Introduction to Microeconomics

Elasticity - 02

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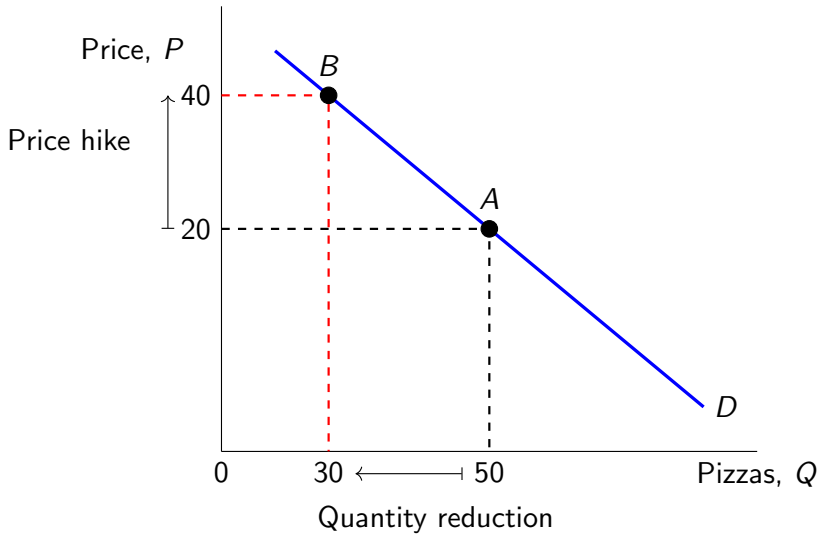
Price Elasticity of Demand

- Price Elasticity of Demand (P$\mathcal{E}$D) measures the percentage change in the quantity demand due to percentage change in price.

$$P\mathcal{E}D = \frac{\text{Percentage change in Quantity Demand}}{\text{Percentage change in Price}} = \frac{\Delta\text{Quantity (\%)}}{\Delta\text{Price (\%)}}$$

- Note that we do not use $\Delta\text{Quantity (\%)} = \frac{(Q_2 - Q_1)x100}{Q_1}$ and $\Delta\text{Price (\%)} = \frac{(P_2 - P_1)x100}{P_1}$ because the (P$\mathcal{E}$D) value is not consistent between same points on the curve. Here, Q_2 and Q_1 represents new quantity and old quantity respectively. P_2 and P_1 represents new price and old price respectively. This method would give you different values for point A to B and from B to A on the same demand curve.



- Following the previously mentioned method, P$\mathcal{E}$D from A to B $= \frac{(30-50)/50}{40-20)/20} = -0.4 = |-0.4| = 0.4$ whereas, from B to A, P$\mathcal{E}$D $=1.34$
- Signs do not matter. You can take the absolute values.

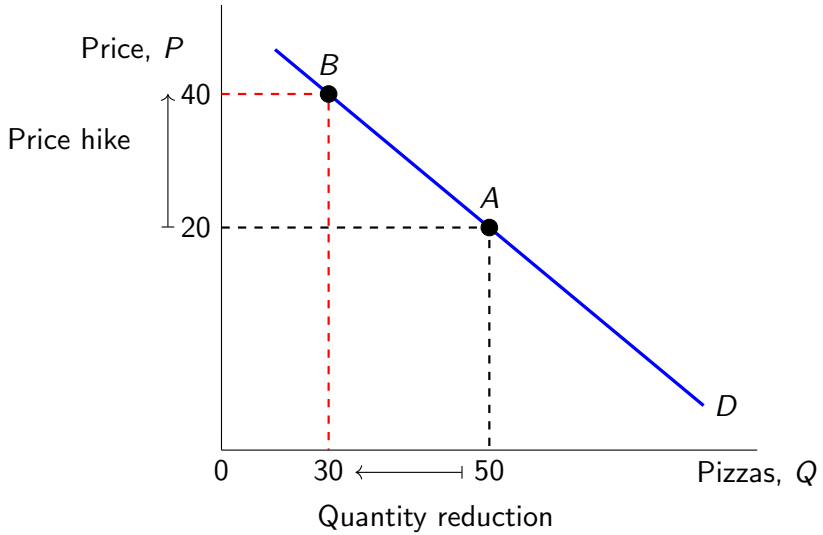
Midpoint Method

- We tackle the inconsistency problem by using midpoint method where we divide the changes in quantity and prices by their respective averages
- $\Delta\text{Quantity } (\%) = \frac{Q_2 - Q_1}{\frac{(Q_1+Q_2)}{2}} x100$

  Here, Q_2 and Q_1 represents new quantity and old quantity respectively
- Similarly, $\Delta\text{Price } (\%) = \frac{P_2 - P_1}{\frac{(P_1+P_2)}{2}} x100$

  P_2 and P_1 represents new price and old price respectively

$$PED = \frac{\Delta\text{Quantity } (\%)}{\Delta\text{Price } (\%)} = \frac{\frac{Q_2 - Q_1}{\frac{(Q_1+Q_2)}{2}}}{\frac{P_2 - P_1}{\frac{(P_1+P_2)}{2}}} \quad \ldots\ldots\ldots (1)$$



Using midpoint method, P$\mathcal{E}$D from A to B $= \frac{\frac{30-50}{(30+50)}{2}}{\frac{40-20}{(40+20)}{2}} = -0.74 = 0.74$

(Signs do not matter) from B to A, P$\mathcal{E}$D $= 0.74$ as well.

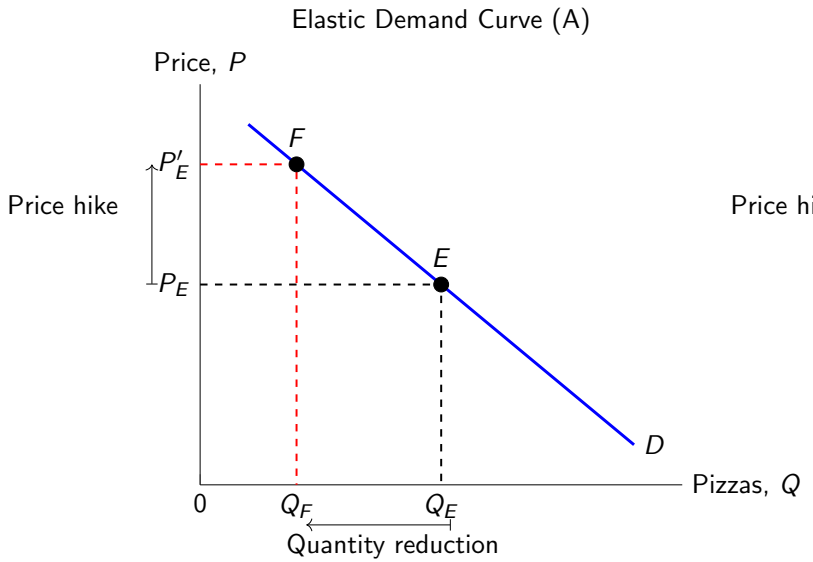
Interpret values of P$\mathcal{E}$D

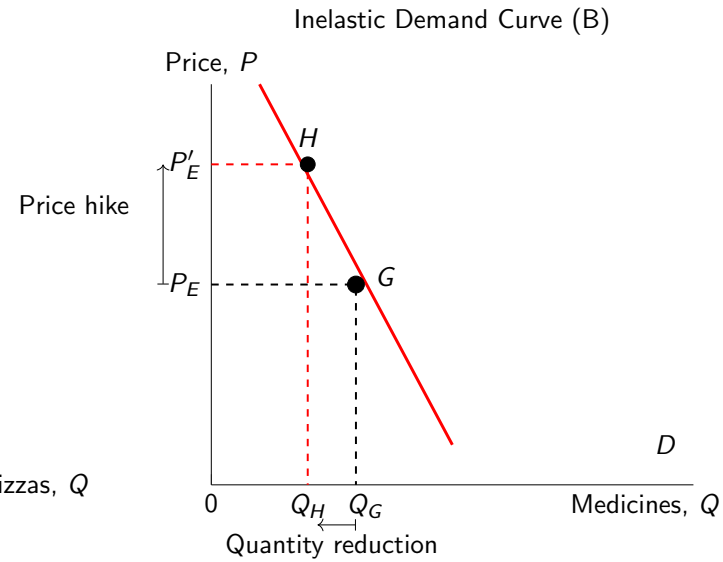
Taking only absolute values (Signs ignored)
Interpretation: With 1% increase in price, the Q_d decreases by 0.74% (Try to understand what's happening here)

1. P$\mathcal{E}$D > 1 : Then the good is **Elastic**
2. P$\mathcal{E}$D < 1 : Then the good is **Inelastic**
3. P$\mathcal{E}$D $= 1$: Then the good is **Unit elastic**
4. P$\mathcal{E}$D $= \infty$: We get **Perfectly elastic Demand**
5. P$\mathcal{E}$D $= 0$: We get **Perfectly inelastic Demand**

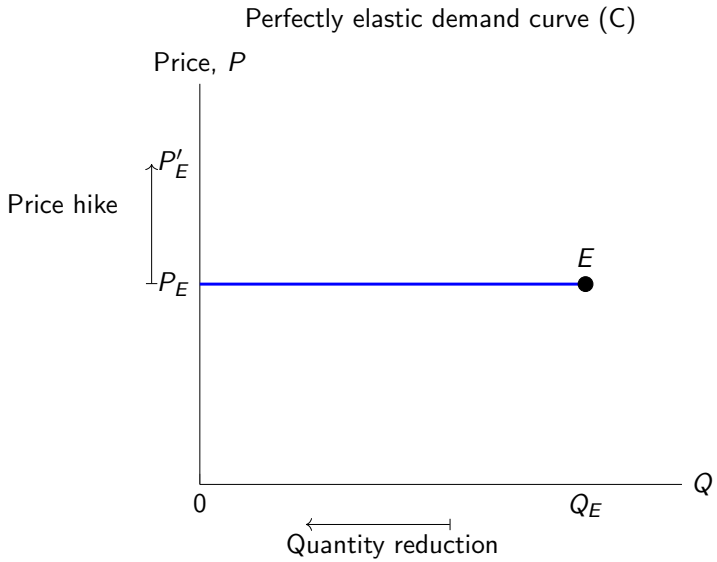
Question: What type of elastic demand curve the good represents with P$\mathcal{E}$D $= 0.74$?

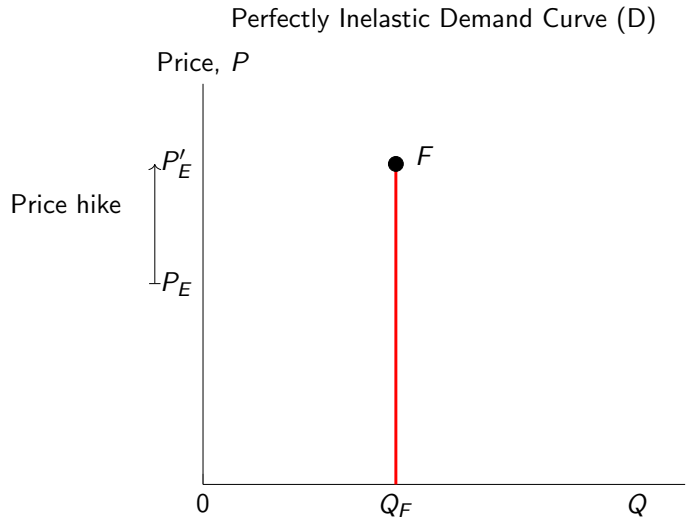
Graphs


Elastic Demand Curve (A)
Price, P
P'_E
P_E
Price hike
F
E
D
0
Q_F
Q_E
Pizzas, Q
Quantity reduction


Inelastic Demand Curve (B)
Price, P
P'_E
P_E
Price hike
H
G
D
0
Q_H
Q_G
Medicines, Q
Quantity reduction

Responsiveness to price change





- Higher elasticity $\longrightarrow$ Flatter Curve
- Higher inelasticity $\longrightarrow$ Steeper Curve
- Necessary items are relatively inelastic; e.g. medicines
- Slightest change in price has severe effect in Perfect Elasticity case (C); e.g. Luxury goods
- Change in price has no effect in Perfect inelastic case (D); e.g.

Elasticity