Generalizing the Perfect Complements Demands

Generalizing to other PC cases

Preferences:

Suppose household wants β units of X for each unit of Y:

$$\frac{Q_x}{Q_y} = \frac{\beta}{1} = \beta$$

β is a *parameter*: chosen to fit case at hand

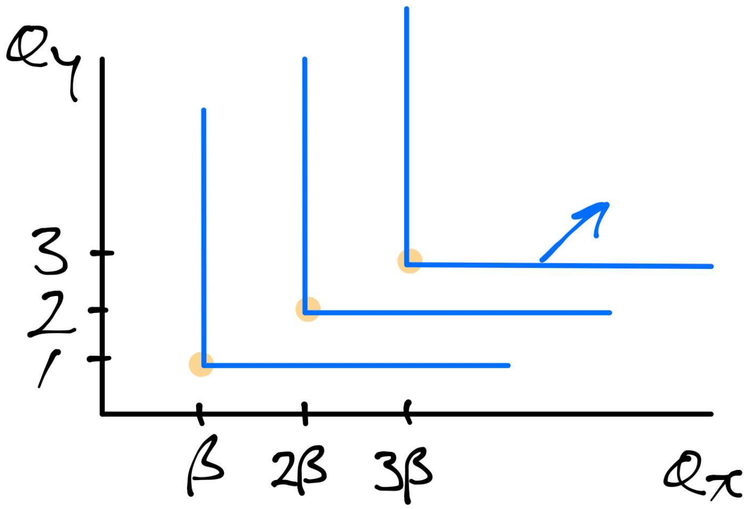
Example 1:
2 popcorn (Q_x) for each movie (Q_y)

$$\beta = \frac{Q_x}{Q_y} = \frac{2}{1} = 2$$

Example 2:
4 units of Y for every unit of X

$$\beta = \frac{Q_x}{Q_y} = \frac{1}{4} = 0.25$$

Graphing the general version:



$$\frac{Q_x}{Q_y} = \frac{\beta}{1}$$

$$Q_x = \beta Q_y$$

Budget constraint:

$$P_x Q_x + P_y Q_y = M$$

Applying the preference equation:

$$P_x(\beta Q_y) + P_y Q_y = M$$

$$(\beta P_x + P_y)Q_y = M$$

$$Q_y = \frac{M}{\beta P_x + P_y}$$

$$Q_x = \beta Q_y$$

$$Q_x = \frac{\beta M}{\beta P_x + P_y}$$

General PC demand equations:

$$Q_x = \frac{\beta M}{\beta P_x + P_y} \qquad Q_y = \frac{M}{\beta P_x + P_y}$$

Will be essential for determining preferences:

1. Observe M, P_x, P_y, Q_x, Q_y
2. Infer β via econometric estimation

Applying to the examples:

Example 1:
2 popcorn for each movie

X = popcorn
Y = movies
$\beta = 2$

$$Q_p = \frac{2M}{2P_p + P_m} \qquad Q_m = \frac{M}{2P_p + P_m}$$

Example 2: daily exercise
4 units of Y for every unit of X

$\beta = 0.25$

$$Q_x = \frac{0.25M}{0.25P_x + P_y} \qquad Q_y = \frac{M}{0.25P_x + P_y}$$

Alternately, multiply each by 4/4:

$$Q_x = \frac{0.25M}{0.25P_x + P_y} * \left(\frac{4}{4}\right) = \frac{M}{P_x + 4P_y}$$

$$Q_y = \frac{M}{0.25P_x + P_y} * \left(\frac{4}{4}\right) = \frac{4M}{P_x + 4P_y}$$

$$Q_x = \frac{M}{P_x + 4P_y} \qquad Q_y = \frac{4M}{P_x + 4P_y}$$

Nice interpretation:

Denominator is the cost of a bundle with 1 X and 4 Y