Elasticity Of Demand

Concept of Elasticity of Demand

Consider the following situations:

(1) As a result of a fall in the price of radio from Rs.500 to Rs.400, the quantity demanded increases from 100 radios to 150 radios.

(2) As a result of fall in the price of wheat from Rs.20 per kilogram to Rs.18 per kilogram, the quantity demanded increases from 500 kilograms to 520 kilograms.

(3) As a result of fall in the price of salt from Rs.9 per kilogram to Rs.7.50, the quantity demanded increases from 1000 kilogram to 1005 kilograms.

What do you notice?

You notice that as a result of a fall in the price of radios or Wheat or Salt the quantity demanded of radios, Wheat, salt increases.

Then, what is the difference?

The difference lies in the degree of response of demand which can be found out by comparing the percentage changes in prices and quantities demanded. Here lies the concept of elasticity

Concept of Elasticity of Demand

For Eg.

A (Petrol/Gasoline)

Price	Qd
100 → 120 (20 → 20%)	1000 → 950 (50 → 5%)

Change of 20% Price → Change of 5% in Qd

$(\frac{\%\Delta QD}{\%\Delta P} = \frac{5\%}{20\%})$ i.e. 0.25 times

↓

Less Response (Less elastic/inelastic)

E = 0.25

B (Pepsi)

Price	Qd
10 → 12 (2 → 20%)	1000 → 200 (800 → 80%)

Change of 20% Price → Change of 80% in Qd

$(\frac{\%\Delta QD}{\%\Delta P} = \frac{80\%}{20\%})$ i.e. 4 times

↓

More Response (More elastic/elastic)

E = 4

Meaning of Elasticity Of Demand

Concept of Elasticity of Demand

Elasticity = Responsiveness or sensitiveness

Concept of Elasticity

Elasticity of demand =

- **Degree of responsiveness or sensitiveness**
- **Quantity Demanded**
- **w.r.t change in its determinant(Price, Income, Price of other goods & Advertisement)**

Elasticity of Demand is the method to measure responsiveness or sensitiveness

Concept of Elasticity of Demand

Elasticity = Responsiveness or sensitiveness

Price → **Price Elasticity** → **Quantity Demanded**

Responsiveness or Sensitiveness

$$\text{Formula} = \frac{\%\Delta QD}{\%\Delta P}$$

Concept of Elasticity of Demand

Elasticity = Responsiveness or sensitiveness

Income Elasticity

Income → **Quantity Demanded**

Responsiveness or Sensitiveness

$$\text{Formula} = \frac{\%\Delta QD}{\%\Delta Y}$$

Concept of Elasticity of Demand

Elasticity = Responsiveness or sensitiveness

Price of other goods → **Cross Elasticity** → **Quantity Demanded**

Responsiveness or Sensitiveness

$$\text{Formula} = \frac{\%\Delta QD(B)}{\%\Delta P(A)}$$

Concept of Elasticity of Demand

Elasticity = Responsiveness or sensitiveness

Promotional Elasticity

Advertisment → **Quantity Demanded**

Responsiveness or Sensitiveness

$$\text{Formula} = \frac{\%\Delta QD}{\%\Delta A}$$

Definition of Elasticity Of Demand

Elasticity = Responsiveness or sensitiveness

Definition: Elasticity of demand is defined as the responsiveness of the quantity demanded of a good to changes in one of the variables(Price, Income, Price of other goods, Advertisement) on which demand depends.

These variables are

1. **Price of the commodity,**
2. **Prices of the related commodities,**
3. **Income of the consumers**
4. **Advertisement**

and other factors on which demand depends.

Thus, we have

1. **Price elasticity,**
2. **Cross elasticity,**
3. **Income elasticity,**
4. **Advertisement elasticity**

Note: In other words, it is price elasticity of demand which is usually referred to as elasticity of demand.

Price Elasticity Of Demand

Concept of Elasticity of Demand

Price Elasticity

Price elasticity of demand expresses the response of quantity demanded of a good to a change in its price, given the consumer's income, his tastes and prices of all other goods.(i.e. assumed to remain Constant)

Formula

Elasticity of demand (Ep) = $\dfrac{\%\Delta \text{QD (Effect)}}{\%\Delta \text{P (Cause)}}$

Concept of Elasticity of Demand

Derivation of Ratio Formula

Formula

$$\text{Elasticity of demand} = \frac{\%\Delta QD \text{ (Effect)}}{\%\Delta P \text{ (Cause)}} = \frac{\frac{\Delta QD}{QD} \times 100}{\frac{\Delta P}{P} \times 100}$$

Proportionate Change in Quantity Demand

$$= \frac{\frac{\Delta QD}{QD}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Proportionate Change in Price

Concept of Elasticity of Demand

Note 1:

Case 1: 10% P↑ 5% QD↓ - Inelastic
15 % QD↓ - Elastic

Case 2: 10% P↓ 5% QD↑ - Inelastic
15 % QD↑ - Elastic

It is not concerned with increase or decrease in QD it is only concerned with percentage change

Concept of Elasticity of Demand

Note 2:

Direct Relation → Positive Slope → Positive Elasticity

Inverse Relation → Negative Slope → Negative Elasticity

$$E = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

↓

Slope

Concept of Elasticity of Demand

But, for the sake of convenience, we ignore the negative sign and consider only the numerical value of the elasticity

Why we ignore the negative sign and consider only the numerical value of the elasticity

Price elasticity of Commodity A = 2	Price elasticity of Commodity B = 4

Had we considered minus signs, we would have concluded that the demand for A is more elastic than that for B, which is not correct.

Hence, by convention, we take the absolute value of price elasticity and draw conclusions.

Concept of Elasticity of Demand

Illustration 1:-
The price of a commodity decreases from Rs. 6 to Rs. 4 and quantity demanded of the good increases from 10 units to 15 units. Find the coefficient of price elasticity

Price elasticity (Ratio Formula) = (-) $\Delta q/\Delta p \times p/q = 5/2 \times 6/10 = (-) 1.5$

Concept of Elasticity of Demand

Illustration 2:-
A 5% fall in the price of a good leads to a 15% rise in its demand. Determine the elasticity and comment on its value.

Price Elasticity	**=**	**Percentage change in QD /Percentage change in price**
(Percentage Formula)	**=**	**15% / 5%**
	=	**3**

Comment: The good in question has elastic demand

Concept of Elasticity of Demand

Illustration 3:-

The price of a good decreases from ` 100 to ` 60 per unit. If the price elasticity of demand for it is 1.5 and the original quantity demanded is 30 units, calculate the new quantity demanded.

Ep	= Δq/Δp X p/q ,	Here (Ep = 1.5)
1.5	= Δq/40 X 100/30	
1.5	= 100Δq/1200	
1.5 x 1200 /100	= Δq	
18	= Δq	

Therefore new quantity demanded = 30+18 = 48 units.

Methods of Measuring Elasticity of demand

Methods of Measuring Elasticity of demand

Point Elasticity Method

In point elasticity, we measure elasticity at a given point on a demand curve

The concept of point elasticity is used for measuring price elasticity where the change in price is infinitesimal.

Percentage Method

$$Ed = \frac{\%\Delta QD\ (Effect)}{\%\Delta P\ (Cause)}$$

Proportionate Method

$$Ed = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Algerbrically (Derivative Method)

$$Ed = \frac{-dq}{dp} \times \frac{P}{Q}$$

Geometrically (Distance Method)

$$Ed = \frac{\text{Lower Segment}}{\text{Upper segment}}$$

Methods of Measuring Elasticity of demand

Point Elasticity Method

a) Percentage Method

Percentage Method

$$Ed = \frac{\%\Delta QD\ (Effect)}{\%\Delta P\ (Cause)}$$

For example

There is 50% change in QD and 25% Change in Price. Calculate Price elasticity

Formula

$$\text{Elasticity of demand} = \frac{\%\Delta QD\ (Effect)}{\%\Delta P\ (Cause)}$$

$$\text{Elasticity of demand} = \frac{50\%}{25\%} = 2$$

Methods of Measuring Elasticity of demand

Point Elasticity Method

b) Proportionate Method

Proportionate Method

$$Ed = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Example

Calculate the Price elasticity when price changed from Rs.10 to Rs.15 and Quantity changed to 100 to 50

Formula

$$\text{Elasticity of demand} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Price	QD
10	100
15	50

$\Delta Q = 50$ $\quad Q = 100$

$\Delta P = 5$ $\quad P = 10$

$$Ed = \frac{50}{5} \times \frac{10}{100} = 1$$

Methods of Measuring Elasticity of demand

Point Elasticity Method

c) Derivative Method

Algebrically ed at specific Point $= \frac{-dq}{dp} \text{ X } \frac{P}{Q}$

dq/dp is the derivative of quantity with respect to price at that point

p – Price at that point

q – Quantity Demanded at that Point

Note: Point elasticity is, therefore, the product of price quantity ratio at a particular point on the demand curve and the reciprocal of the slope of the demand line.

Methods of Measuring Elasticity of demand

Point Elasticity Method

c) Derivative Method

Algebrically Ed at specific Point $= \frac{-dq}{dp} \text{ X } \frac{P}{Q}$

For example Demand Function is Qx = 150 – 5Px, Calculate Price elasticity at Rs. 5

$$\frac{dq}{dp} = -5$$

Px = 5

Qx = 150 – 5(5) =150 – 25 = 125

Ed $= \frac{-dq}{dp} \text{ x } \frac{P}{Q} = -(-5) \text{ x } \frac{5}{125}$ **= 25/125 = 0.2**

Methods of Measuring Elasticity of demand

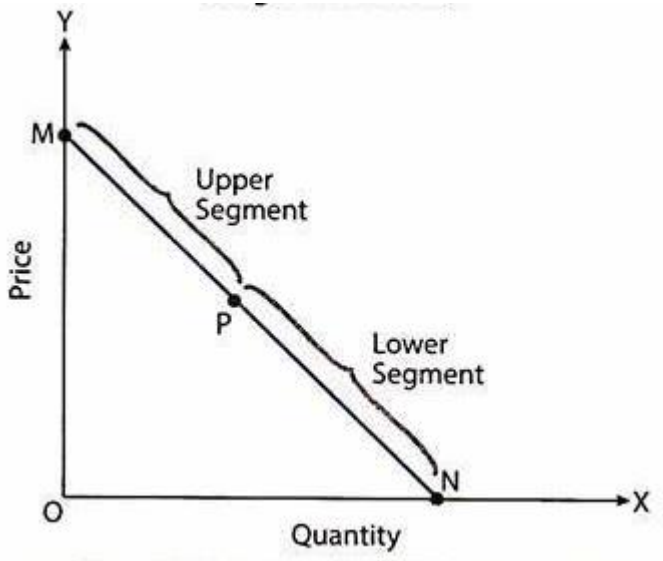
Point Elasticity Method
d) Geometric Method

Geometrically ed at specific Point Ed = $\frac{\text{Lower Segment}}{\text{Upper segment}}$

Elasticity at Point 'P' = $\frac{\text{PN (Lower Segment)}}{\text{PM (Upper segment)}}$

Note: It is to be noted that elasticity is different at different points on the same demand curve

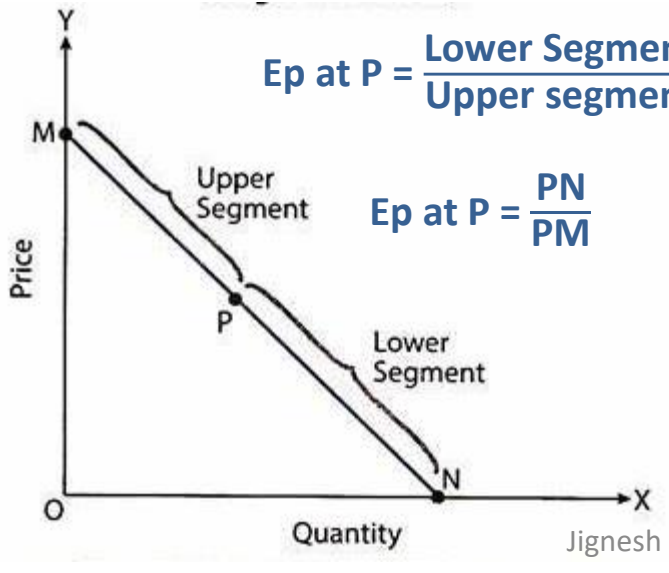
Diagrammatical Presentation



Methods of Measuring Elasticity of demand

Point Elasticity Method
d) Geometric Method

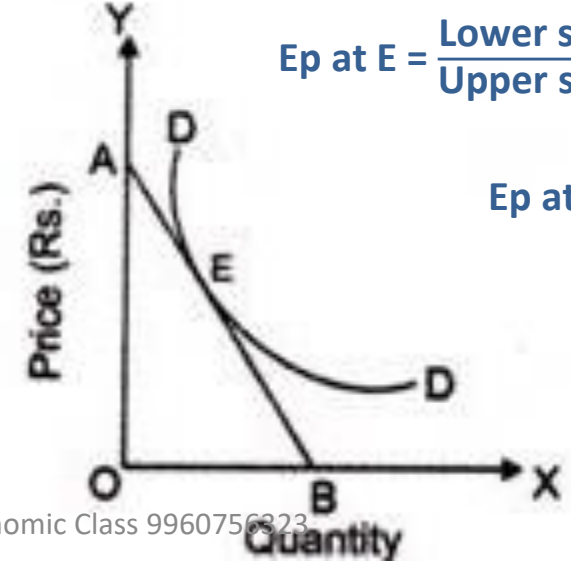
Linear Case (Straight line)



$$\text{Ep at P} = \frac{\text{Lower Segment}}{\text{Upper segment}}$$

$$\text{Ep at P} = \frac{PN}{PM}$$

Non- Linear Case (Curve)

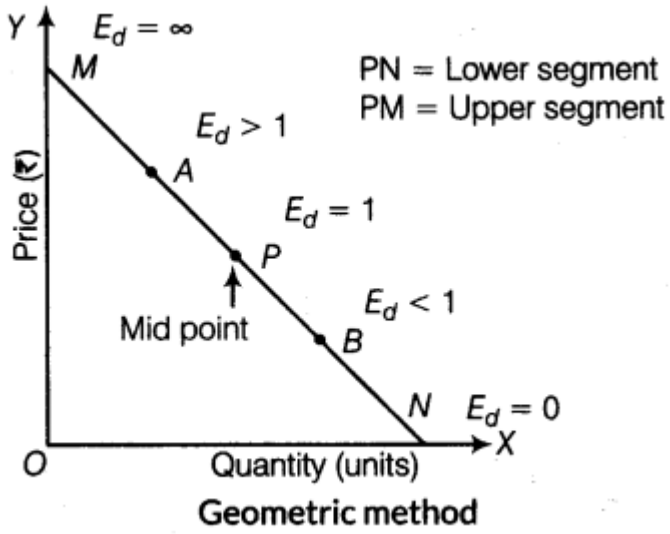


$$\text{Ep at E} = \frac{\text{Lower segment of tangent}}{\text{Upper segment of tangent}}$$

$$\text{Ep at E} = \frac{EB}{EA}$$

Methods of Measuring Elasticity of demand

Point Elasticity Method
d) Geometric Method



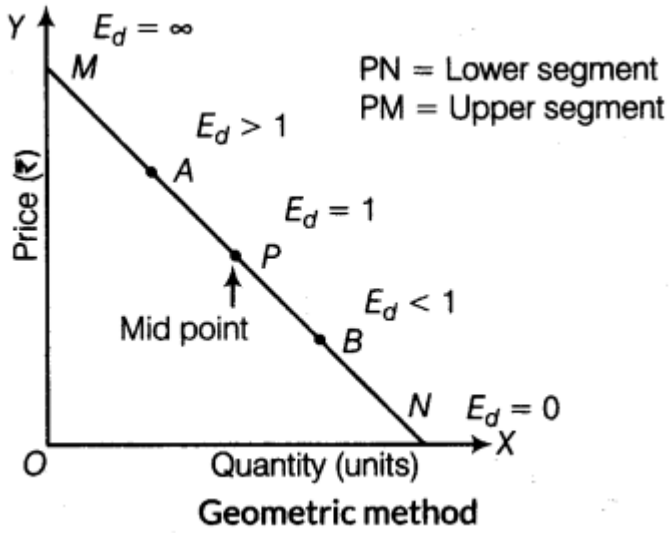
Geometric method

Points	Lower segment	Upper Segment	Formula E = L/U	Elasticity
M	4	0	4/0 = ∞	E = ∞
A	3	1	3/1 = 3	E > 1
P	2	2	2/2 = 1	E = 1
B	1	3	1/3 = 0.33	E < 1
N	0	4	0/4 = 0	E =0

Total Length is 4 cm

Methods of Measuring Elasticity of demand

Point Elasticity Method
d) Geometric Method



Geometric method

- At point on Y axis (e = ∞)
- At point closer to Y axis (e > 1)
- At midpoint (e=1)
- At point closer to X axis (e < 1)
- At Point on X axis (e=0)

Note:
As we move downward Value of e decreases
As we move upward value of e increases

Total Length is 4 cm

Methods of Measuring Elasticity of demand

	Price	Demand
A	10	100
B	9	110

When there is Change the Base price and Quantity Demanded

	Price	Demand
A	10	100
B	15	50

$$e = \frac{\Delta Q}{\Delta P} \text{ X } \frac{P}{Q}$$

$$= \frac{10}{-1} \text{ X } \frac{10}{100}$$

$$= -1$$

$$e = \frac{\Delta Q}{\Delta P} \text{ X } \frac{P}{Q}$$

$$= \frac{-10}{1} \text{ X } \frac{9}{110}$$

$$= -0.9$$

$$e = \frac{\Delta Q}{\Delta P} \text{ X } \frac{P}{Q}$$

$$= \frac{50}{-5} \text{ X } \frac{10}{100}$$

$$= -1$$

$$e = \frac{\Delta Q}{\Delta P} \text{ X } \frac{P}{Q}$$

$$= \frac{-50}{5} \text{ X } \frac{15}{50}$$

$$= -3$$

Not much difference in elasticity because there was not much difference in base. Hence can use point elasticity Method

Much difference in elasticity because there was much difference. Hence we have to use arc elasticity method (i.e. average elasticity method)

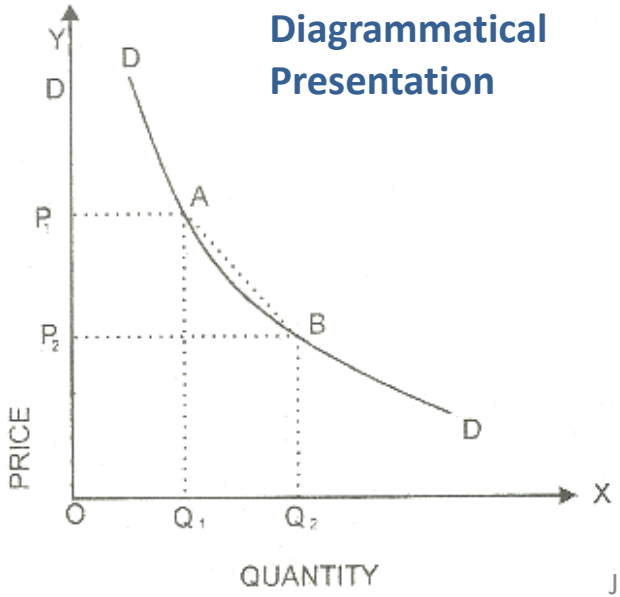
Methods of Measuring Elasticity of demand

Arc Elasticity/Average Elasticity/Midpoint Method

Arc-elasticity: When the price change is somewhat larger, Arc Elasticity is used

Elasticity of demand $= \frac{\Delta Q}{\Delta P} \times \frac{P1+P2}{Q1+Q2}$

Diagrammatical Presentation



Methods of Measuring Elasticity of demand

Arc Elasticity/Average Elasticity/Midpoint Method

For example

If we have to find arc elasticity of radios between

Price	QD
P1 -500	Q1- 100
P2 - 400	Q2- 150

$$\text{Elasticity of demand} = \frac{\Delta Q(Q2-Q1)}{\Delta P(P2-P1)} \times \frac{P1+P2}{Q1+Q2}$$

ΔQ (Q2 –Q1)	= 150-100	= 50
ΔP (P2 –P1)	= 400-500	= 100
P1 + P2	= 400 + 500	= 900
Q1 + Q2	= 100 + 150	= 250

$$\text{Elasticity of demand} = \frac{50}{100} \times \frac{250}{900} = 1.8$$

Methods of Measuring Elasticity of demand

Small Difference (Two Points)

Point elasticity of method (Calculated at a Specific Point)

Percentage Method

$$Ed = \frac{\%\Delta QD\ (Effect)}{\%\Delta P\ (Cause)}$$

Proportionate Method

$$Ed = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Algerbrically Method

$$Ed = \frac{-dq}{dp} \times \frac{P}{Q}$$

Geometrically Method

$$Ed = \frac{\text{Lower Segment}}{\text{Upper segment}}$$

Large Difference (Two Points)

Arc elasticity of method (Calculated by taking average of two Points)

Arc Elasticity

$$Ed = \frac{\Delta Q(Q2-Q1)}{\Delta P(P2-P1)} \times \frac{P1+P2/2}{Q1+Q2/2}$$

Methods of Measuring Elasticity of demand

Total Expenditure Method

Total Expenditure (P x Q) amount Spent by Consumer

Total Revenue (P x Q) Amount received by Producer

Hence Total Expenditure or Outlay = Total Revenue

Methods of Measuring Elasticity of demand

Total Expenditure Method

Price → **Total Outlay /Total Expenditure Total Revenue**

Relationship

↓

Price elasticity of Demand

Inverse Relationship (E>1)	No Relationship (E=1)	Direct Relationship (E<1)

Note: It should be noted that by this method we can only say whether the demand for a good is elastic or inelastic; we cannot find out the exact coefficient of price elasticity.

Methods of Measuring Elasticity of demand

Total Expenditure Method

Case 1

Price	Demand	Total expenditure
2	10	20
1↓	20	20↔

Calculation of elasticity using arc elasticity Formula

$$E = \frac{\Delta Q(Q2-Q1)}{\Delta P(P2-P1)} \times \frac{P1+P2}{Q1+Q2}$$

$$E = \frac{10}{1} \times \frac{2+1}{10+20}$$

$$E = \frac{10}{1} \times \frac{3}{30} = 1 \text{ (Unitary Elastic)}$$

Price ⟶ Total Expenditure

No relationship (E=1)

Methods of Measuring Elasticity of demand

Total Expenditure Method

Case 2

Price	Demand	Total expenditure
2	10	20
1↓	16	16↓

Calculation of elasticity using arc elasticity Formula

$$E = \frac{\Delta Q(Q2-Q1)}{\Delta P(P2-P1)} \times \frac{P1+P2}{Q1+Q2}$$

$$E = \frac{6}{1} \times \frac{2+1}{10+16}$$

$$E = \frac{6}{1} \times \frac{3}{26} = 0.69 \text{ (Inelastic)}$$

Price ⟶ Total Expenditure

Direct relationship (E<1)

Methods of Measuring Elasticity of demand

Total Expenditure Method

Case 3

Price	Demand	Total expenditure
2	10	20
1↓	24	24↑

Calculation of elasticity using arc elasticity Formula

$$E = \frac{\Delta Q(Q2-Q1)}{\Delta P(P2-P1)} \times \frac{P1+P2}{Q1+Q2}$$

$$E = \frac{14}{1} \times \frac{2+1}{10+24}$$

$$E = \frac{14}{1} \times \frac{3}{34} = 1.24 \text{ (Elastic)}$$

Price ⟶ Total Expenditure

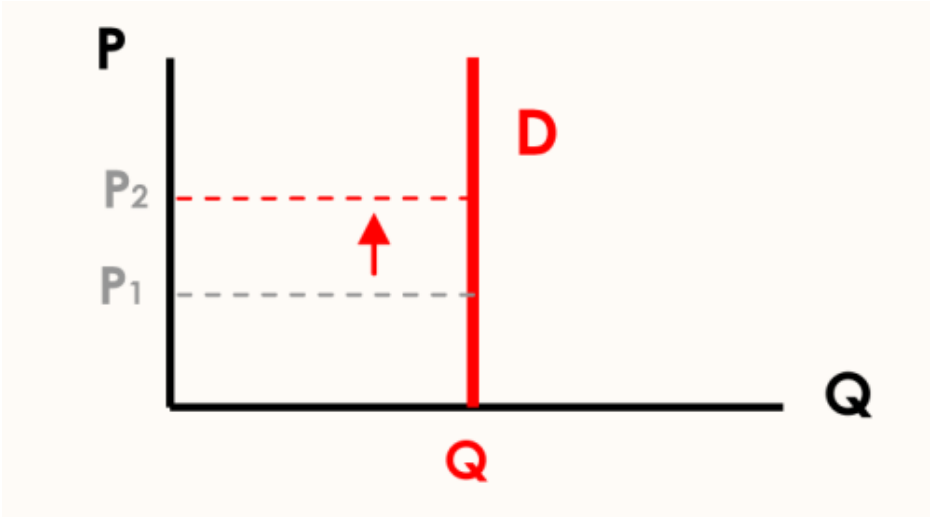
Inverse relationship (E>1)

Types of Price Elasticity's

Types of Price Elasticity's

1. Perfectly Inelastic (E=0)

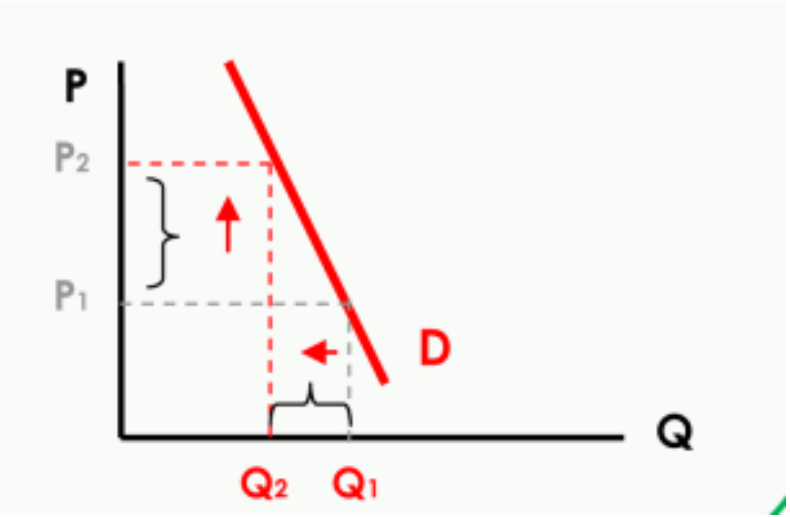
Perfectly Inelastic
% △P = 50% → % △ D = 0%
E = 0
No Change
Vertical Straight line
Parallel to Y - Axis



When Price Change from P1 to P2 and there is no change in Quantity Demand

Types of Price Elasticity's

2. Relative Inelastic (E<1)

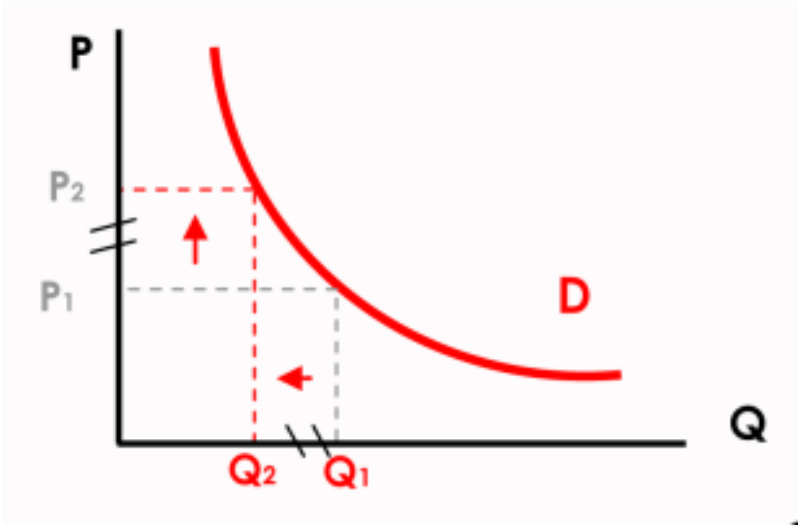


Relative Inelastic
% △ P = 50% → % △ D = 25%
E = 0.5 (E<1)
Less than Prop Change
Steeper Curve
Fast Sloping

When Price Change from P1 to P2 and there is Small Change in Quantity Demand

Types of Price Elasticity's

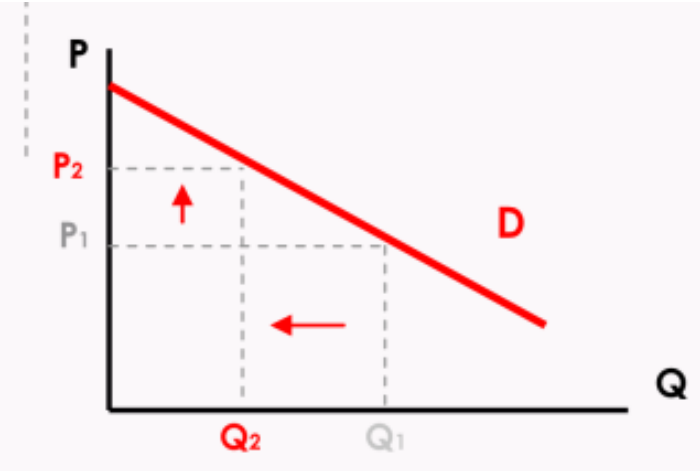
3. Unitary elastic (E=1)



Unitary elastic
% △ P = 50 % → % △ D = 50 %
E = 1
Equal Change
Rectangular Hyperbola
-

When Price Change from P1 to P2 and there is Equal change in Quantity Demand

4. Relative Elastic (E>1)



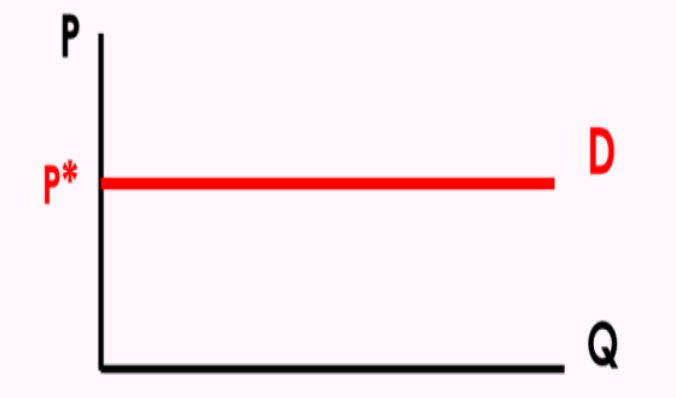
Relative elastic
% △ P = 50% → % △ D = 75%
E =1.5 (E > 1)
More than Prop Change
Flatter Curve
Gradually Sloping

When Price Change from P1 to P2 and there is Large change in Quantity Demand

Types of Price Elasticity's

4. Perfectly Elastic (E=∞)

Perfectly Elastic
%△ P =1% → %△D = ∞ %
E = ∞
Infinite, Tremendous Change
Horizontal Straight Line
Parallel to X - axis



When Price Change, Quantity Demand fall to zero

Types of Price Elasticity's

Perfectly Inelastic	Relative Inelastic	Unitary elastic	Relative elastic	Perfectly Elastic
E = 0	E < 1	E = 1	E > 1	E = ∞
No Change	Less than Prop Change	Equal Change	More than Prop Change	Infinite, Tremendous Change
% △P = 50%	% △ P = 50%	% △ P = 50%	% △ P = 50%	%△ P =1%
% △ D = 0%	% △ D = 25%	% △ D = 50 %	% △ D = 75%	%△D = ∞ %
Vertical Straight line	Steeper Curve	Rectangular Hyperbola	Flatter Curve	Horizontal Straight Line
Parallel to Y - Axis	Fast Sloping		Gradually Sloping	Parallel to X - axis

Factors affecting Price elasticity of Demand

Factors affecting Price elasticity of Demand

Availability of substitutes:

One of the most important determinants of elasticity is the degree of availability of close substitutes

More Substitute Available: Relative Elastic (Pepsi)
Less Substitute Available : Relative Inelastic (Salt)

In simple terms, wider the range of substitutes available, the greater will be the elasticity.

Factors affecting Price elasticity of Demand

Availability of substitutes:

Note: It should be noted that while as a group, a good or service may have inelastic demand, but when we consider its various brands, we say that a particular brand has elastic demand.

1. **While the demand for a generic good like petrol is inelastic, the demand for Indian Oil's petrol is elastic.**
2. **While there are no general substitutes for health care, there are substitutes for one doctor or hospital.**

Factors affecting Price elasticity of Demand

Position of a commodity in a consumer's budget:

Greater Proportion of Income Spent : More Elastic
Lesser Proportion of Income spent : Less Elastic

The greater the proportion of income spent on a commodity; generally the greater will be its elasticity of demand and vice- versa.

1. **The demand for goods like common salt, matches, buttons, etc. tend to be highly inelastic because a household spends only a fraction of their income on each of them.**
2. **On the other hand, demand for goods like clothing, tends to be elastic since households generally spend a good part of their income on clothing**

Factors affecting Price elasticity of Demand

Nature of the need that a commodity satisfies:

Luxury goods are price elastic

while necessities are price inelastic.

Thus, while the demand for television is relatively elastic, the demand for food and housing, in general, is inelastic.

Reason: If it is possible to postpone the consumption of a particular good, such good will have elastic demand. Consumption of necessary goods cannot be postponed and therefore, their demand is inelastic

Factors affecting Price elasticity of Demand

Number of uses to which a commodity can be put:

Multiple Uses: Elastic (Electricity)

Single use : Inelastic

The more the possible uses of a commodity, the greater will be its price elasticity and vice versa.

For Example

To illustrate, milk has several uses. If its price falls, it can be used for a variety of purposes like preparation of curd, cream, ghee and sweets. But, if its price increases, its use will be restricted only to essential purposes like feeding the children and sick persons.

Factors affecting Price elasticity of Demand

Time period:

Long Run: Elastic

Short Run : Inelastic

The longer the time-period one has, the more completely one can adjust.

Petrol car in Short run (Inelastic demand for petrol)

Petrol car in Long run (Elastic demand)

Factors affecting Price elasticity of Demand

Consumer habits:

Consumer Habit: Inelastic

If a consumer is a habitual consumer of a commodity, no matter how much its price change, the demand for the commodity will be inelastic

Factors affecting Price elasticity of Demand

Tied demand:

Tied Demands(Complementary goods): Inelastic

The demand for those goods which are tied to others is normally inelastic as against those whose demand is of autonomous nature. For example printers and ink cartridges.

Factors affecting Price elasticity of Demand

Price range:

Very High or Low Price Range : Inelastic Demand

Medium Price Range: Elastic Demand.

Factors affecting Price elasticity of Demand

Elastic	Inelastic
More Substitute Available	Less Substitute Available
Greater Proportion of Income Spent	Lesser Proportion of Income Spent
Luxury Goods	Necessities
Multiple Uses	Single Uses
Long Run	Short Run
-	Consumer Habit
	Tied Demand
Medium Price	Very High Or Very Low Price Range

Significance of elasticity of Demand

Significance of elasticity of Demand

Business Manager: Aim to achieve profit maximization (i.e. more total revenue)

Relative Elastic	Relative Inelastic
Price ↓	Price ↑
Total Revenue ↑	Total Revenue ↑

Significance of elasticity of Demand

Government Policy

- **Knowledge of price elasticity of demand is important for governments while determining the prices of goods and services provided by them, such as, transport and telecommunication.**

- **Further, it also helps the governments to understand the nature of responsiveness of demand to the increase in prices on account of additional taxes and the implications of such responses on the tax revenues.**

- **Elasticity of demand explains why Governments are inclined to raise the indirect taxes on those goods that have a relatively inelastic demand, like alcohol and tobacco products.**

Income Elasticity

Types of Elasticity's

2. Income Elasticity → Change in income

Income elasticity of demands refers the degree of responsiveness of quantity demanded for a commodity to a given change in income of commodity

Formula

$$\text{Elasticity of demand} = \frac{\%\Delta \text{QD (Effect)}}{\%\Delta \text{Y (Cause)}} \rightarrow \text{Percentage Formula}$$

$$= \frac{\Delta Q}{\Delta Y} \text{ X } \frac{Y1+Y2}{Q1+Q2} \rightarrow \text{Proportionate Formula}$$

Types of Elasticity's

2. Income Elasticity

Example

Income	Demand
10000	100
15000 ↑	150↑

$$e = \frac{\Delta Q}{\Delta Y} \text{ X } \frac{Y1 + Y2}{Q1 + Q2}$$

$$= \frac{50}{5000} \text{ X } \frac{10000 + 15000}{100 + 150}$$

$$= 1$$

Normal goods (direct) : Positive Income elasticity - Upward Sloping
Inferior goods (Inverse) : Negative Income elasticity – Downward Sloping

Types of Income Elasticity's

Types of Income Elasticity's

1. Perfectly Inelastic (E=0)

Perfectly Inelastic
% △ Y = 50% → % △ D = 0%
E = 0
No Change
Vertical Straight line
Parallel to Y - Axis
Zero Income Elasticity

Types of Income Elasticity's

2. Relatively Inelastic (E<1)

Relative inelastic
% △ Y = 50% → % △ D = 25%
E < 1
Less than Prop Change
Steeper Curve
Fast Sloping
Necessities

Types of Income Elasticity's

3. Unitary elastic (E=1)

Unitary elastic
% △ Y = 50 % → % △ D = 50 %
E = 1
Equal Change

Types of Income Elasticity's

4. Relative Elastic (E>1)

Relative elastic
% △ Y = 50% → % △ D = 75%
E > 1
More than Prop Change
Flatter Curve
Gradually Sloping
Luxurious

Types of Income Elasticity's

5. Negatively Elastic (E<0)

Negatively elastic
% △ D = Negative
E < 0
Negative Change
Downward Sloping Curve
-
Inferior Goods

Types of Income Elasticity's

Perfectly Inelastic	Relative Inelastic	Unitary elastic	Relative elastic	Negative Elastic
E = 0	E < 1	E = 1	E > 1	E < 0
No Change	Less than Prop Change	Equal Change	More than Prop Change	Negative Change
% △Y = 50%	% △ Y = 50%	% △ Y = 50%	% △ Y = 50%	%△ Y = 50%%
% △ D = 0%	% △ D = 25%	% △ D = 50 %	% △ D = 75%	%△D = -10 %
Vertical Straight line	Steeper Curve	-	Flatter Curve	Downward Sloping Curve
Parallel to Y - Axis	Fast Sloping		Gradually Sloping	
Zero Income Elasticity	Necessities	-	Luxury	Inferior Goods

Types of Income Elasticity's

All Elasticity's

Commodity	Income Elasticity for household	Comment
Wheat	5%/10% = 0.5(e<1)	Since 0 < .5 < 1, wheat is a normal good and fulfils a necessity.
TV	20%/10% = 2(e>1)	Since 2 > 1, T.V. is a luxurious commodity.
Bajra	(-2)%/10% =(-0.2)	Since –0.2 < 0, Bajra is an inferior commodity in the eyes of the household.
X	7%/7% =1	Since income elasticity is 1, X has unitary income elasticity.
Button	0%/10%	Buttons have zero income-elasticity

Types of Income Elasticity's

Note:

Low income elasticity product are not affected during the period of boom or recession in the economy

On the other hand High income elasticity product will sharply increase during the period of boom or sharply fall during the period of recession in the economy

Relationship Between Income elasticity and Proportion of Income spent

Relationship Between Income elasticity and Proportion of Income spent

Income	Proportion of income Spent	Relationship	Elasticity
Increase	Same(Quantity Demand increase by same proportion)	No relationship	E=1
Increase	Increase (Quantity Demand increases by more proportion)	Direct Relationship	E>1
Increase	Decrease (Quantity Demand increases by less proportion)	Inverse Relationship	E<1

Importance of Income Elasticity of demand

Relationship Between Income elasticity and Proportion of Income spent

- **Knowledge of income elasticity of demand is very useful for a business firm in estimating future demand for its products.**
- **Knowledge of income elasticity of demand helps firms predict the outcome of a business cycle on its market demand.**
- **This enables the firm to carry out appropriate production planning and management.**

Cross Elasticity

Types of Elasticity's

Meaning of Cross Demand

The demand for a particular commodity may change due to changes in the prices of related goods.
These related goods may be either complementary goods or substitute goods.
This type of relationship is studied under 'Cross Demand'.

It may be defined as the quantities of a commodity that consumers buy per unit of time, at different prices of a 'related article', 'other things remaining the same'.

Types of Elasticity's

3. Cross Elasticity → Change in prices of other goods

Price elasticity of demands refers the degree of responsiveness of quantity demanded for a commodity to a given change in price of related goods of commodity

Related Goods= Complimentary and Substitute Goods

Formula

Elasticity of demand = $\frac{\%\Delta QD(A)\ (Effect)}{\%\Delta P(B)\ (Cause)}$ **→ Percentage Formula**

$= \frac{\Delta Q(A)}{\Delta P(B)} \times \frac{P1(B)+P2(B)}{Q1(A)+Q2(A)}$ **→ Proportionate Formula**

Types of Elasticity's

3. Cross Elasticity

Substitute Good's Example

B Price of Related goods		A Demand
Price of Pepsi (B)	Demand of Pepsi	Demand of Coke (A)
10	1000	2000
12 ↑	750	3000 ↑

$$Ec = \frac{\Delta Q(A)}{\Delta P(B)} \times \frac{P1(B)+P2(B)}{Q1(A)+Q2(A)} = \frac{1000}{2} \times \frac{10+12}{2000+3000} = 2.2 \text{ times}$$

Diagram

The cross demand curve slopes upwards (i.e. positively)

Types of Elasticity's

3. Cross Elasticity

Complimentary Good's Example

B Price of Related goods		A Demand
Price of Car (B)	Demand of car	Demand of Petrol (A)
4 Lakhs	1000	10000
6 Lakhs↑	750	7500 ↓

$$Ec = \frac{\Delta Q(A)}{\Delta P(B)} \text{ X } \frac{P1(B)+P2(B)}{Q1(A)+Q2(A)} = \frac{-2500}{2,00,000} \text{ X } \frac{4,00,000+600000}{10000+7500}$$

= - 0.714 times

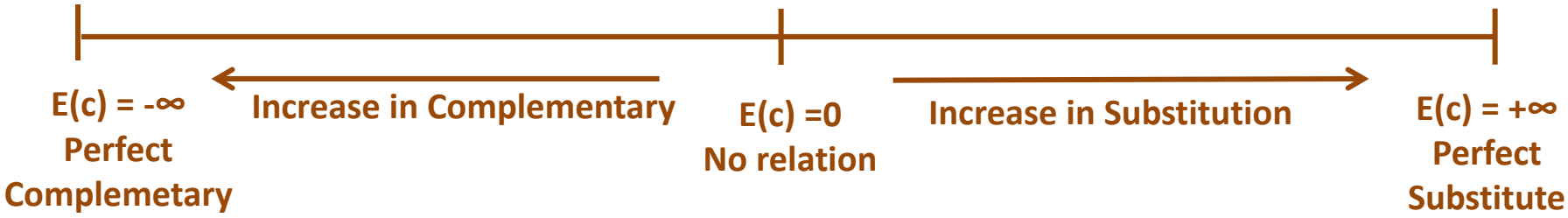
Diagram

The cross demand curve slopes Downward (i.e. Negatively)

Types of Elasticity's

3. Cross Elasticity

Related Goods		Unrelated Goods
Complimentary	Substitute	
Inverse Related	Directly Related	No relation
Downward Sloping	Upward Sloping	Vertical Straight line
Negative elasticity	Positive Elasticity	Zero Elasticity



Significance of cross elasticity

Types of Elasticity's

3. Cross Elasticity

The concept of cross elasticity of demand is useful for a manager while making decisions regarding changing the prices of his products which have substitutes and complements.

Cross Elasticity	Substitute	Close substitute	Elastic	Price dec	Total Revenue inc
Cross Elasticity	Substitute	No close Substitute	Inelastic	Price inc	Total revenue inc
Cross Elasticity	Complementary	Strong complementary	inelastic	Price inc	Total revenue inc
Cross elasticity	Complementary	No Complementary	Elastic	Price Dec	Total revenue inc

Types of Elasticity's

Note:

Substitute goods

- Substitute products → Positive elasticity
- Positive elasticity → Substitute Products

Complementary goods

- Complemetary Goods → Negative elasticity
- Negative elasticity → Not always Complemetary

A (Superior Goods) Honda City	Substitute Goods	B (Inferior Goods) Tata Nano
Price	Demand	Demand
↑	↓	↓

Demand Forcasting

Demand Forecasting

Prof: Jignesh Gada: 9960756323

A forecast is an estimation of situation in the future
A demand Forecasting is an estimation of demand for the commodity in Future period

Business Enterprise
↓
Demand/sales forecast
↓
Plan for the future

Note: Since future is uncertain, no forecast is cent(100%) percent accurate
However every firm tries to forecast as precise possible

Importance of Demand Forecasting

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The importance of demand forecasting has increased all the more on account of mass production and production in response to demand.

1. A good forecast enables the firm to perform **efficient business planning**.
2. Forecasts offer information for **budgetary planning and cost control** in functional areas of finance and accounting.
3. Good forecasts help in **efficient production planning, process selection, capacity planning, facility layout and inventory management**.
4. A firm can plan **production scheduling** well in advance and **obtain all necessary resources for production such as inputs, and finances**.
5. **Capital investments can be aligned** to demand expectations and this will check the possibility of overproduction and underproduction, excess of unused capacity and idle resources.
6. **Marketing relies on sales forecasting** in making key decisions.
7. Demand forecasts also provide the necessary information for **formulation of suitable pricing and advertisement strategies.**

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Types of demand Forcasting

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Macro level Forecasting

Macro-level forecasting deals with the general economic environment prevailing in the economy as measured by the Index of Industrial Production (IIP), national income and general level of employment etc.

Industry Level Forecasting

Industry- level forecasting is concerned with the demand for the industry's products as a whole. For example, demand for cement in India.

Firm Level Forecasting

Firm- level forecasting refers to forecasting the demand for a particular firm's product, say, the demand for ACC cement.

Types of demand Forcasting

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Short term Forecasting

Short-term demand forecasting covers a short span of time, depending of the nature of industry. It is done usually for six months or less than one year and is generally useful in tactical decisions.

Long term Forecasting

Long-term forecasts are for longer periods of time, say two to five years and more. It provides information for major strategic decisions of the firm such as expansion of plant capacity

Demand Distinction

Types of demand Forcasting

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Non Durable Goods

- Non durable goods are those which cannot be consumed more than once.
- These will meet only the current demand.

Durable Goods

- Durable goods do not quickly wear out, can be consumed more than once and yield utility over a period of time.
- The demand for durable goods is likely to be derived demand.

Types of demand Forcasting

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Derived Demand

- The demand for a commodity that arises because of the demand for some other commodity called 'parent product', is called derived demand.
- For example, the demand for cement is derived demand, being directly related to building activity.

Autonomous Demand

- If the demand for a product is independent of the demand for other goods, then it is called autonomous demand.
- It arises on its own out of an innate desire of the consumer to consume or to possess the commodity.

Types of demand Forcasting

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Industry Demand

- The term industry demand is used to denote the total demand for the products of a particular industry,
- e.g. the total demand for steel in the country.

Firm Demand

- The demand for firm's product denotes the demand for the products of a particular firm, i.e. the quantity that a firm can dispose off at a given price over a period of time.
- E.g. demand for steel produced by the Tata Iron and Steel Company.

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Short Run Demand

- Short-run demand refers to demand with its immediate reaction to changes in product price and prices of related commodities, income fluctuations, ability of the consumer to adjust their consumption pattern, their susceptibility to advertisement of new products etc.

Long Run Demand

- Long-run demand refers to demand which exists over a long period.
- Most generic goods have long- term demand.
- Long term demand depends on long-term income trends, availability of substitutes, credit facilities etc. In short, long-run demand is that which will ultimately exist as a result of changes in pricing, promotion or product improvement, after enough time is allowed to let the market adjust to the new situation.

For example, if electricity rates are reduced, in the short run, the existing users will make greater use of electric appliances. In the long-run, more and more people will be induced to use electric appliances.

Factor affecting Demand

Factor affecting Non Durable Goods

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Features of Non durable goods

Current Consumption only: Non-durables are purchased for current consumption only.

Repeated in Nature: From a business firm's point of view, demand for non-durable goods gets repeated depending on the nature of the non durable goods.

Wide in Varieties: Usually, non durable goods come in wide varieties and there is competition among the sellers to acquire and retain customer loyalty

Factor affecting Non Durable Goods

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(i) **Disposable income:** Disposable income is found out by deducting personal taxes from personal income. Other things being equal, the demand for a commodity depends upon the disposable income of the household.

(i) **Price:** Other things being equal, the demand for a commodity depends upon its own price and the prices of related goods (its substitutes and complements).

(ii) **Demography:** This involves the characteristics of the population, human as well as non-human, using the product concerned. For example, it may pertain to the number and characteristics of children in a study of demand for toys

Factor affecting Durable Goods

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Feature of Durable good

Postponement of Demand: A consumer can postpone the replacement of durable goods.

Requires Special facilities: These goods require special facilities for their use e.g. roads for automobiles, and electricity for refrigerators and radios.

Influenced by Many Factors: As consumer durables are used by more than one person, the decision to purchase may be influenced by family characteristics like income of the family, size, age distribution and sex composition.

Factor affecting Durable Goods

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Influenced by Many Factors: As consumer durables are used by more than one person, the decision to purchase may be influenced by family characteristics like income of the family, size, age distribution and sex composition.

Replacement Demand: Replacement demand is an important component of the total demand for durables. Greater the current holdings of durable goods, greater will be the replacement demand.

Influenced by price and credit Facilities: Demand for consumer durables is very much influenced by their prices and credit facilities available to buy them.

Factor affecting producer goods

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Since producers' goods or capital goods help in further production, the demand for them is derived demand, derived from the demand of consumer goods they produce.

The demand for them depends upon the

- Rate of profitability of user industry and
- The size of the market of the user industries.

Hence data required for estimating demand for producer goods (capital goods) are:

(i) Growth prospects of the user industries;

(ii) Number of capital required in order to produce certain unit of output

Factor affecting producer goods

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- An increase in the price of a substitutable factor of production, say labour, is likely to increase the demand for capital goods.
- An increase in the price of a factor which is complementary may cause a decrease in the demand for capital.
- Higher the profit making prospects, greater will be the inducement to demand capital goods.
- If firms are optimistic about selling a higher output in future, they will have greater incentive to invest in producer goods.
- Advances in technology enabling higher efficiency at reduced cost on account of higher productivity of capital will have a positive impact on investment in capital goods.
- Investments in producer goods will be greater when lower interest rates prevail as firms will have lower opportunity cost of investments and lower cost of borrowing

Method of Demand forcasting

Method of demand forcasting

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Survey of Buyers' Intentions:
The most direct method of estimating demand in the short run is to ask customers what they are planning to buy during the forthcoming time period, usually a year.
This method involves direct interview of potential customers.

Depending on the purpose, time available and costs to be incurred, the survey may be conducted by any of the following methods:
Complete enumeration - All potential customers are interviewed
Sample survey method - Sample of potential customers are interviewed
End–use method especially used in forecasting demand for inputs, involves identification of all final users

Disadvantages
- Not be wise to depend wholly on the buyers' estimates
- Biases may creep
- Customers may themselves misjudge their requirements

Method of demand forcasting

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Collective opinion method(Salesman point of View):

- This method is also known as sales force opinion method or grass roots approach.
- The rationale of this method is that salesmen being closest to the customers are likely to have the most intimate feel of the reactions of customers to changes in the market.

Steps

- Estimate expected sales in their respective territories.
- Consolidated the total estimated sales.
- Reviewed to eliminate pessimism and optimism on the part of salesman
- Review further in light of changes in macroeconomic condition
- Final sales forecast would emerge

Advantages

- Simple and based on first hand information

Disadvantages

- Subjective as they are personal opinions
- salesmen may be unaware of the broader economic changes

Note: Therefore, forecasting could be useful in the short run, for long run analysis however, a better technique is to be applied

Method of demand forcasting

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Expert Opinion method:

- In general, professional market experts and consultants have specialized knowledge about the numerous variables that affect demand.
- Information is elicited from them through appropriately structured unbiased tools of data collection such as interviews and questionnaires.

Delphi Techniques

- The Delphi technique, developed by Olaf Helmer at the Rand Corporation of the USA,

Steps

- Experts are asked to provide forecasts and reasons for their forecasts.
- Experts are provided with information and opinion feedbacks of each others without revealing the identity of the opinion provider.
- These opinions are then exchanged the process goes on until convergence of opinions is arrived at.
- This method is best suited in circumstances where intractable changes are occurring and the relevant knowledge is distributed among experts.

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Delphi Techniques Advantages :

- Delphi technique is widely accepted due to its broader applicability and ability to address complex questions.
- It also has the advantages of speed and cheapness

Method of demand forcasting

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Statistical methods:

- Statistical methods have proved to be very useful in forecasting demand.
- Forecasts using statistical methods are considered as superior methods because they are more scientific, reliable and free from subjectivity.

Method of demand forcasting

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Statistical methods:

Trend Projection method:

- This method, also known classical method, is considered as a ‘naive’ approach to demand forecasting.

Steps

- Collect data on sales pertaining to different time periods.
- Arranged chronologically, develop a ‘time series’.
- Project the trend of the time series.

Method assumes that factors responsible for the past trend in demand will continue to operate in the same mann

Method of demand forcasting

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Statistical methods:

Graphical Method:

- This method, also known as ‘free hand projection method’ is the simplest and least expensive.
- This involves plotting of the time series data on a graph paper and fitting a freehand curve to it passing throug many points as possible.
- The direction of the curve shows the trend.

Advantage

- It is the simplest and least expensive.

Disadvantage

- The main draw-back of this method is that it may show the trend but the projections made through this meth are not very reliable.

Method of demand forcasting

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Statistical methods:

Fitting trend equation or Least Square Method:

- It is a mathematical procedure for fitting a line to a set of observed data points.
- This trend is then used to project the dependent variable in the future.
- The least square method is based on the assumption that the past rate of change of the variable under study will continue in the future.
- The forecast based on this method may be considered reliable only for the period during which this assumption holds.

Advantage

- simple and inexpensive.
- fairly reliable estimates of future demand

Disadvantage

- The major limitation of this method is that it cannot be used where trend is cyclical with sharp turning points of troughs and peaks.
- Also, this method cannot be used for short term forecasts.

Method of demand forcasting

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Statistical methods:

Regression analysis:

This is the most popular method of forecasting demand.

Steps

- Develop a relationship between dependent and independent variable
- Develop a regression equation in linear form of Y= a+ bx
- Predict the value of Y based on Value of X

Note: There could also be a curvilinear relationship between the dependent and independent variables.

Method of demand forcasting

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Method of demand forcasting

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Controlled Experiments:

- Under this method, future demand is estimated by conducting market studies and experiments on consumer behaviour under actual, though controlled, market conditions. This method is also known as market experiment method.

- An effort is made to vary separately certain determinants of demand which can be varied, for example, price, advertising, etc., and conduct the experiments assuming that the other factors would remain constant. Thus, the effect of demand on sales can be assessed

- The responses of demand to such changes over a period of time are recorded and are used for assessing the future demand for the product. For example, different prices would be associated with different sales and on that basis the price-quantity relationship

- It should be noted however, that the market divisions here must be homogeneous with regard to income, tastes, etc

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Controlled Experiments:

Disadvantage

- The method of controlled experiments is used relatively less because this method of demand forecasting is expensive as well as time consuming.

- Moreover, controlled experiments are risky too because they may lead to unfavorable reactions from dealers, consumers and competitors.

- It is also difficult to determine what conditions should be taken as constant and what factors should be regarded as variable so as to segregate and measure their influence on demand.

- Besides, it is practically difficult to satisfy the condition of homogeneity of markets

Method of demand forcasting

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Barometric method of forecasting :

- The various methods suggested till now are related with the product concerned. These methods are based on past experience and try to project the past into the future.
- Such projection is not effective where there are economic ups(boom) and downs(recession)
- Therefore, in order to find out these turning points, it is necessary to find out the general behaviour of the economy.
- The economists use economic indicators to forecast trends in business activities.
- This information is then used to forecast demand prospects of a product

Method of demand forcasting

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Barometric method of forecasting :
Movements in these indicators are used as basis for forecasting the likely economic environment in the near future.

There are leading indicators, coincidental indicators and lagging indicators.
Leading Indicators: The leading indicators move up or down ahead of some other series.
For example, the heavy advance orders for capital goods give an advance indication of economic prosperity.

Lagging Indicators: The lagging indicators follow a change after some time lag. The heavy household electrical connections confirm the fact that heavy construction work was undertaken during the past with a lag of some time.

Coincidental Indicators: The coincidental indicators, however, move up and down simultaneously with the level of economic activities. For example, rate of unemployment.