Price Elasticity of Demand

* Propaedeutic for Taxes

Elasticity

* A measure of how demand and supply react to changes in price, their sensitivity with respect to changes in price

Price Elasticity of Demand

* A demand curve is elastic when an increase in price reduces the quantity demanded a lot (and vice versa).
* When the same increase in price reduces quantity demanded just a little, then the demand curve is inelastic.
* Elastic/inelastic measure reactions to changes in price

Price elasticity of Demand

Demand 1

P🡪 (freccia verso l’alto) 25%

Q 🡨(freccia verso il basso) ≈ 🡨6% (only)

Demand 2

P 🡪 25% , but there is a much greater reduction quantity traded at that price

Q 🡨 75% (which is much more than before)

Main Difference

* The Demand 1 is an inelastic demand, while the demand 2 is an elastic demand
* Demand 2 is much sensitive with regards to changes in price than demand 1

Defininig and Measuring Elasticity

* Price elasticity of demand (PEoD)  
  Definition  
  Formula

Ex: Calculate the P.E.o.D.

Demand 1

E^d = -6%/25% = - 0.25

Demand 2

E^d = -75%/25% = -3

Ex: Defining and Measuring Elasticity

Using the midpoint formula

The midpoint Method

Mathematics of Demand elasticity

P Q

10 100

20 90

Demand1

P🡨20%

Q🡪6.6%

E^d = 6.6%/-20% = -0.33

Midpoint allow us to get a number that does not depend on the initial or final price/value

* Considering the same demand curve we can get different results by considering the initial point, so we use the midpoint formula to get and univocal result

Using the midpoint formula

* Price elasticity of demand is sensitive to the initial point
* If we start from 40 🡪 50 we get a value for E^d , while if we do the opposite movement we get another result

Mathematics of Demand and Elasticity – Midpoint Method to calculate the PEoD

1. % change in quantity demanded

* 90-100 (Numerator)
* (Enumerator) Divided by the Average Number of
* Multiplied by 100

1. % change in price
2. Price elasticity of Demand

P Q

I. 10 100

F. 20 90

Ex:

P Q

40 80

50 75

CiQD = 75-80/ (75+80)/2 \*100 =

CiP = 50-40/ (50+40)/2 \*100 =

PEoD =

Estimating Elasticities

Interpreting the price elasticity of demand

* Unit Elastic (Ed = 1), the quantity demanded changes in a way that is exactly proportional to the change in price.   
  If P🡪10%, Q 🡨10% ; If P goes up of X%, Q goes down of X%
* Inelastic, If the quantity demanded changes in a way that is less than proportional than the changes in price.  
  If P 🡪
* Elastic, if the quantity demanded changes in a way that is more than proportional than the changes in price.   
  If P 🡪 1, Q

Extremely low elasticity of Demand

We need to consider 2 more cases

* Demand that is perfectly elastic
* Demand that is perfectly inelastic

Perfectly inelastic demand (insensitive to changes in price)

When the demand curve is almost vertical,   
we observe that after this big change in price,   
the reduction in quantity is very small

* Elasticity demand = 0

Perfectly Elastic Demand Curve

* Even very small changes in prices, translate in huge quantity demanded
* Elasticity demand = + Infinite

Unit elasticity of Demand

* P🡪20%  
  Q 🡨20%
* Perfectly Proportional

Inelastic Demand

Elastic Demand

Why do we care about the PEoD

* Important in the analysis of taxes
* To predict how the market will react to changes in price, how consumers react to changes in price

Elasticity   
E^d = ∆Q/ ∆P x P\*/Q\* (in equilibrium)

Q^d = a-bP

∆Q/∆P = -b (coefficient in the direct demand function)

∫Q(P)/∫P = -b (derivative)

Elasticity and Total Revenue

* If we know the PEoD we are able to understand how elastic some goods are
* Producers need it to see what is their total revenue (their profits at a specific price)

Total revenue by area

* Price effect on price increase is better or worse for the price effect of price dc

Elasticity and total revenue

Inelastic

* Increase in price, increase in total revenue
* An increase in price, translates into small reduction of quantity

Elastic

* Increase in price, significant reduction in the quantity demande
* The market reacts a lot, so the total revenue decreases

Demand Schedule and Total Revenue

* Two graphs
* Graph on the top, Demand Schedule
* Second Graph, Demand Schedule

If we are on the elastic part of the demand curve

* Increase in price 🡪quantity effects dominates the price effect, because the demand is very sensitive to changes in price, so the increase in price translates into…
* Inelastic –> price effects dominates the quantity effect, the demand is not sensitive to changes in price

1. Example of how elasticity changes along the D.C.   
   -
2. Translate info from the graph

* Demand cure elastic 🡪 price effect dominates…
* Inelastic 🡪 quantity effect dominates…

What factors determine the price elasticity of demand

* Fewer… because it would be difficult to have subs
* Many … because it is easy to switch brand

1. The share of income spent on the good

* If we spend only a tiny share of our income on a good, we are not really sensitive to this change in price (viceversa)

1. The length of time elapsed since the price change matters

Price elasticity of Supply

Measuring the price elasticity of supply

* PEoS, measure the sensitivity of supply with regards of changes in price
* Price increases, the quantity supplied…

E^s = 0 E^s=∞ E^s=1 E^s > 1 E^s < 1

Inelastic Elastic Unit Elastic Elastic Inelastic

Two Extreme cases of Price elasticity of Supply

* Perfectly Inelastic supply  
  After a huge increase in price, the quantity supplied increases only a little   
  Not very sensitive to changes in price

Here, changes in price translates to no change in quantity (perfectly inelastic S.C.)

* Perfectly Elastic Supply

Here changes in price translates into a huge change in quantity (perfectly elastic SC)

Price elasticity of Supply

Supply Curve 1

P🡪25%

Q 🡪6.3%

E^s = 6.3%/25% = 0.2 (supply inelastic)

Supply Curve 2  
P 🡪25%

Q 🡪112%

E^s = 4.5

What factors determine the price elasticity of supply

1. Availability of inputs

* Costs of inputs

1. Time

Income elasticity of demand

* Is a measure of how the quantity demanded is sensitive to changes in income

It depends on the nature of the goods

Normal Goods, positive relationship

Inferior Goods, negative relationship