GRADUATE MICRO
BARUCH COLLEGE

Eryk Wdowiak

NOTES ON THE ELASTICITY OF SUBSTITUTION

$$\sigma_{XY} \equiv \frac{-\Delta\left(\frac{X}{Y}\right)}{\Delta\left(\frac{P}{Q}\right)} \cdot \frac{\left(\frac{P}{Q}\right)}{\left(\frac{X}{Y}\right)}$$

Note: $M = p \cdot x + q \cdot y$

Note: This is the only elasticity that I define with a negative sign.

→ The "elasticity of substitution in consumption" is what we'll focus on here, but before I start I want to point out that there is also an elasticity of substitution in production:

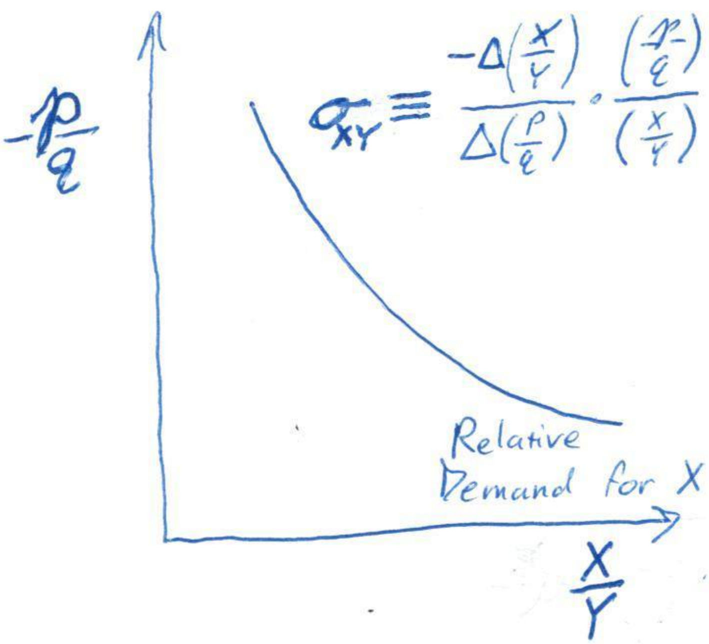
$$\sigma_{KL} \equiv \frac{-\Delta\left(\frac{L}{K}\right)}{\Delta\left(\frac{w}{r}\right)} \cdot \frac{\left(\frac{w}{r}\right)}{\left(\frac{L}{K}\right)}$$

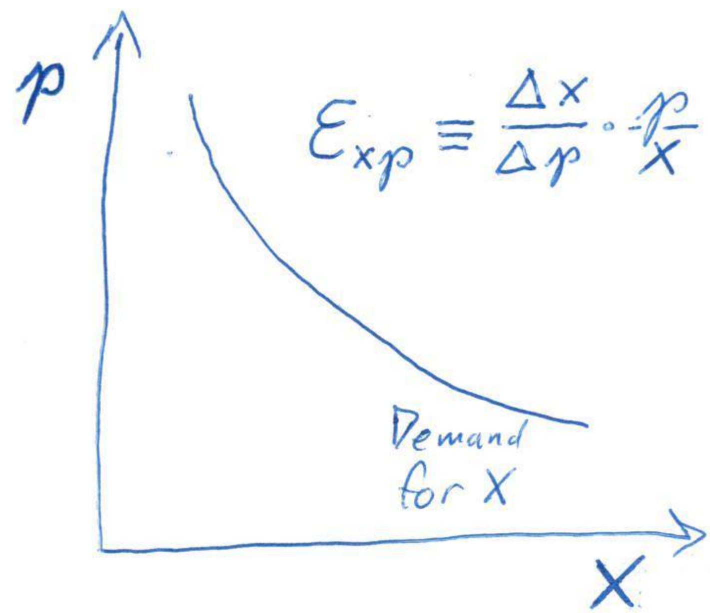
→ We focus on the elasticity of substitution in consumption because it and the income elasticity determine whether two goods are complements or substitutes

$$\mathcal{E}_{xq} = k_y \left(\sigma_{xy} - \eta_x\right)$$

→ The elasticity of substitution in consumption is the elasticity of the relative demand curve.

Note that it is set up just like the own price elasticity of demand





→ Remember also from our discussion of the Robinson Crusoe Model that the Relative Demand curve measures the slope of the indifference curve, i.e. $MRS \equiv \frac{MU_x}{MU_y}$, which the consumer sets equal to the relative price of X at a utility maximum.

→ On the horizontal axis, the Relative Demand curve measures the X/Y ratio at each point along the indifference curve.

→ Since the Relative Demand curve is derived from the indifference curve, it measures the HICKSIAN substitution effect

> "when the relative price of X increases, how much less X and how much more Y must ~~the~~ we consume, to stay on the same indifference curve (ie. maintain the same level of utility)?"

→ The elasticity of substitution is the elasticity of the relative demand curve, so it appears in the Slutsky Equation:

$$\varepsilon_{XQ} = k_Y \left(\underset{\text{SUBS}}{\sigma_{XY}} - \underset{\text{INCOME}}{\eta_X} \right)$$