

## Clarifications (Hopefully!!) on elasticity of demand

I wrote these notes to provide some clarifications about elasticities. If you recall seminar one, I said few things about a common confusion in economics: We write Q as a function of P while at the same time we draw P on the vertical axis and Q on the horizontal (See also Prof. Session's notes, Topic 1, page 10 ). When we have a normal demand curve e.g.  $Q=4-0.5P$  we need to invert it if we want to draw the demand curve in a diagram that Price is on the Vertical Axis. In this case, the demand curve (inverse) becomes :

$$Q = 4 - 0.5P \Rightarrow Q - 4 = -0.5P$$

$$P = \frac{4}{0.5} - \frac{1}{0.5}Q$$

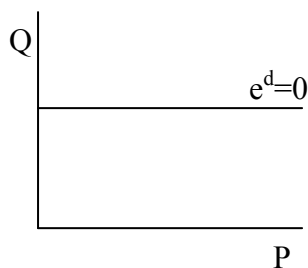
Now Recall the Definition of elasticity :

$$e^d = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

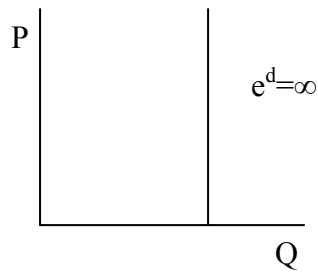
When the demand is **perfectly inelastic**,  $\Delta Q=0$ . This means that no matter the price, the quantity demanded will always be the same. In other words, the consumers need this good so bad that they are willing to purchase the same quantity at any price.

Substituting  $\Delta Q=0$  into the elasticity formula we get :  $e^d = \frac{0}{\Delta P} \cdot \frac{P}{Q} = 0$ . You can see

that in the diagram below, the Quantity doesn't change, it is the price that moves along the horizontal axis.

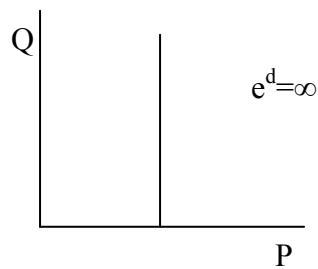


Inverting the diagram so that to have P on the Vertical and Q on the horizontal we have :

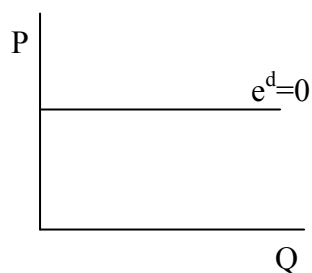


It is the same think like having the two sides of the same coin : Again, the Quantity *Doesn't change* but if we want to have price on the vertical axis,  $e^d$  must be  $\infty$ .

Now when the demand is **perfectly elastic**, the consumers are only purchasing the good at a certain price. If the price goes up or down they simply stop buying it. Since then  $\Delta P=0$ ,  $e^d = \frac{\Delta Q}{0} \cdot \frac{P}{Q} = \infty$ . This is depicted below, the price remains the same for every possible value of Q :



Reversing the diagram so that P to be on the vertical axis we have :



Hope this helps a little and does not confuse you more !

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