## Chapter 5: Elasticity and Its Application

- What is elasticity? What kids of issues can elasticity help us understand?
- What is the price elasticity of demand? How is it related to the demand curve? How is it related to revenue \& expenditure?
- What is the price elasticity of supply? How is it related to the supply curve?
- What are the income and cross-price elasticities of demand?
: a measure of the responsiveness of quantity demanded
or quantity supplied to one of its determinants


## ELASTICITY OF DEMAND

Law of Demand states a fall in price increases the quantity demanded. By how much?
: a measure of how much the quantity demanded of a
good responds to a change in the price of that good
Price elasticity of demand $=$ Percent change in $\mathrm{Qd} / \%$ change in Price

- Examples: Price of Butterfinger Bites falls $20 \%$ \& causes an increase in Qd of $25 \%$, Price of insulin increases $15 \%$ and the Qd of insulin decreases 2.5\%


## Computing the Price Elasticity of Demand

The Midpoint Method of Calculating the Elasticity of Demand

- Elasticity is ratio of percent changes, therefore going from point A to B will have different elasticity than going from B to A .
- Get around this problem with the midpoint method
- Note: Standard method of computing Percent change is (end value - start value)/start value*100
- Midpoint method: (end value - start value)/mid point $* 100$

$$
\left.\varepsilon_{d}=\left|\frac{\% \Delta Q d}{\% \Delta P}\right|=\left|\frac{\frac{\left(Q_{2}-Q_{1}\right)}{\left(Q_{2}+Q_{1}\right)}}{2}\right| \frac{\frac{\left(P_{2}-P_{1}\right)}{\frac{\left(P_{2}+P_{1}\right)}{2}}}{} \right\rvert\,
$$

- Example: Price of hotel rooms increases from $\$ 70$ to $\$ 90$. The Qd decreases from 5000 to 3000.

Note: Because of the law of demand quantity demanded will always move in the opposite direction to that of price change so the price elasticity of demand will always be negative. It is common to ignore the negative sign and report only the absolute number.

What determines Price Elasticity of Demand?

- Availability of Close Substitutes (Breakfast Cereal vs. Sunscreen)
- Goods with close substitutes have more elastic demand (because consumers can easily switch goods)
- Necessities vs. Luxuries (Insulin vs. Caribbean Cruises)
- Necessities have inelastic demand
- Luxuries have elastic demand
- Definition of the Market (blue Jeans vs. Clothing)
- narrowly defined markets have elastic demand
- broadly defined markets have inelastic demand
- Time Horizon (Gasoline in the SR vs. Gasoline in the LR)
- longer periods of time have elastic demand, with time more substitutes become available

What do these numbers mean?

- PERFECTLY INELASTIC if $\varepsilon=0$
- INELASTIC if $\varepsilon<1$
- UNIT ELASTIC if $\varepsilon=1$
- ELASTIC if $\varepsilon>1$
- PERFECTLY ELASTIC if $\varepsilon=$ infinity


## Graphs

## Elasticity of a Linear Demand Curve

Even though the slope (change in $y /$ change in $x$ ) is constant, the elasticity (ratio of \% changes) is not

- Low price \& high Qd inelastic demand
- High price \& low Qd elastic.



## Application: Price Elasticity of Demand and the Total Revenue

total revenue: the amount paid by buyers and received by sellers of a good

- $\mathbf{T R}=\mathbf{P} * \mathbf{Q}$
- Example: our scenario, \$200 to \$250
- More revenue? Sell fewer units?
- It depends on the price elasticity of demand.


## Relationship between TR \& Elasticity

- Demand elastic $\rightarrow \mathrm{E}>1 \rightarrow \% \Delta \mathrm{Qd}>\% \Delta \mathrm{P}$
- Price $\uparrow \rightarrow \mathrm{Qd} \downarrow \rightarrow \mathrm{TR} \downarrow$
- $\downarrow \mathrm{P} \rightarrow \mathrm{Qd} \uparrow \rightarrow \uparrow \mathrm{TR}$
- Demand inelastic $\rightarrow \mathrm{E}<1 \rightarrow \% \Delta \mathrm{P}>\% \Delta \mathrm{Qd}$
- Price $\uparrow \rightarrow \mathrm{Qd} \downarrow \rightarrow \mathrm{TR} \uparrow$
- $\downarrow \mathrm{P} \rightarrow \mathrm{Qd} \uparrow \rightarrow \downarrow \mathrm{TR}$
- Example: A. Pharmacies raise the price of insulin by 10\%. Does total expenditure on insulin rise or fall?
B. As a result of a fare war, the price of a luxury cruise falls $20 \%$. Does luxury cruise companies' total revenue rise or fall?


## PRICE ELASTICITY OF SUPPLY

price elasticity of supply: a measure of how much the quantity supplied of a good responds to a change in the price of that good.
$\varepsilon_{s}=\frac{\% \Delta Q s}{\% \Delta P}$
Same as Demand:
Perfectly inelastic: E=0
Inelastic: $\mathrm{E}<1$
Unit elastic: $\mathrm{E}=1$
Elastic: E>1
Perfectly elastic: E=infinity
The determinants of supply curve

- More easily change the Q sellers produce, greater price elasticity of supply
- Greater in the LR

Elasticity changes along the supply curve.

## Other Elasticities:

: a measure of how much the quantity demanded
of a good responds to a change in consumers' income
Income elasticity of demand $=$ Percent change in $\mathrm{Qd} / \%$ change in Income

$$
\varepsilon_{d}=\frac{\% \Delta Q d}{\% \Delta Y}
$$

- Normal goods have positive income Elasticities
- Inferior goods have negative income elasticities

Example: Jessica's income increases from \$1500/mo to \$2000/mo. Her consumption of Jamba Juices increases from 20/mo to 27/mo. Is Jamba a normal or inferior good for Jessica? What is her income elasticity?
of a good responds to a change in the price of another good
Cross-Price elasticity of demand $=$ Percent change in Qd good 1/ \% change in P good 2

$$
\varepsilon_{d}=\frac{\% \Delta Q_{d}^{1}}{\% \Delta P_{2}}
$$

- Substitutes have positive cross-price Elasticities
- Complements have negative cross-price elasticities

Example: The price of a burrito falls from $\$ 23$ to $\$ 17$. As a result, Mansour's quantity demanded of beer falls from 3 to 2. Are these goods complements or substitutes? What is the cross-price elasticity?

## Suggested Problems: Problems and Applications - 1, 2, 5

