USEFUL FORMULAS FOR ELASTICITY [†]

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The four types of elasticities that is of concern here are defined as follows:

- Price elasticity of demand (ϵ_{ii}^D)
- Price elasticity of supply (ϵ_{ii}^S)
- Cross-price elasticity of demand (ϵ_{ij}^D)
- Income elasticity of demand (ϵ_i^I)

where good $i \neq$ good j. (ii implies own-price elasticity)

$\Rightarrow \epsilon_{ii}^D = \frac{\triangle Q_i^D\%}{\triangle P_i\%}$. **Ex.** The price of Saxbys coffee goes down by 10% and we observe that the amount of demand (Q_i^D) goes up by 20% for the same product, $\epsilon_{ii}^D = \frac{20\%}{-10\%}$ = -2.
$\star$ $|\epsilon_{ii}^D| > 1$: Elastic, $|\epsilon_{ii}^D| = 1$: Unit-elastic, and $|\epsilon_{ii}^D| < 1$: Inelastic.

$\Rightarrow \epsilon_{ii}^S = \frac{\triangle Q_i^S\%}{\triangle P_i\%}$. **Ex.** The price of Saxbys coffee goes down by 10% and we observe that the amount of supply (Q_i^S) goes down by 20% for the same product, $\epsilon_{ii}^S = \frac{20\%}{10\%} = 2$.
$\star$ $|\epsilon_{ii}^S| > 1$: Elastic, $|\epsilon_{ii}^S| = 1$: Unit-elastic, and $|\epsilon_{ii}^S| < 1$: Inelastic.

$\Rightarrow \epsilon_{ij}^D = \frac{\triangle Q_i^D\%}{\triangle P_j\%}$, good $i \neq$ good j. **Ex.** (Substitutes) The price of Starbucks coffee (good j) goes down by 10% and we observe that the amount of demand (Q_i^D) goes down by 20% for Saxbys Coffee (good i), $\epsilon_{ij}^D = \frac{20\%}{10\%} = 2$.
$\star$ $\epsilon_{ij}^D > 0$: Substitutes, $\epsilon_{ij}^D < 0$: Complements, and $\epsilon_{ij}^D = 0$: Unrelated.

[†]These notes are prepared as a supplement for first year introductory economics courses. It gives a quick review of the formulas used in my lecture on elasticity and does not require a background on calculus.

$\Rightarrow \epsilon_i^I = \frac{\triangle Q_i^D\%}{\triangle I\%}$. **Ex.** (Normal goods) When your income increases by 10%, you buy 2% more of your favorite coffee at Saxbys, $\epsilon_i^I = \frac{2\%}{10\%} = 0.2$.

$\star$ $0 < \epsilon_i^I < 1$: Normal and a necessity, $\epsilon_i^I > 1$: Normal and a luxury, and $\epsilon_i^I < 0$: Inferior.

Midpoint Formula:

$$\frac{Q_2 - Q_1}{\frac{Q_2+Q_1}{2}} \div \frac{P_2 - P_1}{\frac{P_2+P_1}{2}}$$

Ex. Lecture # 3 Slides - Solving the Problem:

$$\frac{2500 - 2000}{\frac{4500}{2}} \div \frac{3.30 - 3.50}{\frac{6.80}{2}} = -3.8 \quad \blacksquare$$