ECO

Market: An institution where buyers & sellers exchange their goods / services at an agreeable price.

Buyer: Revealed preferrence = Demand

Seller: " " = Supply

Demand: Desire for a good/service backed by the ability & willingness to pay for it.

Prof: Alfred Marshall gave "Law of Demand":
"All else equal, Price (P) & Quantity Demanded (Q) are inversely ∮ related," for normal commodity under normal circumstances.

$$Q_d = Q_d(P, Y).$$

↑ Price ↑ Income.

25/7/11

* Assumptions of Demand law:

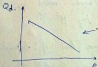
(a) Income (Y) of the consumer is constant

(b) Population has to be constant.

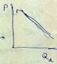
(c) Preference of consumer is constant.

$$Q_d = Q_d(P) \Rightarrow Q_d \text{ is a fn. of } P$$

$$Q'_d < 0.$$



← This should be but traditionally we follow →



* Griffen / Inferior Goods: Commodities for which P & Q_d are directly related. • Concept of "all else equal" not valid. People tend to buy less of goods of lesser value when income ↑

Conspicuous Goods: Purchase / demand to show others how rich one is. This was given by Veblen. Even if P goes up, we buy more to show-off. eg: gold / diamond

* Absolute Goods: P & Qd are not related. like water or salt. If P ↓ doesn't mean we consume more. eg: life-saving drugs.

Thus in the above 3 cases, the Demand Law does not hold good.

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Change in Demand: ~~Chan~~ Variation in demand due to a change in other determinants of demand than price. eg Y

Change in Qty Demanded: Change in demand due to a change in price.

Elasticity:

Price elasticity of Demand: % change in demand due to % change in Price. (e_p) $\frac{\partial Q_d}{\partial P} / \frac{Q_d}{P}$

Income elasticity of Demand (e_y): % change in demand due to % change in income of customer. $\frac{\partial Q_d}{\partial Y} / \frac{Q_d}{Y}$

Q. Find out elasticity of Qd wrt P, Y. (H.W)

elasticity → $\frac{dy}{dx} / \frac{Y}{x}$

$\frac{\partial Q_d}{\partial P} / \frac{Q_d}{P}$

$\frac{\partial Q_d}{\partial Y} / \frac{Q_d}{Y}$

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$Q_d'(P) < 0$

$Q_d'(Y) > 0$

$$e_p = \frac{\partial Q_d}{\partial P} \Big/ \frac{Q_d}{P} = -ve.$$

($\frac{\partial Q_d}{\partial P}$ ↓ $-ve$; $\frac{Q_d}{P}$ ↓ $+ve$.)

$$\therefore e_p = \left| \frac{\partial Q_d}{\partial P} \Big/ \frac{Q_d}{P} \right|$$

1.) Unitary Elasticity : $|e_p| = 1$

For some change in P, Qd changes by exactly same %.

2.) More Elasticity: $|e_p| > 1$.

Happens more to competitive products. Response is greater than unitary.
eg: for 1% change in P, Qd changes by more than 1%.

3.) Less Elasticity. $|e_p| < 1$.

Response ~~i~~ is less. eg: life-saving drugs.

~~4.) Perfe~~

4) <u>Perfectly</u> <u>Elastic</u> <u>Demand</u>: For an insignificant change in price ~~rate~~ results in drastic change in Q_d. $|e_p| = \infty$.

↓se in Price → $Q_d = \infty$.

↑se in Price → $Q_d = 0$

5.) <u>Perfectly</u> <u>Inelastic</u> <u>Demand</u>: $|e_p| = 0$.

eg: salt.

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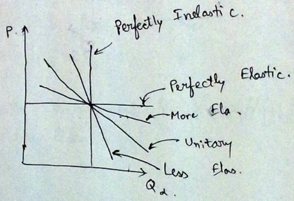
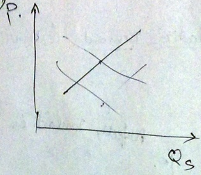
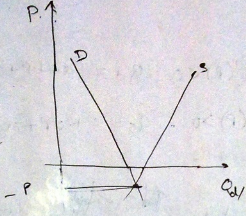


* Income Elasticity of Demand (e_y) /

* Law of Supply: All else equal, Price (P) & Quantity Supplied (Q_s) are directly related for normal commodity.





For a market to exist there should be a +ve price. Condns. for existence of market:

(i) D $\not<$ S for zero price.

i.e. $Q_d > Q_s$ at $P = 0$.

(ii) Both the Demand fn. & supply fn. should be linear

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D.C : $Q_d = Q_d(P)$, $Q_d'(P) < 0$, $Q_d = a - bP$ ~~$+ \pi_1 P^2$~~

S.C : $Q_s = Q_s(P)$, $Q_s'(P) > 0$, $Q_s = c + dP$ ~~$+ \pi_2 P^2$~~

$$Q_d = Q_s = Q^*$$

$$\Rightarrow a - bP = c + dP$$

$$\Rightarrow P(b+d) = a - c$$

$$\Rightarrow \boxed{P^* = \frac{a-c}{b+d}} \quad \forall\, a > c.$$

Price(Qs) depends on previous price.

$$Q_{s_t} = Q_s(P_{t-1})$$

$\therefore$ $Q_{d_t} = a - bP_t$

$Q_{s_t} = c + dP_{t-1}$

$Q_{d_t} = Q_{s_t}$

$\Rightarrow a - bP_t = c + dP_{t-1}$

5/8/11

$$a - bP_t = c + dP_{t-1}$$

$$\Rightarrow dP_{t-1} + bP_t + (c-a) = 0.$$

$$P_t = P_p + P_c$$

Equilibrium Price. — P_t

"Particular Price" (P_p) → Price paid at pt. of exchange.

"Complimentary Price" (P_c) → ~~Fluctuat~~ Periodic fluctuations in price.

$$P_t = \beta^t \neq 0. \Rightarrow \text{(Price at exchange} \neq 0)$$

$$P_{t-1} = \beta^{t-1}$$

$$a - c = 0. \text{ (assume const.} = 0)$$

$$P_p = d\beta^{t-1} + b\beta^t = 0.$$

$$\Rightarrow \beta^t \left(\frac{d}{\beta} + b\right) = 0.$$

$$\Rightarrow \beta^t = 0 \quad \text{or} \quad \frac{d}{\beta} + b = 0.$$

But $\beta^t \neq 0$

$$\therefore \beta = -\frac{d}{b}$$

$$\therefore P_t^p = \left(-\frac{d}{b}\right)^t = P_p.$$

P_c: $P_t = \alpha$, $P_{t-1} = \alpha$.

$$\Rightarrow \alpha = \frac{a-c}{d+b}$$

$$\therefore \boxed{P_t^* = \left(-\frac{d}{b}\right)^t + \frac{a-c}{b+d}}$$

18/11

CONSUMPTION

* Consumption (C): Destruction of utility for satisfaction of ~~consumer~~ human want.

Utility (U): Want satisfying quality of a commodity / service.

Level of utilities depends on utility consumed.

$$U = U(q_1, q_2, \ldots q_n).$$

q_i are the commodities.

Marginal Utility: $MU_1 = \frac{\partial U}{\partial q_1}$

If consumption is continuous, then successive utilities goes on ↓se. This ~~is~~ successive utility is called Marginal Utility. This is called "Law of Diminishing Marginal Utility."

Unit of Marginal Utility = Util

M.U. ↓se but Total Utility (T.U.) ↑se to a constant.

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Indifference Law: Combination of different commodities such that utility remains same.

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Indifference Curve:

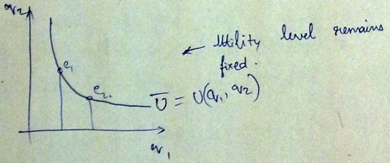
$\bar{U} = U(q_1, q_2)$.

Assumption: (1) Consumer is Rational.

(2) "Saturation pt." for both commodities are not ~~zero~~ reached. → Marg. Utility = 0.

Suppose $5q_1 + 10q_2 = U_1$

$7q_1 + 7q_2 = U_1$



∴ ↑ in consumption of one product compels ↓ in consumption of other prod.

* Properties of I.C.:

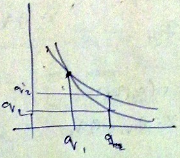
(1) Downward Slopping.

(2) Convex to origin.

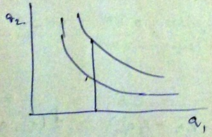
(3) I.C. will never intersect each other.

Since ↓ in MU of q_2 is more than ↑ in MU of q_1, thus q_1 & q_2 are not related linearly.

If 2 I.C. intersect, it will defy logic as q_1 will remain same, but q_2 will change which is not possible.



(4) Higher I.C. reflects higher utility.



If price of q_1 & q_2 are P_1 & P_2.

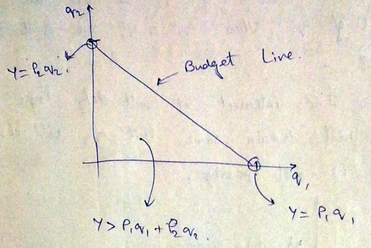
Total Expenditure $= P_1q_1 + P_2q_2 = TE$.

Income $= Y$

If we assume $Y = TE$.

$Y = P_1q_1 + q_2P_2$. (Budget constant).

Consumer needs to maximise $\bar{U}$ while subjected to condn. $Y = P_1q_1 + P_2q_2$.



(H.W). Maximise $U = U(q_1, q_2)$

subject to $Y = P_1 q_1 + P_2 q_2$.

$$\frac{\partial U}{\partial q_1} = 0, \quad \frac{\partial U}{\partial q_2} = 0.$$

$$\begin{vmatrix} \frac{\partial^2 U}{\partial q_1^2} & \frac{\partial^2 U}{\partial q_1 \partial q_2} \\ \frac{\partial^2 U}{\partial q_2 \partial q_1} & \frac{\partial^2 U}{\partial q_2^2} \end{vmatrix} < 0.$$

$Y - P_1 q_1 - P_2 q_2 = 0.$

$$Z = U(q_1, q_2) + \lambda(Y - P_1 q_1 - P_2 q_2) = f(q_1, q_2, \lambda)$$

Z → Lagrangian Fn. λ → Lag. Multiple.

$$\frac{\partial Z}{\partial q_1} = \frac{\partial U}{\partial q_1} - \lambda P_1 = 0, \Rightarrow \lambda = \frac{\partial U}{\partial q_1} / P_1$$

$$\frac{\partial Z}{\partial q_2} = \frac{\partial U}{\partial q_2} - \lambda P_2 = 0 \Rightarrow \lambda = \frac{\partial U}{\partial q_2} / P_2.$$

$$\frac{\partial Z}{\partial \lambda} = Y - P_1 q_1 - P_2 q_2 = 0, \Rightarrow Y = P_1 q_1 + P_2 q_2.$$

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$\Rightarrow \frac{\partial U}{\partial q_1} / P_1 = \frac{\partial U}{\partial q_2} / P_2$

$\Rightarrow \boxed{\frac{MU_1}{P_1} = \frac{MU_2}{P_2}}$ → Law of equi-marginal Utility

eg:	MU	P	MU/P
1 →	100	10	10
2 →	50		

$\boxed{\frac{\partial U_1}{\partial q_1} / \frac{\partial U}{\partial q_2} = \frac{P_1}{P_2}}$ ← Logical Interpretation

(10, 5)

Hence consumer will go for 1, then MU will ↓ for 1. 2 will become scarce, MU will ↑.

Thus when both become equal, consumer gets max. utility.

⇒ You should spend money on commodity where you get more MU.

Law of EquiMU: MU on each commodity should remain equal.

$$\frac{\partial^2 Z}{\partial q_1^2} = \frac{\partial^2 U}{\partial q_1^2}$$

$$\frac{\partial^2 Z}{\partial q_2^2} = \frac{\partial^2 U}{\partial q_2^2}$$

$$\frac{\partial Z}{\partial q_1} = \frac{\partial U}{\partial q_1} - \lambda P_1$$

$$\frac{\partial^2 Z}{\partial q_1 \partial q_2} = \frac{\partial^2 U}{\partial q_1 \partial q_2}$$

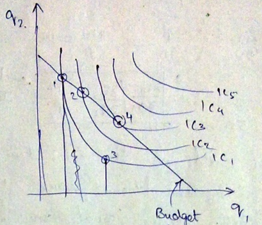
$$\frac{\partial^2 Z}{\partial q_2 \partial q_1} = \frac{\partial^2 U}{\partial q_2 \partial q_1}$$

$$\frac{\partial^2 U}{\partial q_1^2} \cdot \frac{\partial^2 U}{\partial q_2^2} - \frac{\partial^2 U}{\partial q_1 \partial q_2} \cdot \frac{\partial^2 U}{\partial q_2 \partial q_1} < 0.$$

$$\Rightarrow \frac{\partial^2 U}{\partial q_1^2} \cdot \frac{\partial^2 U}{\partial q_2^2} < \frac{\partial^2 U}{\partial q_1 \partial q_2} \cdot \frac{\partial^2 U}{\partial q_2 \partial q_1}$$

$$\Rightarrow \frac{\partial^2 Z}{\partial q_1^2} \cdot \frac{\partial^2 Z}{\partial q_2^2} < \frac{\partial^2 Z}{\partial q_1 \partial q_2} \cdot \frac{\partial^2 Z}{\partial q_2 \partial q_1}$$

22/8/11 Langrangian fn. introduces the constraint into the objective fn. without disturbing its sanctity.



A rational consumer will go for (3) as he gets some saving but our constraint does not allow it.

Also utility order: $IC_5 > IC_4 > \dots > IC_1$

∴ Consumer will go for IC_3 to get max U where the IC is tangent to the Budget Line

Slope of IC = slope of B.L.

$$\therefore \boxed{\frac{\partial U}{\partial q_1} \Big/ \frac{\partial U}{\partial q_2} = \frac{P_1}{P_2}}$$

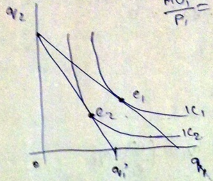
Geometrical Interpretation of Equi MU Law.

This law assumes all of diminishing MU law & also of IC.

20/8/11 * "Price - Effect."

Suppose $P_1 \uparrow$ & P_2 const.

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2}.$$



Total effect of a price change on quantity of consumer demanded. Effect of price change on real income is called "Income Effect" which ultimately has an effect on Q_d.

When P_1, relative price changes.

Relative Price of $q_1 = \frac{P_1}{P_2}$.

" " of $q_2 = \frac{P_2}{P_1}$.

Here q_2 becomes relatively cheaper. Consumer has a psychological tendency to replace a dearer commodity with a cheaper commodity. This is called "Substitution Effect".

Income Effect + Substitution Effect = Price Effect.

2/9/11 Suppose $U = U(q_1, q_2) = q_1 q_2$

$Y = P_1 q_1 + P_2 q_2$, say $100 = 5q_1 + 4q_2$.

$Z = q_1 q_2 + \lambda(Y - P_1 q_1 - P_2 q_2) = 0$.

$\frac{\partial Z}{\partial q_1} = q_2 - \lambda P_1 = 0$.

$\frac{\partial Z}{\partial q_2} = q_1 - \lambda P_2 = 0$.

$\Rightarrow \frac{q_2}{P_1} = \frac{q_1}{P_2}$ $\Rightarrow q_1 = \left(\frac{P_2}{P_1}\right) \cdot q_2$.

$\therefore Y = P_1 \cdot \left(\frac{P_2}{P_1}\right) q_2 + P_2 q_2$.

$\Rightarrow Y = 2 P_2 q_2$

$\Rightarrow q_2 = \frac{Y}{2P_2} = f(Y, P_2)$. $\Rightarrow q \propto \frac{1}{P}$

Q_d	P.	
100	15	$\rightarrow e_1$
115	13	
120	12	$\rightarrow e_2$
130	10	$\rightarrow e_3$

$e = \frac{e_1 + e_2 + e_3}{3}$.

PRODUCTION

Production: Creation of ~~some~~ utility (U) for the satisfaction of human want.

Some "non-null" quantities are transferred into some other non-null qty. with some additional utilities.

Q = Output, I = Input (factors of production)

$\therefore$ $\boxed{Q = Q(I)}$

Input → Traditionally classified into:

- Land (N)
- Labour (L)
- Capital (K)
- Organisation. (O).

$\Rightarrow$ $\boxed{Q = Q(N, L, K, O)}$

- N → Rent
- L → Wage
- K → Interest
- O → Profit

Rent, Wage, Interest, Profit: Remunerations of Production (What you get..)

On adding these 4, we get cost of production.

1/11

$Q = Q(L, K)$.

Labour: Any physical or mental excercise that gives wage.

Capital: Accumulation of past labour for further production.

Short Run Production: where one as a producer cannot change all factors of production (only one factor maybe).

eg: T-shirt eg ⇒ sudden ↑ in demand → labour increment only.

Long Run Production: Can change all factors.

eg: (Short Run). keep K const. → You vary the prop. of inputs to get diff. output.

$Q = Q(L, \bar{K})$.

$Q_1 \rightarrow \bar{K} - L_1$ $\bar{K}/L_1$

$Q_2 \rightarrow \bar{K} \rightarrow L_2$. $\bar{K}/L_2$

$Q_3 \rightarrow \bar{K} - L_3$ $\bar{K}/L_3$,

"**Law of Variable Proportions**" – Response due to change in proportionate use of factors of prod. Also ka. "**Short Term Law of Prod.**"

According to the Law of Variable Proportions, we may have 4 stages:

(1) Increasing Return.

Q↑ more than proportionate to I
(like 10% ↑ in labour → 12% ↑ in Q).

(2) Constant Return.

(3) Decreasing Return.

(4) -ve Return.

Case (1) happens when output is not optimised. If we ↑ labour to optimal level, Q might ↑ more than prop. to I.

eg: Marks (Classes, Time).

Stage	Marks	Time
Ise Return.	10	1 hr.
Ise Return.	20	2
Ise Return.	33	3
Ise Return. / Const. Ret.	70	4
Const. Ret.	80	5
Const. Ret. / Dse Return	90	6
Dse Return / -ve Ret.	94	7
-ve Ret.	91	8

1/11.

① Increasing Return.

$\frac{\partial Q}{\partial L} > 0 \qquad \frac{\partial^2 Q}{\partial L^2} > 0.$

② Constant Return

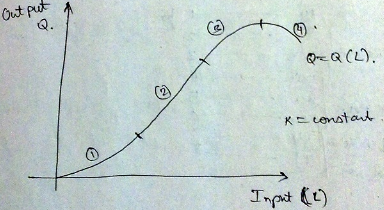
$\frac{\partial Q}{\partial L} > 0 \qquad \frac{\partial^2 Q}{\partial L^2} = 0.$

③ Decreasing Return.

$\frac{\partial Q}{\partial L} > 0 \qquad \frac{\partial^2 Q}{\partial L^2} < 0.$

④ -ve Return ⟹ Leads to "Disguised Employment".

$\frac{\partial Q}{\partial L} < 0$



* In **Long-Run**,

$Q = Q(K, L)$

scale of operation will vary.

"**Law of** **Returns** (Output) **to Scale**" or "(Law of) **Long-Run Production**" → explains producer's behaviour in Long-Run prod.

Here we will 3 stages:

a) Increasing Returns to Scale
b) Constant Returns to scale.
c) Decreasing " " "

Here we don't have usually -ve return for a rational producer. Since time period is big, a producer can shut down production before -ve return

Isoquant: Combination of 2 inputs (here K & L) that give equal level of output (IN to IC)

8/9/11

Average Wage = w.

Then wL = Cost of producing unit on labor.

Average ~~Rof~~ Interest for capital = r

Then rK = Cost of prod. unit on capital.

$\therefore$ $\boxed{C = wL + rK.}$ ⟶ Cost Constant (~~Iso Cost Line~~).

↓

Cost of Production.

$\bar{Q} = Q(L, K)$.

Prod. wants to maximise $\bar{Q}$.

$\frac{\partial Q}{\partial L}$ = Marginal (Physical) Prod. of Labor. $= MP_L$

$\frac{\partial Q}{\partial K}$ = MPP of K = MP_K.

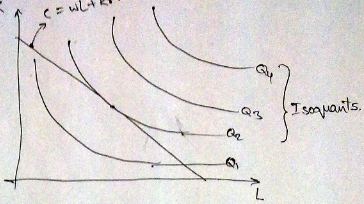
$$\bar{Q} = Q(L, K) - \lambda(C - wL - rK)$$

$$\frac{\partial \bar{Q}}{\partial L} = \frac{\partial Q}{\partial L} - \lambda w = 0.$$

$$\frac{\partial \bar{Q}}{\partial K} = \frac{\partial Q}{\partial K} - \lambda r = 0.$$

$$\Rightarrow \frac{1}{w} \cdot \frac{\partial Q}{\partial L} = \frac{1}{r} \cdot \frac{\partial Q}{\partial K}.$$

$$\Rightarrow \boxed{\frac{MP_L}{w} = \frac{MP_K}{r}}$$



$Q = Q(L, K) = A L^{\alpha} K^{\beta} . \mu$ ← (Cup - Douglas Prod. fn.)

where,

Q = output , L = Labour input

K = Capital input.

α & β are constants.

A = efficiency ~~factor~~ . parameter.

α = partial elasticity of L wrt Q.

β = " " " K " "

μ = Random error