MANAGERIAL ECONOMICS

ELASTICITY OF DEMAND

TOPIC 5

ITM BUSINESS SCHOOL
PGDM 2021 - 2023 - SEM I
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The Economic Concept of Elasticity

- **Elasticity**: the percentage change in one variable relative to a percentage change in another.

$$\text{Coefficient of Elasticity} = \frac{\text{percent change in A}}{\text{percent change in B}}$$

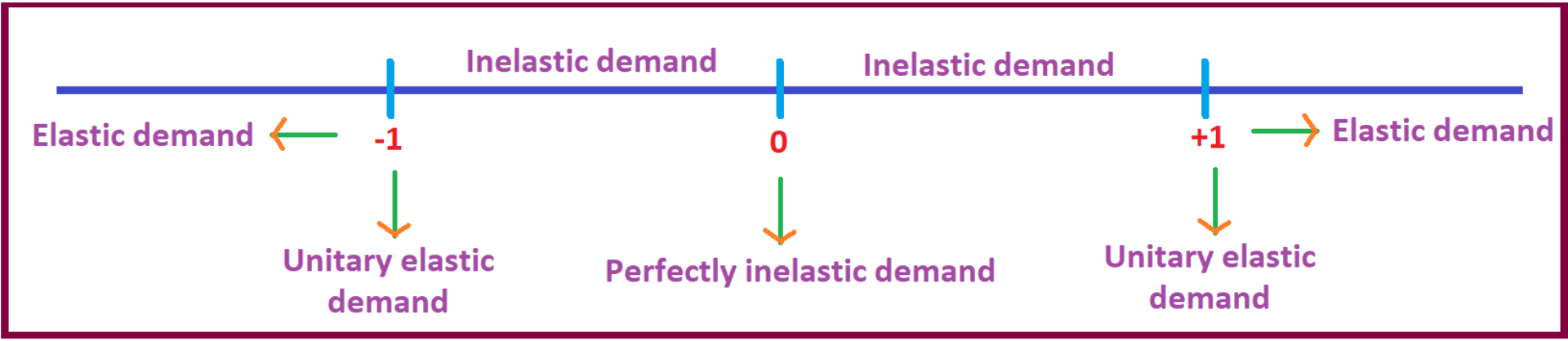
The Economic Concept of Elasticity

Price elasticity of demand: The percentage change in quantity demanded caused by a 1 percent change in price.

$$E_p = \frac{\%\Delta \text{ Quantity}}{\%\Delta \text{ Price}}$$

- *P* & *Q* are inversely related by the law of demand so *E* is always negative
  - The larger the absolute value of ***E***, the more sensitive buyers are to a change in price

Degrees of Elasticity



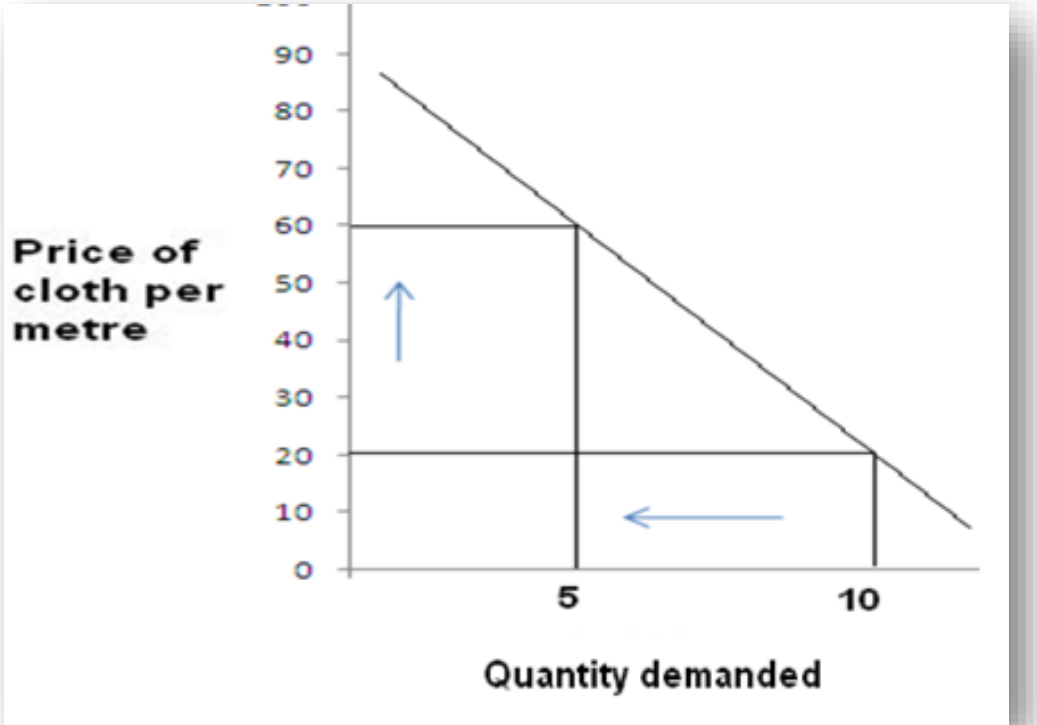
Degrees of Elasticity

Inelastic demand	→	0 to +1 0 to - 1
Elastic demand	→	Greater than +1 Less than - 1 (towards -2)
Unitary elastic demand	→	Equal to -1 or +1
Perfectly inelastic demand	→	Equal to '0'
Perfectly elastic demand	→	∞ 'Infinity'

Degrees of Elasticity

Less than unit elastic demand or relatively inelastic(ep<1): When percentage change in quantity demanded is less than percentage change in price, the demand for the commodity is said to be less than unit elastic demand or relatively inelastic.

Price of cloth per metre(Rs.)	Demand (mt.)
20	10
60	05



Case 1

What do higher oil prices mean for India?

Considering India is a net oil importer with inelastic demand, movement in global crude oil prices tend to have an important bearing on the macro stability risks

Tanvee Gupta Jain

Last Updated at November 17, 2017 13:56 IST Business Standard

- Brent crude oil prices have continued to recover and are now **exceeding US$60/bbl**. This **is up about 35% from this year's low**, and **10% above our 2018 forecast of US$55/bbl**. According to our global oil team, oil prices have responded to:
- 1) the **drop in global oil inventories**, with the US alone having shed about 80m barrels since the peak reached in March 2017;
- 2) expectations for an extension of **OPEC production cuts**; and
- 3) a stagnant and modestly **falling US oil rig count(**"a weekly census of the number of drilling rigs actively exploring for or developing oil or natural gas in the United States and Canada).

Case 1

What do higher oil prices mean for India?

Considering India is a net oil importer with inelastic demand, movement in global crude oil prices tend to have an important bearing on the macro stability risks

Tanvee Gupta Jain

Last Updated at November 17, 2017 13:56 IST Business Standard

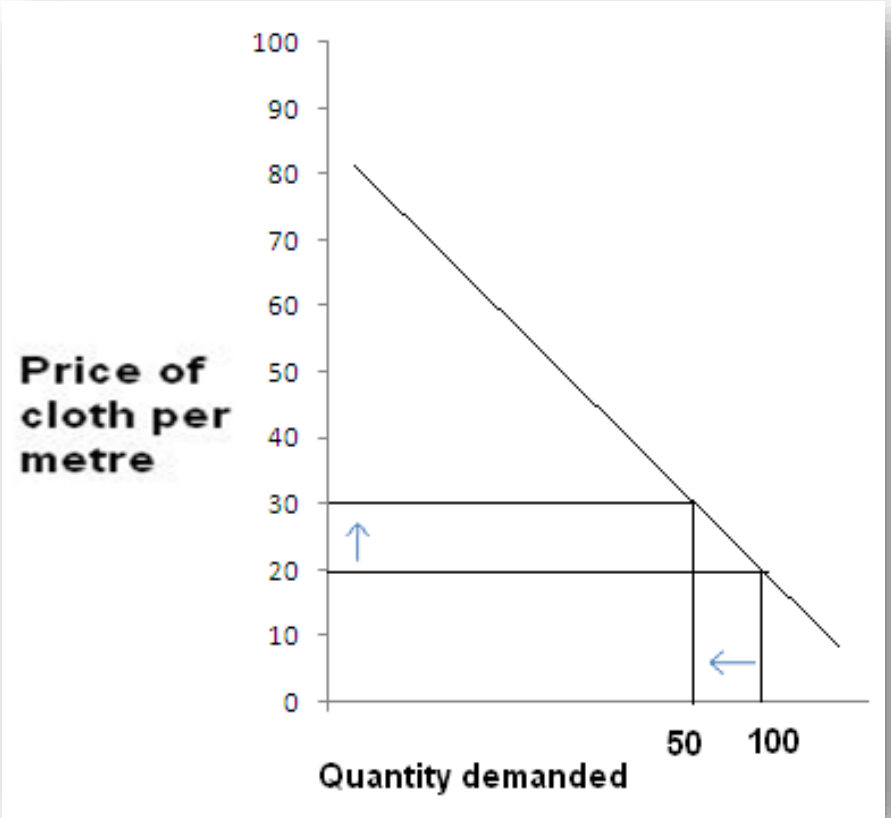
- Considering India **is a net oil importer with inelastic demand, movement in global crude oil prices tend to have an important bearing on the macro stability risks (inflation, current account deficit [CAD] and fiscal deficit**) and hence economic growth prospects. If the Brent price averages around US$60/bbl in FY18 (versus US$55/bbl UBS estimate), the macro stability risks will widen but will still be manageable. The Monetary Policy Committee (MPC) would prefer to go in for a prolonged pause (versus scope of one more 25bp rate cut priced in as per our base case, assuming a stable fiscal position). However, **strengthening in oil prices above US$70-75/bbl could lead to terms of trade shock and could have a significant impact on growth, inflation, CAD and fiscal balance. In such a scenario, there is a risk of further tightening in policy rates**.

Analysis: As a fastest-growing economy, India's demand for energy is tremendous. To achieve increasing demand for the economic growth, India has to consume more oil. Hence, India is having inelastic demand for oil even though the prices are increasing.

Degrees of Elasticity

Unit elastic demand(ep=1): When percentage change in demand is equal to percentage change in price, the demand for the commodity is said to be unit elastic.

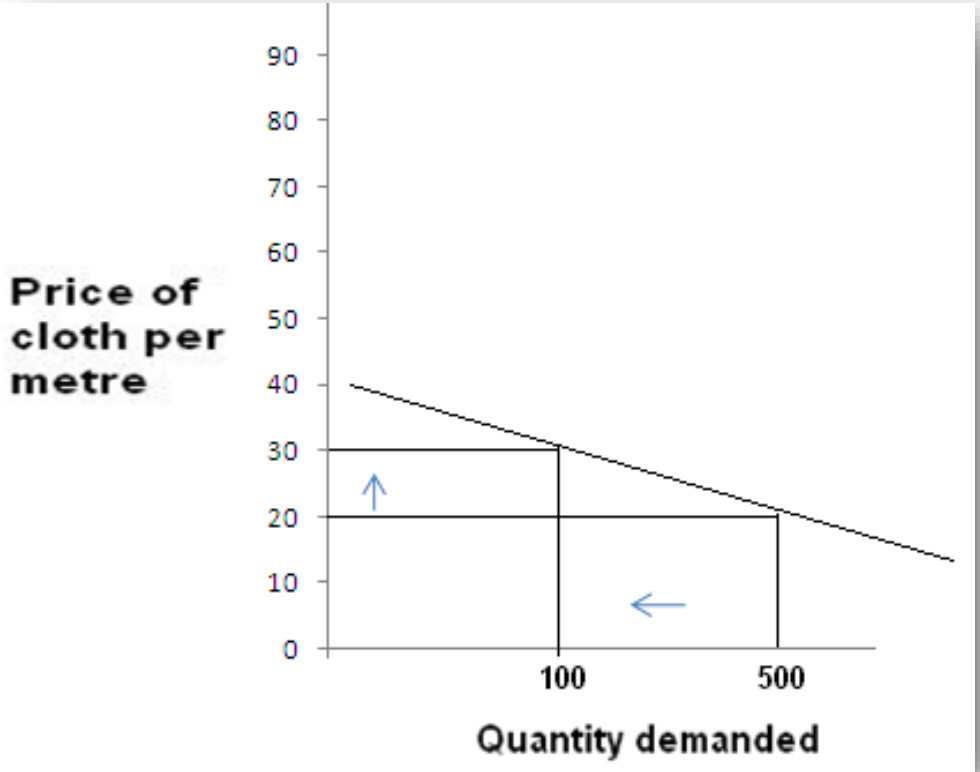
Price of cloth per metre(Rs.)	Demand (mt.)
20	100
30	50



Degrees of Elasticity

More than unit elastic demand or highly elastic(ep>1): When percentage change in demand is more than percentage change in price, the demand is said to be more than unit elastic demand or highly elastic.

Price of cloth per metre(Rs.)	Demand (mt.)
20	500
30	100



Case 2

Discretionary spending slips with price rise

"The increase in prices has made entry-level products unaffordable and hence a lot of consumers are either postponing or cancelling their purchase decision," said Godrej Appliances business head Kamal Nandi.

By *Writankar Mukherjee*, ET Bureau | Jul 02, 2018, 09.10 AM IST

Prices of **big-ticket or discretionary products** including televisions, refrigerators, washing machines and air-conditioners **went up 1-3% under the GST regime** with net taxation **going up from 26% in the VAT-excise period to 28%**. This, along with hardening of commodity prices, **pushed up prices by an overall 3-5% in the past year**.

Case 2

Discretionary spending slips with price rise

Apparel retailers, however, saw **average prices drop due to the reduced taxation rate of 5% under GST** for products below Rs 1,000.

Lifestyle International managing director Vasanth Kumar said **average apparel prices have dropped 3-4% in the past year**. “This **has increased consumption overall**. But the biggest benefit for retailers is simplification of stock movement, which now happens in half the time,” he said.

Cigarette **prices rose 4-8% due to increase in cess in the GST regime**, where effective tax rose 11-15%. As a result, **sales volume declined 8-9%** last year and is still affected, having fallen 3% in the March quarter.

Case 2

Discretionary spending slips with price rise

But eating out expenses remained nearly unchanged, especially after removal of input tax credit in November. “Restaurant industry is the only industry which does not receive input tax credit, one of the crucial components of GST, which is used to prevent cascading of taxes in all other sectors,” said Rahul Singh, president, National Restaurant Association of India. “This has not just hurt menu prices but also expansion plans for restaurateurs.”

Analysis: As the prices of the products are increasing because of increased in GST rates, products are not affordable to the customers. Customers are postponing their consumption for such a product. As they are responding towards the increase in the price, we have to conclude demand for such products is elastic.

Degrees of Elasticity

Perfect inelastic demand(ep=0): When quantity demanded does not change at all in response to change in price of a commodity, the demand for that commodity is said to be perfectly inelastic.

Price of cloth per metre(Rs.)	Demand (mt.)
20	20
30	20
40	20

Degrees of Elasticity

- **Perfectly elastic demand[ep=∞(infinity)]:**When the demand for a commodity expands or contracts to any extent without any change or with very little change in price, the demand for the commodity is said to be perfectly elastic or infinitely elastic.
- In real life, we rarely come across such a situation.

Price of cloth per metre(Rs.)	Demand (mt.)
30	100
30	400

Elasticity

Elasticity	Responsiveness	$\lvert E \rvert$
Elastic	$\lvert \%\Delta Q \rvert > \lvert \%\Delta P \rvert$	$\lvert E \rvert > 1$
Unitary Elastic	$\lvert \%\Delta Q \rvert = \lvert \%\Delta P \rvert$	$\lvert E \rvert = 1$
Inelastic	$\lvert \%\Delta Q \rvert < \lvert \%\Delta P \rvert$	$\lvert E \rvert < 1$

Point Elasticity

Point elasticity: Elasticity measured at a given point of a demand (or a supply) curve.

- Price elasticity can be calculated by multiplying the slope of demand ($\Delta Q/\Delta P$) times the ratio of price to quantity (P/Q)

$$E = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} = \frac{\Delta Q}{\Delta P} \times \frac{P_1}{Q_1}$$

Problem 1

Q1.The Aryan Paper Company lowers its price of envelopes (1,000 count) from Its 6 to Its 5.40. If its sales increase by 20 percent following the price decrease, what is the elasticity coefficient?

Solution 1

Q1.The Aryan Paper Company lowers its price of envelopes (1,000 count) from Its 6 to Its 5.40. If its sales increase by 20 percent following the price decrease, what is the elasticity coefficient?

Ans.

$$\frac{\%\ \text{change Q}}{\%\ \text{change P}} = \frac{.2}{-.1} = -2$$

Problem 2

Q2.When the price per unit of a commodity is Rs.20,quantity demanded is 200 units. But when price falls to Rs.15 per unit, demand expands to 300 units. Calculate elasticity of demand.

Solution 2

Q2.When the price per unit of a commodity is Rs.20,quantity demanded is 200 units. But when price falls to Rs.15 per unit, demand expands to 300 units. Calculate elasticity of demand.

Ans. ΔP = (15-20) = -5

ΔQ = (300 – 200) = 100

P1 = 20

Q1 = 200

Ep = 100/-5 * 20/200 = -2

The demand for the commodity is very elastic.

Problem 3

Q3.If the price of a commodity rises from Rs.8 per unit to Rs.10 per unit, a consumer's demand falls from 110 units to 100 units. Find out the price elasticity of demand for the commodity

Solution 3

Q3.If the price of a commodity rises from Rs.8 per unit to Rs.10 per unit, a consumer's demand falls from 110 units to 100 units. Find out the price elasticity of demand for the commodity

Ans. $\Delta P = (10 - 8) = 2$

$\Delta Q = (100 - 110) = -10$

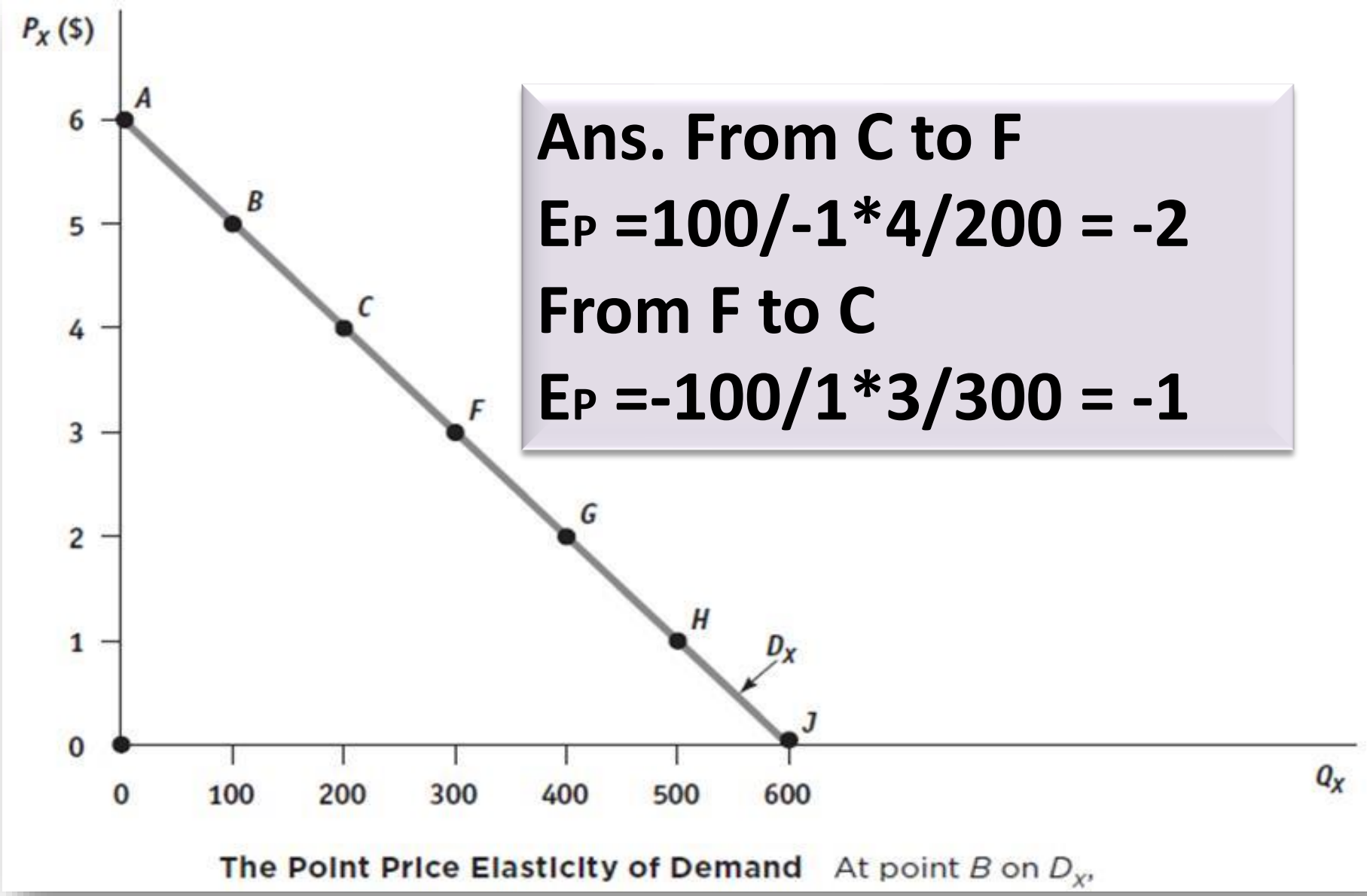
$P1 = 8$

$Q1 = 110$

$Ep = -10/2 * 8/110 = -0.36$

The demand for the commodity is less elastic or inelastic.

Limitation of Point Elasticity



Ans. From C to F

E_P =100/-1*4/200 = -2

From F to C

E_P =-100/1*3/300 = -1

The Point Price Elasticity of Demand At point B on D_X,

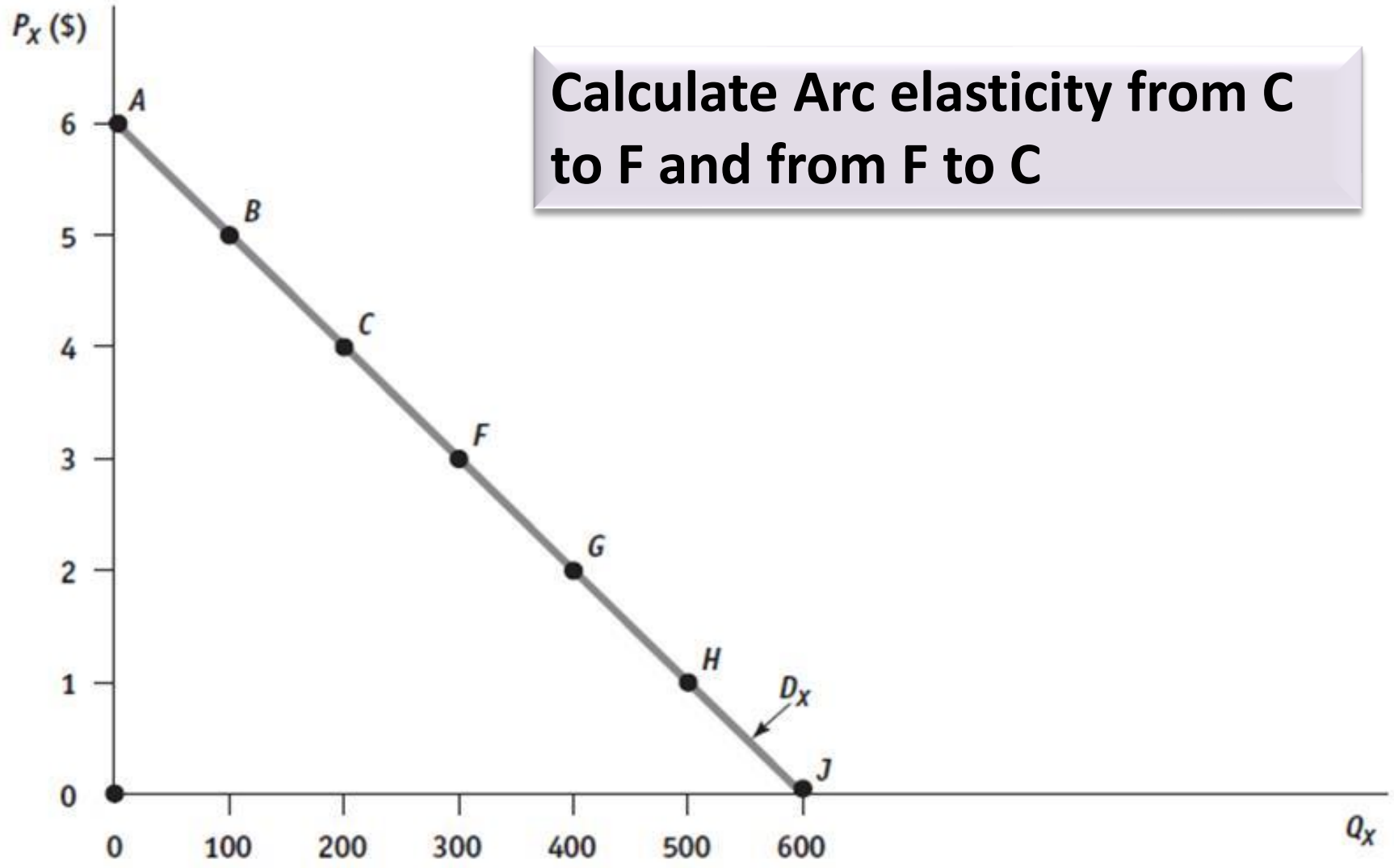
Arc Elasticity

- **Arc elasticity**: Elasticity which is measured over a discrete interval of a demand (or a supply) curve.

$$E_p = \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_1 + P_2)/2}$$

- E_p = Coefficient of arc price elasticity
- Q_1 = Original quantity demanded
- Q_2 = New quantity demanded
- P_1 = Original price
- P_2 = New price

Arc Elasticity: Problem 1



Calculate Arc elasticity from C to F and from F to C

The Point Price Elasticity of Demand At point B on D_X,

Arc Elasticity: Problem 1

Calculate Arc elasticity from C to F and from F to C

Ans: From C to F

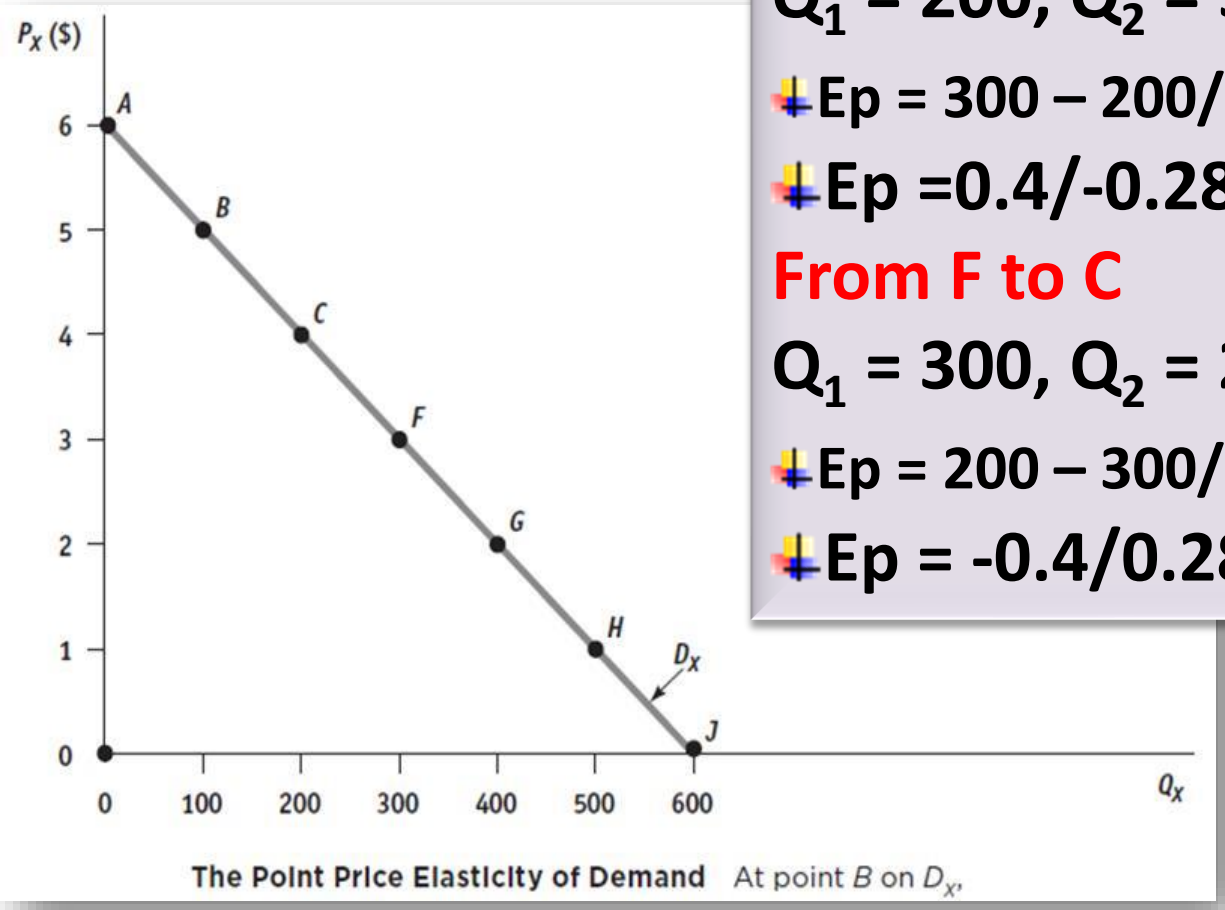
$Q_1 = 200$, $Q_2 = 300$, $P_1 = 4$ and $P_2 = 3$

- **Ep = 300 – 200/(200+300)/2/3-4/(4+3)/2**
- **Ep =0.4/-0.28 = -1.4**

From F to C

$Q_1 = 300$, $Q_2 = 200$, $P_1 = 3$ and $P_2 = 4$

- **Ep = 200 – 300/(300+200)/2/4-3/(3+4)/2**
- **Ep = -0.4/0.28 = -1.4**



The Point Price Elasticity of Demand At point B on D_X,

Arc Elasticity: Problem 2

Q2.If the price of a product rises from Rs.11 to Rs.12,causing a fall in quantity demanded from 7 to 6. Calculate price elasticity coefficient.

Arc Elasticity: Solution 2

Q2.If the price of a product rises from Rs.11 to Rs.12,causing a fall in quantity demanded from 7 to 6. Calculate price elasticity coefficient

Ans. $Q_1 = 7$, $Q_2 = 6$, $P_1 = 11$ and $P_2 = 12$

- **$Ep = 6 - 7/(7+6)/2/12-11/(11+12)/2$**
- **$Ep = -0.15/0.08 = -1.7$**

The demand for the commodity is elastic.

Arc Elasticity: Problem 3

Q3.If the price of a product rises from Rs.10 to Rs.12,causing a fall in quantity demanded from 8 to 6. Calculate price elasticity coefficient.

Arc Elasticity: Solution 3

Q3.If the price of a product rises from Rs.10 to Rs.12,causing a fall in quantity demanded from 8 to 6. Calculate price elasticity coefficient

Ans. $Q_1 = 8$, $Q_2 = 6$, $P_1 = 10$ and $P_2 = 12$

- **$Ep = 6 - 8/(8+6)/2/12-10/(10+12)/2$**
- **$Ep = -0.28/0.18 = -1.5$**

The demand for the commodity is elastic.

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ **Q-effect dominates**	**Unitary elastic** $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ **No dominant effect**	**Inelastic** $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ **P-effect dominates**
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ Q-effect dominates	Unitary elastic $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ No dominant effect	Inelastic $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ P-effect dominates
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Acer Laptop Rs.50,000 → Demand was 100 units → TR=Rs. 5000000

Acer Laptop Rs.55,000 → Demand decreased to 80 units → TR=Rs.4400000

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ Q-effect dominates	Unitary elastic $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ No dominant effect	Inelastic $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ P-effect dominates
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Acer Laptop Rs.50,000 → Demand was 100 units → TR=Rs. 5000000

Acer Laptop Rs.40,000 → Demand increased to 140 units → TR=Rs.5600000

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ Q-effect dominates	Unitary elastic $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ No dominant effect	Inelastic $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ P-effect dominates
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Acer Laptop Rs.50,000 → Demand was 100 units → TR=Rs. 5000000

Acer Laptop Rs.75,000 → Demand was 66 units → TR=Rs. 5000000

And inverse,decrease of price from Rs.75.000 to Rs.50,000 → TR=Rs. 5000000

Note: In this there will be no exact change in either percentage change in price or demand for laptop.

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ Q-effect dominates	Unitary elastic $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ No dominant effect	Inelastic $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ P-effect dominates
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Acer Laptop Rs.50,000 → Demand was 100 units → TR=Rs. 5000000

Acer Laptop Rs.55,000 → Demand was 100 units → TR=Rs. 5500000

Price Elasticity & Total Revenue

	Elastic $\lvert\%\Delta Q\rvert > \lvert\%\Delta P\rvert$ **Q-effect dominates**	**Unitary elastic** $\lvert\%\Delta Q\rvert = \lvert\%\Delta P\rvert$ **No dominant effect**	**Inelastic** $\lvert\%\Delta Q\rvert < \lvert\%\Delta P\rvert$ **P-effect dominates**
Price rises	TR falls	No change in TR	TR rises
Price falls	TR rises	No change in TR	TR falls

Acer Laptop Rs.50,000 → Demand was 100 units → TR=Rs. 5000000

Acer Laptop Rs.45,000 → Demand was 100 units → TR=Rs. 4500000

Case 4

Unilever's profit surges 143%, driven by declining operating cost: **Business Day** by MICHEAL ANIApril 26, 2018 | 12:58 am

Increase in Profit

- Unilever, one of Nigeria's biggest players in the Fast-Moving Consumer Goods (FMCG), space has reported **an increase in profit after tax of 143 percent on the back of a decline in operating cost,** data from its 2017 full-year financial report shows.
- While the consumer goods firm saw an **increase in profit of 143 percent to N7.45 billion in 2017, from the N3.07 billion recorded in 2016**, its operating cost dropped by six basis points (6bps) in the same period under review.
- The firm's stock price shows that **investors are finding it attractive as price rallied some 29.27 percent, outperforming the NSE all-share index of 6.59 percent** year-to-date.

CBN Restriction

- **The Central bank Of Nigeria(CBN) decision to restrict specific items from accessing its official window in 2015** placed significant **pressure on input costs for FMCGs**, as they **had to source for foreign exchange (FX) from the parallel market at higher rates to settle import bills** which consequently **depressed gross margins.**

Case 4

Unilever's profit surges 143%, driven by declining operating cost: **Business Day** by MICHEAL ANIApril 26, 2018 | 12:58 am

Strategies

- In response to this, several **FMCG companies developed backward integration strategies and effective supply chain management to reduce overreliance on imports to militate against exchange rate volatility** that has previously hampered growth.
- The apex bank also pushed the **possibility of FX concessions for manufacturing firms who are willing to set up production facilities in the country** rather than **continually depending on the CBN for FX to import their inputs** – and this **led to Unilever's commissioning of a new Blue Band factory in 2017**.

Elastic Demand

- **Rising input costs and FX constraints, saw gross margins come under pressure** for most FMCGs in 2017. This **led to several price increases in products as companies responded to keep up with margin expectations**. As a result, **consumer demand declined**, given the **strong price elasticity of most consumer** items other than the household necessities.

Case 4

Unilever's profit surges 143%, driven by declining operating cost: **Business Day** by MICHEAL ANIApril 26, 2018 | 12:58 am

Capital Raising

- Unilever successfully **raised N63 billion via a rights issue last year**. Management indicated that the proceeds **will be used to settle foreign currency intercompany loans**, support **working capital** and for **capacity expansion.**

Outcome

- The **FMCG recorded a 30.1 percent increase in revenue.** This **revenue growth in 2017 primarily reflected price increases rather than volume expansion.**

Business Relevance of Demand Elasticities

- Knowledge of Price elasticity of demand (PED) is useful to **help understand price variations in a market**, the **impact of changing prices on consumer expenditure, sales revenue and government indirect tax receipts.**
- A very good example of price variations in a market is the price of tickets to watch a major sporting event. In 2012, the UK hosted the Olympic Games. The price of tickets to watch athletics events ranged from $140 to $650, the cheapest tickets being for the heats of field and track events with the most expensive being for the last day when medals were being awarded for the main events.

Business Relevance of Demand Elasticities

Variations in price elasticity of demand can also be used to explain:

- the difference between peak and off peak rail travel in some countries
- why it is usually cheaper to purchase airline tickets a few months rather than a few days ahead of travel
- why restaurant meals are more expensive during religious festivals.

In all of these cases, businesses are using price variations to try to maximise their revenue. They are well aware that there are variations in price elasticity of demand in their markets and therefore trying to exploit the opportunities presented to them.

Factors Affecting Price Elasticity of Demand

- **Availability of substitutes**
  The better & more numerous the substitutes for a good, the more elastic is demand
- **Percentage of consumer's budget**
  The greater the percentage of the consumer's budget spent on the good, the more elastic is demand
- **Time period of adjustment**
  The longer the time period consumers have to adjust to price changes, the more elastic is demand

Cross-Price Elasticity

Cross-price elasticity (E_X) measures the responsiveness of quantity demanded of good A to changes in the price of related good B, holding the price of good A & all other demand determinants for good A constant

$$E_X = \frac{\%\Delta Q_A}{\%\Delta P_B}$$

Cross-Price Elasticity

Cross-elasticity of demand: The percentage change in quantity consumed of one product as a result of a 1 percent change in the price of a related product.

- Positive when the two goods are substitutes
- Negative when the two goods are complements
- Two products are considered good substitutes or complements when the coefficient is larger than 0.5.

$$E_X = \frac{\%\Delta Q_A}{\%\Delta P_B}$$

The Cross-Elasticity of Demand

Point Elasticity

$$E_X = \frac{\Delta Q_A}{Q_A} \div \frac{\Delta P_B}{P_B}$$

Arc Elasticity

$$E_x = \frac{Q_{2A} - Q_{1A}}{(Q_{1A} + Q_{2A})/2} \div \frac{P_{2B} - P_{1B}}{(P_{1B} + P_{2B})/2}$$

Cross-Elasticity of Demand: Problem 1

Q1: Would you expect cross-elasticity between the following pairs of products to be positive, negative, or zero?

- Television sets and Dish TV
- White bread and whole wheat bread
- Construction of residential housing and furniture
- breakfast cereal and men's shirts

Explain the relationship between each pair of products.

Cross-Elasticity of Demand: Solution 1

Q1: Would you expect cross-elasticity between the following pairs of products to be positive, negative, or zero?

- Television sets and Dish TV
- Rye bread and whole wheat bread
- Construction of residential housing and furniture
- breakfast cereal and men's shirts

Explain the relationship between each pair of products.

a. Negative: television sets and Dish TV are complements.

b.Positive: White bread and whole-wheat bread are substitutes.

c.Negative: construction of residential housing and furniture purchases are complements.

d.Probably zero: breakfast cereal and men's shirts are unrelated products. However, they may be thought of as substitutes in the competition for a consumer's budget dollars.

Cross-Elasticity of Demand: Problem 2

Q2: The Efficient Software Store had been selling a **spreadsheet program** at a rate of 100 unit per month and a **graphic program** at the rate of 50 unit per month. In September 2004, Efficient's supplier lowered the price for the spreadsheet program, and Efficient passed on the savings to customers by lowering its retail price from Its 400 to Rs 350. The store manager then noticed that not only had sales of the spreadsheet program risen to 120, but also the sales of the graphics program increased to 56 per month. Explain what has happened. Find arc price elasticity **spreadsheet program** and cross-elasticity for **graphic program**.

Cross-Elasticity of Demand: Solution 2

Q2: Arc price elasticity for spreadsheet program:

$$E_p = \frac{(120 - 100)}{(120 + 100)/2} \Big/ \frac{(350 - 400)}{(350 + 400)/2}$$

= -1.36

Arc cross elasticity for graphics program:

$$E_x = \frac{(56 - 50)}{(56 + 50)/2} \Big/ \frac{(350 - 400)}{(350 + 400)/2}$$

= -0.85

- The quantity demanded for spreadsheets increased due to the price change. The price elasticity is greater than (absolute) 1, and therefore revenue will rise from $40,000 to $42,000.
- The graphics program is a complementary commodity to the spreadsheet program, and its quantity sold benefited from the price decrease in the spreadsheet program. The cross-elasticity is -0.85 (the negative sign shows complementarity), and is quite strong.

Cross-Elasticity of Demand: Problem 3

Q3:. A local supermarket lowers the price of its vanilla ice cream from Rs 3.50 per half gallon to Rs 3. Vanilla ice cream (unit) sales increase by 20 percent. The store manager notices that the (unit) sales of chocolate syrup increase by 10 percent.

a) What is the price elasticity coefficient of vanilla ice cream?
b) Why have the sales of chocolate syrup increased, and how would you measure the effect?
c) Overall, do you think that the new pricing policy was beneficial for the supermarket?

Cross-Elasticity of Demand: Solution 3

Ans 3:a. There is a 14.3% decrease in price. With a 20% increase in quantity, this implies an elasticity coefficient of -1.4.

b. Syrup is a complementary good in relation to ice cream. Cross elasticity would measure this effect.

+0.1/-0.143 = -0.7

c. The coefficient of cross elasticity is -0.7, confirming complementarity of syrup to ice cream. The coefficient is quite high, and thus one could conclude that the two products are fairly close complements.

d. Yes, revenues for both ice cream and syrup rise. Unless costs rise more quickly (a very dubious conclusion), this action should increase the supermarket's profit.

Other Elasticity Measures

Elasticity is encountered every time a change in some variable affects quantities.

- Advertising expenditure
- Interest rates
- Population size

Final Problem

Final Problem 1

Q.1.A book store opens across the street from the University Book Store (UBS). The new store carries the same textbooks but offers a price 20 percent lower than UBS. If the cross elasticity is estimated to be 1.5, and UBS does not respond to its competition, how much of its sales is it going to lose?

Final Solution 1

Q.1.A book store opens across the street from the University Book Store (UBS). The new store carries the same textbooks but offers a price 20 percent lower than UBS. If the cross-elasticity is estimated to be 1.5, and UBS does not respond to its competition, how much of its sales is it going to lose?

Ans: 1.5 = -30%/-20%.

UBS would lose 30% of its sales.

Final Problem 2

Q2. The demand function for a Pepsi in general is **$Q = 20 - 2P$** where *Q* stands for quantity and P stands for price.

a) Calculate arc elasticity at the interval between P=5 and *P=6.*

b) At which price would a change in price and quantity result in approximately no change in total revenue? Why?

Final Problem 2

Q2. The demand function for a Pepsi in general is **Q = 20 – *2P*** where *Q* stands for quantity and P stands for price.

a) Calculate arc elasticity at the interval between P=5 and *P=6.*

Ans. 2. a.

At P = 5, Q = 10

At P = 6, Q = 8

Arc price elasticity = - 1.2

Final Problem 2

Q2. The demand function for a Pepsi in general is **Q = 20 – *2P*** where *Q* stands for quantity and P stands for price.

b) At which price would a change in price and quantity result in approximately no change in total revenue? Why?

Ans. 2. b.

Price	Quantity	Total Revenue
4	12	48
5	**10**	**50**
6	8	48
7	6	42

At a price of $5, revenue reaches its peak. This is also where point price elasticity is 1, as shown in part a. of this problem.

Final Problem 3

Q 3. Given the demand equation Q =1,500 - 200P, calculate all the numbers necessary to fill in the following table:

Price	Quantity	Arc	Total Revenue	Marginal Revenue
7.5				
6.5				
6				
5.5				
5				
4.5				
4				
3.5				
3				
2.5				

Final Solution 3

Q3. Given the demand equation Q =1,500 - 200P, calculate all the numbers necessary to fill in the following table:

TR Max
When, MR=0 & Elasticity = -1 or 1

Price	Quantity	Arc	Total Revenue	Marginal Revenue
7	100		700	
6.5	200	-9.00	1300	6.00
6	300	-5.00	1800	5.00
5.5	400	-3.29	2200	4.00
5	500	-2.33	2500	3.00
4.5	600	-1.73	2700	2.00
4	700	-1.31	2800	1.00
3.5	800	**-1.00**	**2800**	**0.00**
3	900	-0.76	2700	-1.00
2.5	1000	-0.58	2500	-2.00

Final Problem 4

Q4. The equation for a demand curve has been estimated to be **Q=100 - 10P + 0.5Y,** where Q is quantity, *P* is price, and Y is income. Assume *P* = 7 and Y = 50.

a. Interpret the equation.
b. If price reduced to 6,calculate Arc price elasticity
c. Now assume income is 70. What is the Point elasticity P=8and Arc price elasticity at *P* = 8 and P=7?

Final Solution 4

Q4. The equation for a demand curve has been estimated to be **Q=100 - 10P + 0.5Y,** where Q is quantity, *P* is price, and Y is income. Assume *P* = 7 and Y = 50.

a. Interpret the equation.

Ans. 4. a.

- When price changes by 1, quantity will change by 10 in the opposite direction.
- When income changes by 1, quantity will change by .5 in the same direction.

Final Solution 4

Q4. The equation for a demand curve has been estimated to be **Q=100 - 10P + 0.5Y,** where Q is quantity, *P* is price, and Y is income. Assume *P* = 7 and Y = 50.

b. If price reduced to 6, calculate Arc price elasticity.

Ans. 4. b.

Arc elasticity, between P = 7 and P = 6:

at P = 6, Q = 100 - (10)(6) + (.5)(50) = 65

$E_p = ((65 - 55)/(65 + 55)) / ((6 - 7)/(6 + 7)) =$

$E_p = -1.08$

Final Solution 4

Q4. The equation for a demand curve has been estimated to be **Q=100 - 10P + 0.5Y,** where Q is quantity, *P* is price, and Y is income. Assume *P* = 7 and Y = 50.

c. Now assume income is 70. What is the Arc price elasticity at *P* = 8 and P=7?

Ans. 4. c.

Arc elasticity, between P = 8 and P = 7

Q = 100 - (10)(7) + (.5)(70) = 65

E_p = ((65 - 55)/(65 + 55)) / ((7 - 8)/(7 + 8)) = -1.25