrow$. But since demand is inelastic, TR rises.

But in long run, when SS shifts leftwards, the market price would increase but the dd & ss have become much more elastic. Hence this TR falls. It is due to the emerging alternatives of petroleum for transport. Hence for TR to $\uparrow$, OPEC will have to increase its SS for other areas thereby reducing price.



Short run

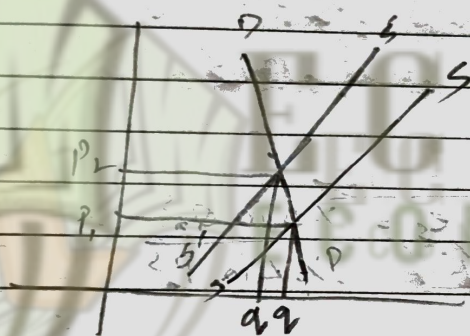


long run

3] Ways of Tackling 'drug menace'

There are two methods (i) heavy crime enforcement
(ii) education program.

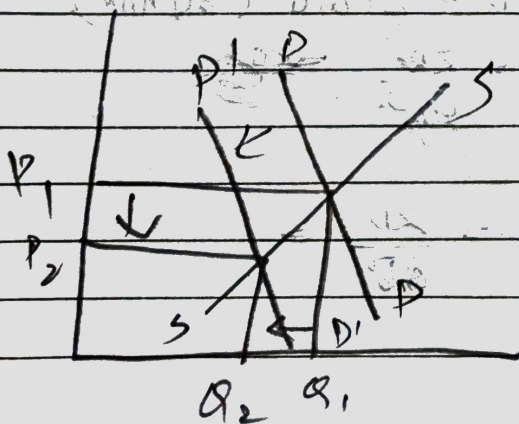
(i) Crime enforcement :- This method affects the supply side as it has a direct impact on sellers. Increase in crime enforcement would mean - Supply curve would shift left, as a result, price $\uparrow$ and qty $\downarrow$. Since dd for drugs for the drug users is inelastic, Total expenditure $\uparrow$.



$P \uparrow$ $Q \downarrow$ $TE \uparrow$

As we see that it doesn't affect the demand. The amt paid by buyers gets higher. Thus some of the buyers may quit, most of the buyers would indulge in more crime so as to procure the the less qt of crime qty of drugs available.

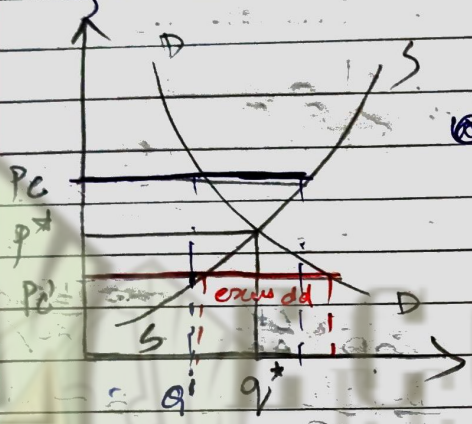
(ii) Drug education :- It reduces the demand for drugs and thereby price $\downarrow$ and qty $\downarrow$. As a result - TE on drugs $\downarrow$. Thus it not only reduces drug usage but also drug related crime.



$P \downarrow$ $Q \downarrow$ $TE \downarrow$

Q. The concept of price ceiling

It is a legal law where on how high, a price is charged for a product. It is a legal maximisation on price at which goods can be sold. It is to benefit consumers.
eg: Rent control.



3 cases

Let price ceiling be represented as P_c and eq. price as P^*

① $P_c > P^*$

price = O.P.C.

In this case the market demand and supply automatically moves to reach P^*

$\therefore$ eq. (P^*, Q^*) . This is a situation of excess supply and here price ceiling is non-binding.

② $P_c = P^*$ then eq. (P^*, Q^*) - Trivial case.

③ $P_c < P^*$

price = O.P.C.

In this case there is excess demand. But since the law says price can't be put higher than O.P.C., buyers can't bid up the price in the market. Hence eq. (P_c, Q') . This is an example of binding price ceiling.

29-12-2021.

Price flooring

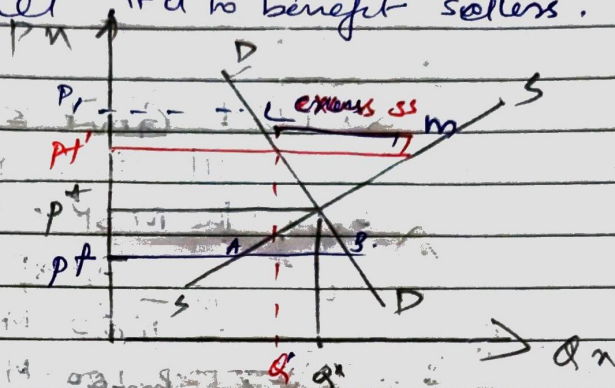
The law says that the market price can't be below a certain level. It is to benefit sellers.

$$P_f < P^*$$

Market eq. (P^*, Q^*)
(excess DD)

$$P_f = P^*$$

Market eq. (P^*, Q^*)



Both these cases are non-binding

Now when $P_f > P^*$ i.e. at price P_f'

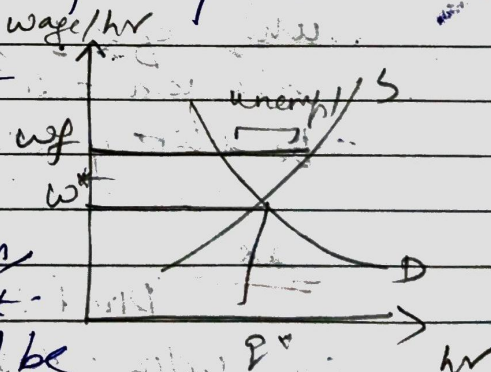
$$\text{Mkt eq.} = (P_f', Q')$$

unsold goods - LM

At any arbitrary point $P' > P_f'$

Excess ss $\rightarrow$ unsold goods $\rightarrow$ P $\downarrow$ till P_f' , cannot reduce further since it is floored.

Similar example $\rightarrow$ Labour Wage Market



if we set a wage floor at w_f so as to benefit labour,

it will create unemployment.

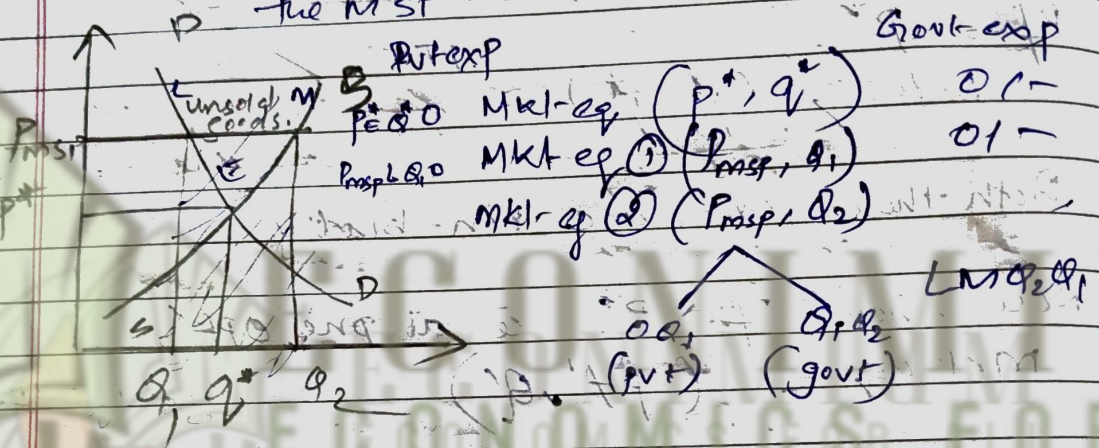
Those who still have jobs will be better off.

MSP

It has 2 aspects in it

1. Market price can't be below P_{MSP} where $P_{MSP} > P^*$

2. (1) + Govt says it will procure all the grains that comes to it at the MSP.



But MSP without (2) — i.e. Govt procurement would mean for (a normally defied) goods like wheat, where $e_p < 1$, $P \uparrow, Q \downarrow \Rightarrow R \uparrow \Rightarrow$ so those who can sell will be better off. But there'll be a lot of unsold goods.

Tax

Direct tax are taxes on factors of production and indirect tax are on goods and services.

I If tax is absent then buyers price (P_b) is equal to sellers price (P_s) is equal to eq price P .

$$P_b = P_s = P //$$

$P \uparrow$ $TR \downarrow$

If tax t is explicitly imposed on buyer then

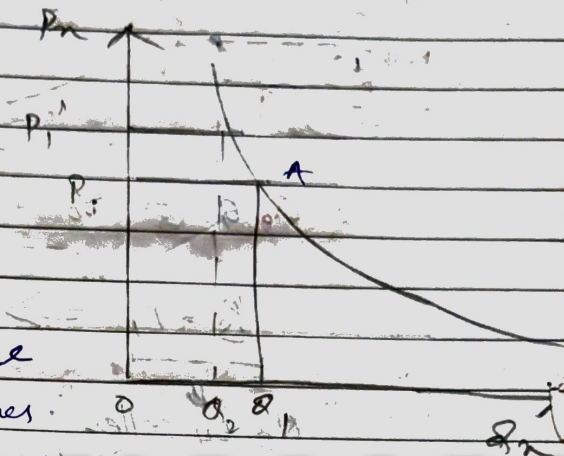
$$P_b > P_s \Rightarrow P_b - P_s = t //$$

Note

here P_s & P_b are all per unit prices

At P_s , qty demanded is OQ_1

But remember ACB shows the maximum price that the consumer is willing to pay for OQ_1 qty.
i.e. $(O, P_1) \rightarrow OQ_1$ be demanded.
 $\therefore P > P_1 \rightarrow OQ_1$ can't be demanded

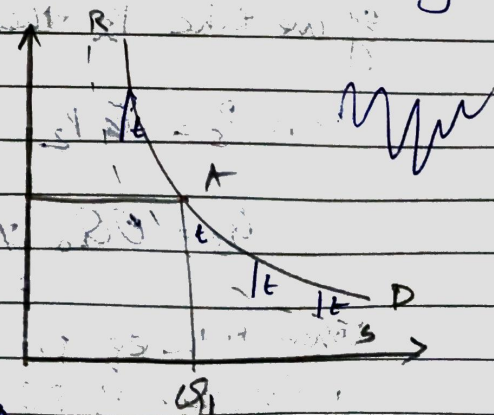


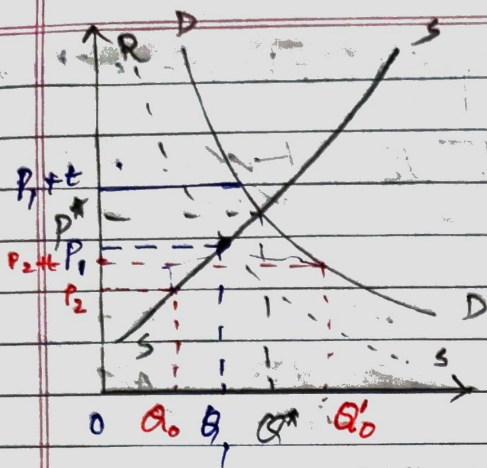
In general, for any quantity Q_1 , the height of the demand curve at Q_1 tells us the maximum price (per unit) that consumer is willing to pay for that amt. of commodity.

Now if the seller sells at AC level i.e. @ P_s price, then worth't buy tax how much will the seller get?

Original demand curve DD' would now be curve that shows relationship between P_b and Q_b

The new curve RS , vertically below DD' shows relationship between P_s and Q_s





Equil before tax ($P^* Q^*$)

[Eq with tax + paid explicitly by buyer.

after tax.

DD — $B_p Q_0$

RS — $S_p Q_0$

$$P_s = P_1 \Rightarrow P_b = P_1 + t$$

↓
Qs by seller given by 'SS'

↓
Qd by the buyer will be shown by 'DD'

$$OQ_1 = OQ_1$$

Market clears

$$E_q (P_b, P_s, Q_t) = (P_1 + t, P_1, OQ_1)$$

The equilibrium found will be unique

If we take P_2 then

$$\text{then } P_s = P_2 \quad P_b = P_2 + t$$

$$Q_s = OQ_0 \neq Q_0 = OQ_0$$

Where is the eq pt in such a model? Look for intersection of RS curve with SS curve. Height of RS curve'll tell eqi Sp.

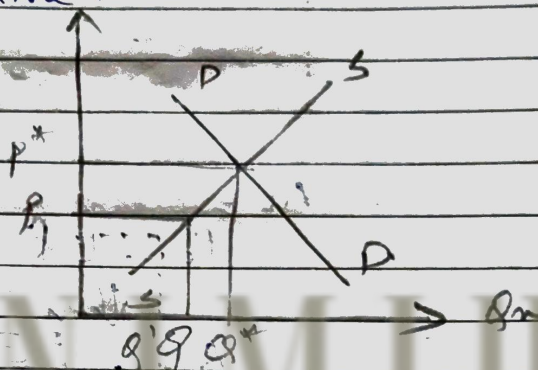
03-01-2022

II If tax 't' per unit of good is to be explicitly ^{on seller} when it is imposed $P_b \neq P_s \Rightarrow P_b > P_s$.

Alternative interpretation of SS curve.

↓ $P \in [0, P_1]$, take a price $P' \in [0, P_1]$.

Seller is willing to sell an amt $0Q' < 0Q_1$ and not $0Q_1$.



↑ $P_1 > P_1$: $0Q_1$ amt of qty willing to supply

$\therefore 0Q_1$ will be brought a price of P_1 or more.

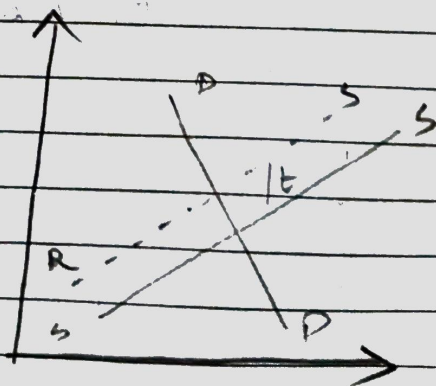
$\therefore$ The min price for selling $0Q_1$ amt of qty is P_1 .

$\therefore$ Height of the SS curve at any pt Q_1 is the minimum price at which seller is willing to sell $0Q_1$ amt of goods.

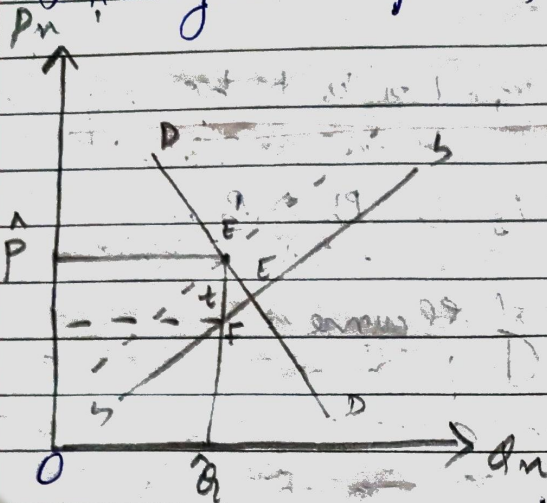
After imposition of tax.

(i) SS curve tell us relation b/w P_s and Q_s .

(ii) RS curve tell us the relation betw P_b and Q_d .



Following method to find equilibrium



To find we need to consider the point where RS curve cuts the DD curve (ie E').

At E'

$$P_b = E'Q \quad \wedge \quad P_s = FQ$$

↓

↓

$$Q_d = PE \quad Q_s = PF$$

$$= OQ \quad = OQ$$

Market clears.

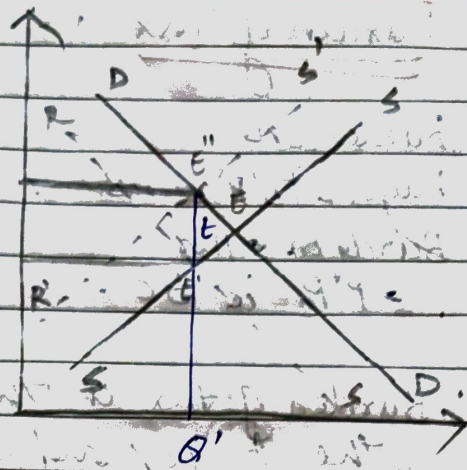
Equilibrium (P_s, P_b, Q)

$$(\hat{P}, \hat{P} - t, OQ)$$

$$\text{or } (E'Q, FQ, OQ)$$

Summary (I & II)

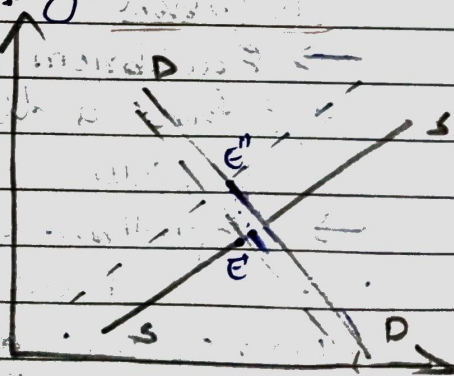
When tax is imposed explicitly on buyer, the ~~price~~ price-qty curve ~~is~~ P_s & Q_s relation chosen by RS curve and eq is at pt E' RS cuts P_s where $E'q$ is (P_s', P_b', Q')



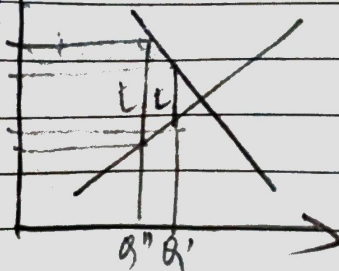
When tax is imposed on seller, the P_s' drawn't vertically above shows P_s & Q_s relation and eq is at pt E'' where P_s' curve cuts DD curve and eq is (P_b, P_s', Q') .

Thus it is understood that E' and E'' are collinear.

Now let us change the proportion of tax paid. For per unit tax t' of which $\frac{9}{10}$ portion is paid by seller and $\frac{1}{10}$ is paid by buyer. Applying this in the $\frac{1}{10}$ prev dem, we obtain the same set of equilibrium.



Task Also Given a tax amt, now to the left of DD and SS fill the gap b/w them & t' mentioned in the prob. the ghy at the point is the new eq with tax.
as tax $\uparrow$, Q trade $\downarrow$, $P_b \downarrow$, $P_s \downarrow$.



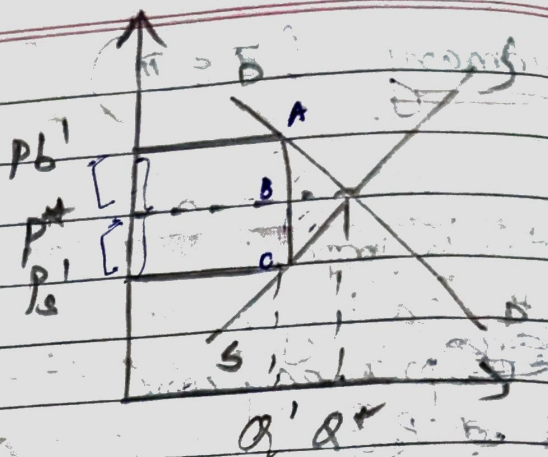
Burden of Tax

Burden on

buyer = $P_b' - P^*$ i.e. AB

Burden on seller

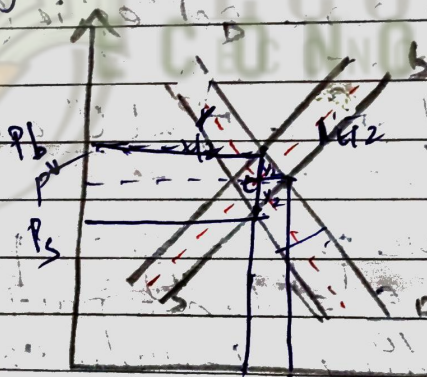
= $P^* - P_s'$ i.e. BC.



Burden of tax is the burden borne by the buyer and seller on the price at which the ~~it~~ is paid and price received by buyer and seller.

Sum of the burden = t

Ex. 11/10



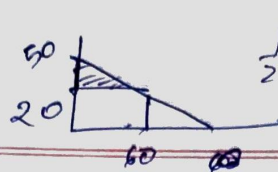
tax t imposed

--- $\frac{t}{2}$ by buyer

--- $\frac{t}{2}$ by seller

Conclusion

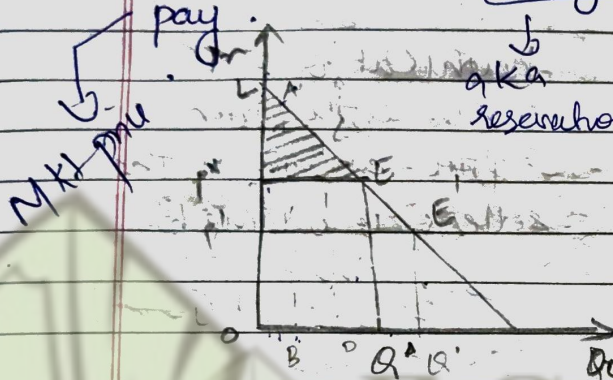
- Equilibrium doesn't depend on how the tax is distributed explicitly on the buyer/seller
- Equilibrium depends on amt of tax
- The burden of tax would be independent of how the tax is explicitly paid by law by buyer & seller.



05-01-2022

Consumer Surplus:

It is the difference between what the consumers are willing to pay and what they actually pay.



Assumption:- Consumer wishes to buy 1 unit of the comm.

Height of the DD curve for any qty is the max amt. the consumer is willing to pay for that unit of commodity.

For OB units, cons. who value the good the most pays AB and so on.

Let market equilibrium is at E.

Total valuation/total amt that consumers are willing to pay for OQ^* amt of commodity = the sum of height $AB + CD + \dots = \text{ar} (OLEQ^*)$

Total amt they actually pay for $OQ^* = \text{ar} (OP^*EQ^*)$

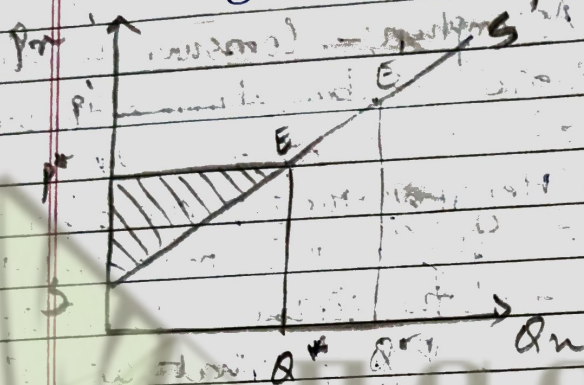
$\therefore \text{Consumer Surplus} = \text{ar} (LP^*E)$

Another way is to add the consumer surplus to each take cons. surpl. of every unit that is traded.
 $\text{ar} (LP^*E)$

Cons Surplus is the area under dd curve till qty traded (Q^*) above the equilibrium price (P^*).
 $Q^* \uparrow (P^* \downarrow)$ then cons surpl. $\uparrow$ ($\text{ar} LP^*E' > \text{ar} LP^*E$)

Producer Surplus

It is the diff between what the producers actually get and the minimum amount that the producer is willing to supply that unit of good.



any height at Q of SS curve is the min price at which the seller is willing to sell that qty

Equilibrium is at E with qty Q^* and price P^*

$\therefore$ For all $0Q^*$ amount, the minimum amt that must be paid to sellers so that they are willing to sell = ar ($0SEQ^*$)

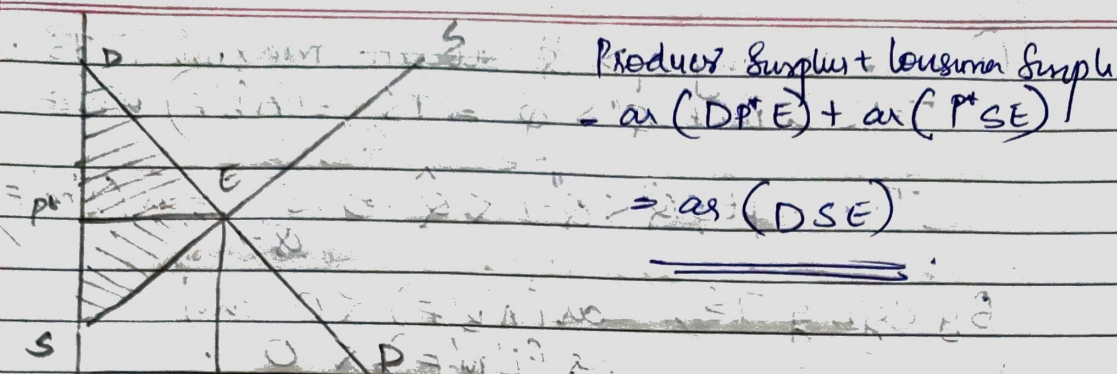
Total amt they actually get for $0Q^*$ = ar ($0P^*EQ^*$)

$\therefore$ Producer Surplus = ar (P^*SE)

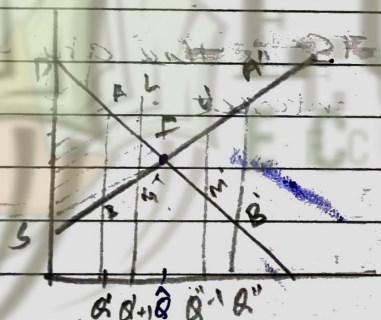
Another way is to take producer surplus at each pt and then sum it up to get ar (P^*SE)

Producer Surplus is the area above SS curve till Q^* but below P^*

As $P^* Q^* \uparrow$, producer surplus $\uparrow$ (ar $SP^*E > SP^*E$)



Total surplus is the difference between the maximum amount less as consumers are willing to pay and the minimum amount at which sellers are willing to sell.



Claim: $\hat{Q}$ maximizes Total Surplus.

By proof by deduction i.e. (taking each and every unit). For any point beyond $\hat{Q}$, $TS < 0$.

Proof by contradiction

$\hat{Q}$ maximizes Total Surplus

$\Rightarrow$ ① any $Q < \hat{Q}$ doesn't maximise TS and
 ② any $Q > \hat{Q}$ doesn't maximise TS.

① Any $Q < \hat{Q}$ doesn't maximise TS.
 Proof by contr.

Any $Q < \hat{Q}$ maximise TS,

Consider a pt $Q' < \hat{Q} \Rightarrow TS_{Q'} = ABSD$.

Now take a pt $Q'+1 > Q' \Rightarrow TS_{Q'+1} = LMSD$.

Clearly $LMSD > ABSD$.

Thus we arrive in contradiction.

$\therefore$ Any $Q < \hat{Q}$ maximise TS.

①

② Assume any $Q > \hat{Q}$ doesn't maximize TS.
Take a point $Q'' > \hat{Q} \Rightarrow TS_{Q''} = a(A'B'F)$ ~~which~~

Take a pt $SQ < Q''-1 < \hat{Q} \Rightarrow TS_{Q''-1} = a(L'm'F)$

By defn of TS, $a(A'B'F) < 0$ and $a(L'm'F) < 0$.

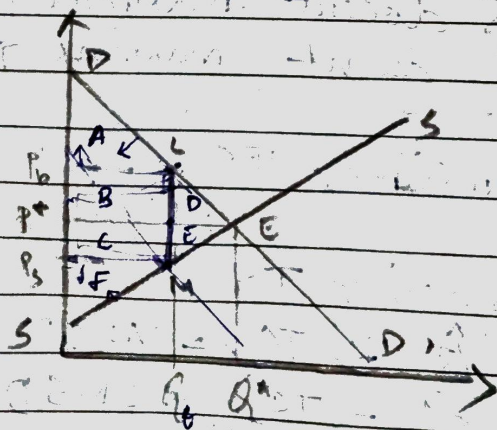
Graphically $a(A'B'F) > a(L'm'F)$ but
~~By defn~~ since both're -ve $TS_{Q''-1} > TS_{Q''}$.

Thy. we arrive in contradiction ②
from ① & ② it is understood $\hat{Q}$ maximizes TS.

$\therefore$ The qty which maximizes TS is the qty at which the dd and ss curves intersect.

10-01-2022

Lets take the idea of total surplus along with the taxation policy.



Pre Tax Scenario (P^*, Q^*)

- (CS) Consumer Surplus - $a(A+B+D) = P^* D E^*$
 (PS) Producer Surplus - $a(C+E+F) = S P^* E^*$
 (GR) Government Revenue - $\text{tax} \times \text{qty} = 0$
 $\therefore CS + PS + GR = SDE = a(A+B+C+D+E+F)$

In a market free of tax, Total surplus is maximised.

Post-Tax Scenario (P_b, P_s, Q)

- (CS) Consumer Surplus - $a(A) = P_b D L$
 (PS) Producer Surplus - $a(F) = P_s S M$
 (GR) Govt Revenue - $P_b M L P_s = a(B+C)$
 $\therefore CS + PS + GR = a(A+B+C+F)$

$$\Delta CS = -(B+D)$$

$$\Delta PS = -(C+E)$$

$$\Delta TS = -(E+D) \text{ aka deadweight loss.}$$

$$\Delta GR = +(B+C)$$

$$\nexists Q^t \leq Q^* \quad TS_{Q^t} < TS_{Q^*}$$

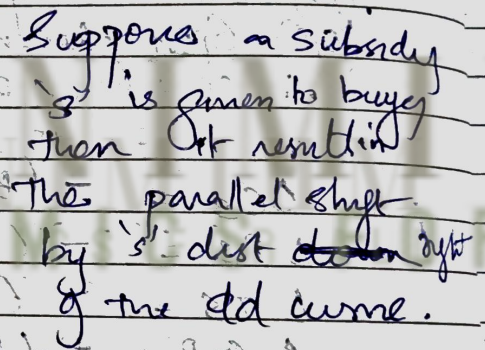
* When tax is imposed, producers and consumers face a loss compared to pre-tax scenario and govt gains.

Note: Height of DD at qty Q to DD - Benefit of Society
 height of SS line at qty Q - Cost of Society

A quantity Q_{E+I} can be produced as benefit to society & cost of society but since taxation persists at such Q_{E+I} , it can't be done.

This means when TS reduces, society could be taken $q_{t+1} > q_t$ but the fall in TS makes the economy unable to do so.

4) When subsidy is given to the buyer:

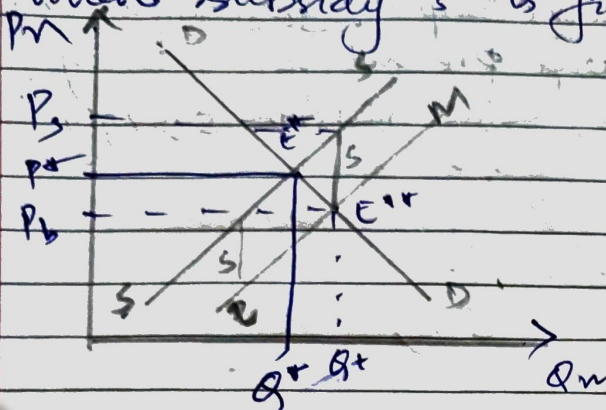


RS denote P_1 and Q_n relation
and DD denote P_2 and Q_m relation.

Thus eq is (P_b, P_s, Q'_b) ~~is~~

Market clears

II When subsidy 's' is for the sellers.

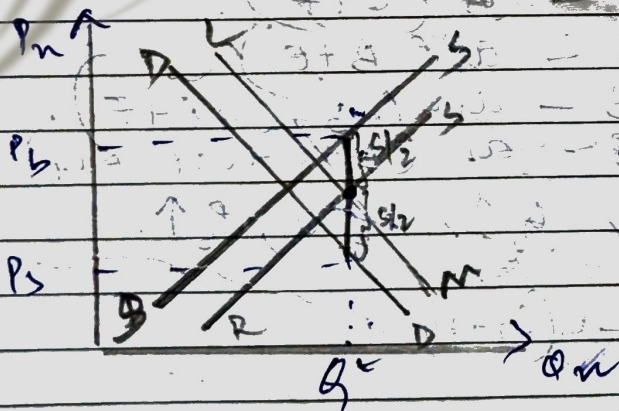


Suppose a subsidy s is given by the govt to sellers, then there'll be a shifted curve to the right of SS curve by s dist.

$\hookrightarrow$ M curve shows $P_b - Q$ relation
 SS curve shows $P_s - Q$ relation

New eq (Q_1, P_b, P_s)

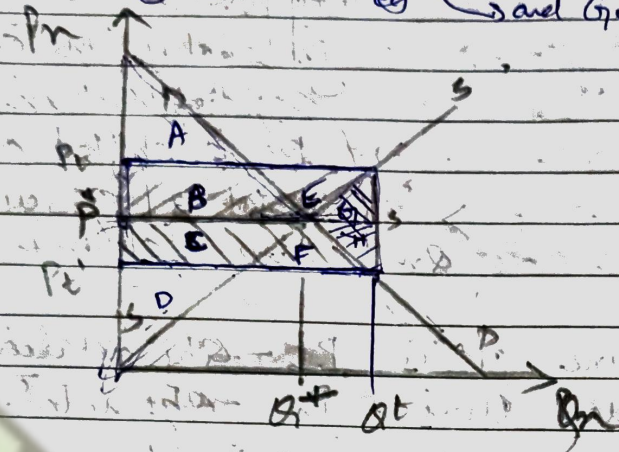
III When subsidy 's' is provided by govt b/w the seller and buyers in 1:1 proportion



on this case too, eq is (at Q_1, P_b, P_s)

~~no~~ no to whom subsidy is imposed and/or what proportion, equilibrium is same

Consumer Surplus, Producer Surplus, Total Surplus and deadweight loss after pre and post subsidy
said Govt exp - subsidy



Pre tax subsidy

$$CS - a(A+B)$$

$$PS - a(C+D)$$

$$TS - a(A+B+C+D)$$

$$GE - 0$$

Post tax subsidy

$$CS - a(A+B+C+F)$$

$$PS - a(E+D+B+E)$$

$$TS - a(A+B+C+D+E+F)$$

$$GE - a(B+C+E+F+D+H)$$

$$\Delta CS - a(C+F)$$

$$\Delta PS - a(B+E)$$

$$\Delta TS - a(B+C+E+F)$$

$$\Delta GE - a(B+C+E+F+D+H)$$

after subsidy's, $Q \uparrow$, $P_b \downarrow$, $P_s \uparrow$

$$DWL - a(G+H)$$

Dead weight loss

meaning: It refers to decline in total surplus due to market distortion such as taxes

More reading required

classmate

Date

Page

Factors affecting DWL:

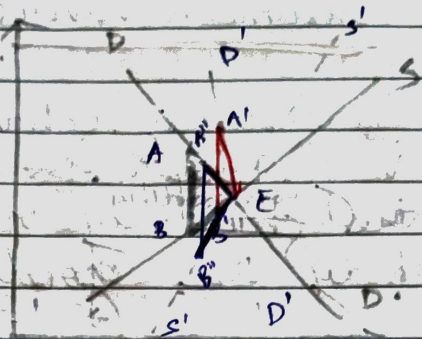
I Slopes of DD and SS:

DD: $DWL = ABE$

$D'D'$: $DWL = A'B'E$

SS: $DWL = ABE$

$S'S'$: $DWL = A''B''E$

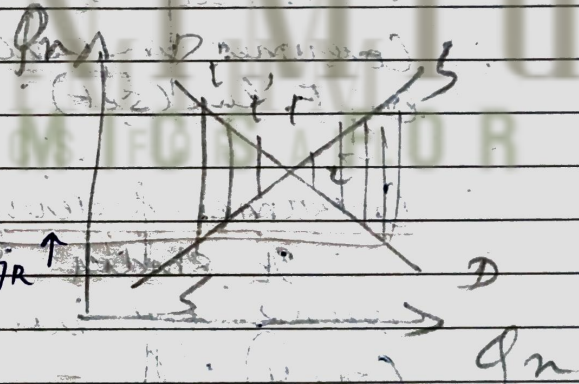


When the slopes of demand and supply curve change in such a manner that tax imposed creates an equilibrium ^{comparatively} closer to the eq pt (highers)

II When tax changes from t to t' to t'' ,

tax $\uparrow$ and thus $DWL \uparrow$:

$\rightarrow p_b \uparrow$ and $p_s \uparrow$ and $G_R \uparrow$



Laffer curve: refers to the curve which explains the relationship b/w size of tax and govt total tax revenue.

Note: If $E_{part} = 0$. Then there won't be DWL despite tax.

tax revenue

