World Food Economy Economics Review

April 21, 2020

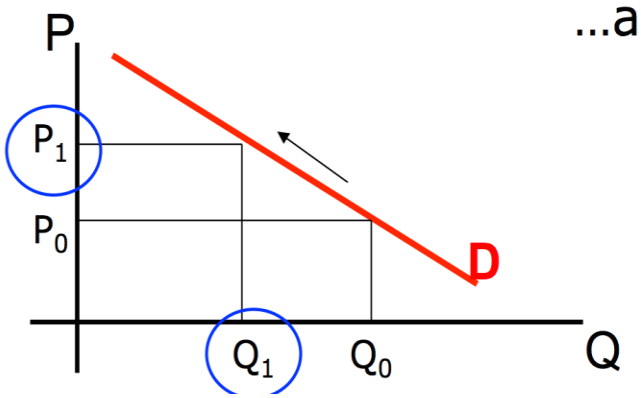
Beatriz Pousada

Based on the WFE – Econ Review created by Odyssia Ng in 2019.

1. Demand and Supply

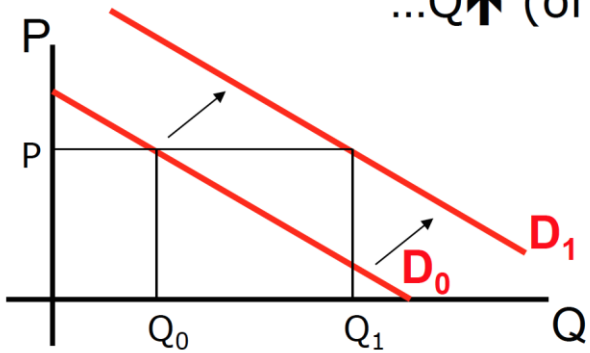
1.1 Demand

- Movement along the demand curve…



Know the difference!

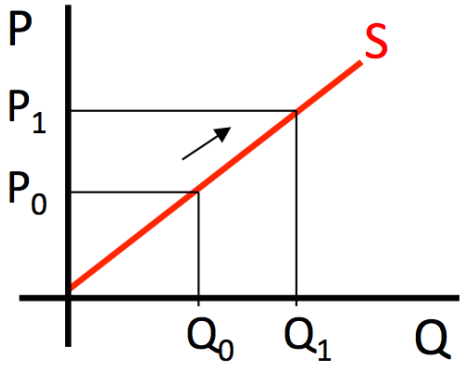
- Shift in the demand curve…



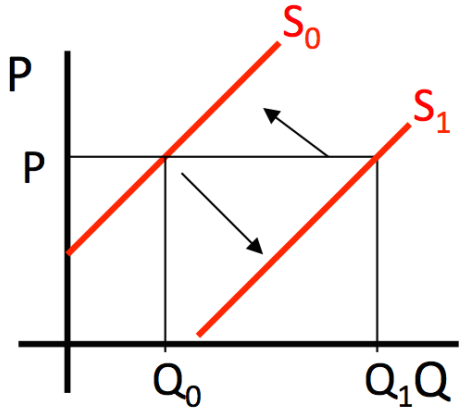
Examples?

1. Demand and Supply (ct'd)

- **1.2 Supply**



Movement along the supply curve…



…versus a shift in supply

Know the difference!

Examples?

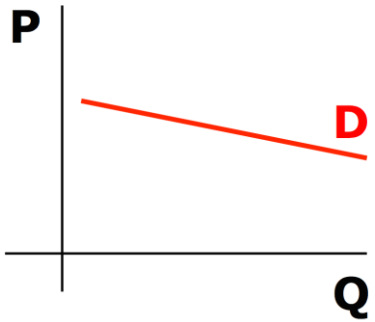
2. Elasticities

The elasticity of Y with respect to X is the percentage change in Y associated with a 1% increase in X:

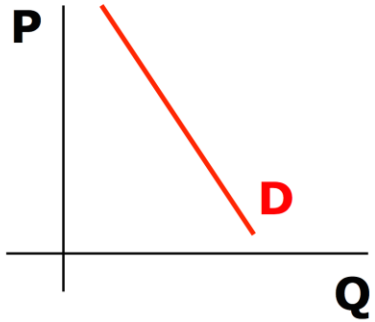
$$\eta = \frac{\%\Delta Y}{\%\Delta X} = \frac{\frac{\Delta Y}{Y}}{\frac{\Delta X}{X}} = \frac{X}{Y}\frac{\Delta Y}{\Delta X}$$

2.1 Elasticities of Demand

- The **aggregate income elasticity of demand** is $\eta = \frac{\%\Delta E_{FOOD}}{\%\Delta TE} = \frac{TE}{E_{FOOD}} \frac{\Delta E_{FOOD}}{\Delta TE}$
- The **income elasticity of demand for good** i is $\eta_i = \frac{\%\Delta E_i}{\%\Delta TE} = \frac{TE}{E_i} \frac{\Delta E_i}{\Delta TE}$
  - $\eta_i \leq 0$: inferior good
  - $0 \leq \eta_i \leq 1$: normal good
  - $\eta_i > 1$: luxury good
- **Own-price elasticity of demand for good** i : $\epsilon_{ii} = \frac{\%\Delta Q_i^d}{\%\Delta P_i}$
  - Always negative
  - More vs less elastic:



(A)



(B)

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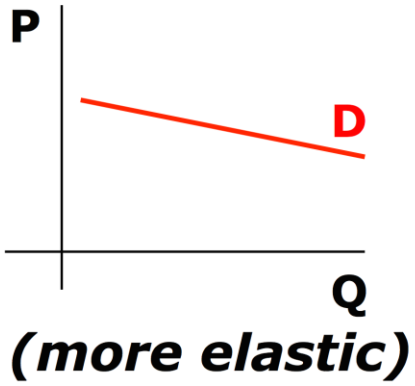
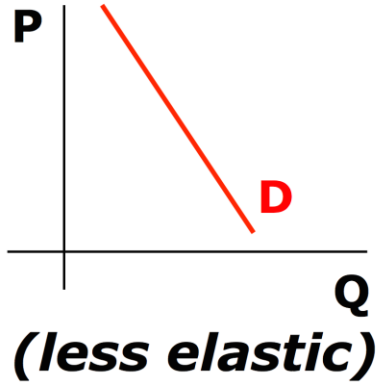


(more elastic)



(less elastic)

2.1 Elasticities of Demand (ct'd)

- **Cross-price elasticity of demand for good** i : $\epsilon_{ij} = \frac{\%\Delta Q_i^d}{\%\Delta P_j}$
  - $\epsilon_{ij} > 0$: goods i and j are substitutes
  - $\epsilon_{ij} < 0$: goods i and j are complements

Examples?

2.2 Elasticities of Supply

- **Own-price elasticity of supply for good** i : $\epsilon_{ii} = \frac{\%\Delta Q_i^s}{\%\Delta P_i}$
  - Always positive
- **Cross-price elasticity of supply for good** i : $\epsilon_{ij} = \frac{\%\Delta Q_i^s}{\%\Delta P_j}$
  - $\epsilon_{ij} > 0$: crops i and j are complements in production
  - $\epsilon_{ij} < 0$: crops i and j are substitutes

Examples?

2.3 Elasticity Examples

Example 1:

Suppose the own-price elasticity for rice is -0.9, and a household buys 4lbs ofrice when the price is $0.5 per lb. How much rice does the household buy when the price ofrice is $0.75 per lb?

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- Own price elasticity for rice: $\eta_{ii} = \frac{P_i}{Q_i}\frac{\Delta Q_i}{\Delta P_i} = -0.9$

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- Own price elasticity for rice: $\eta_{ii} = \frac{0.5}{4}\frac{\Delta Q_i}{\Delta P_i} = -0.9$

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- $\Delta Q_i = Q_i^{new} - 4 = -1.8 \implies Q_i^{new} = 2.2$

2.3 Elasticity Examples

Example 2:

Given:

- Own-price elasticity of corn = -0.1
- Cross-price elasticity of rice to corn = 0.05
- Own-price elasticity of rice = -0.2

What will be the percent change in quantity demanded of corn if the price of rice increases by 20%?

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$$\eta_{corn,corn} = -0.1 = \frac{\%\Delta Q_{corn}}{\%\Delta P_{corn}}$$

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2.3 Elasticity Examples

Example 3:

- Own-price elasticity of corn: $\eta_{C,C} = -0.4$
- Cross-price elasticity of corn to wheat: $\eta_{C,W} = 0.1$

Suppose initial quantity demanded of corn is $Q_0 = 100$ (million metric tons). The next period, the price of corn increases by 20% and the price of wheat increases by 30%. Given these two changes, what is the quantity demanded of corn in period 1?

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$$Q_C^{new} = 100(1 - 0.08)(1 + 0.03) = 94.76$$

3. Consumer Choice

Budget Constraint

Given two goods Food (F) and Non-Food (NF) with prices P_F and P_{NF}, the consumer's budget constraint is

$$P_F Q_F + P_{NF} Q_{NF} = \text{Total Expenditures}$$

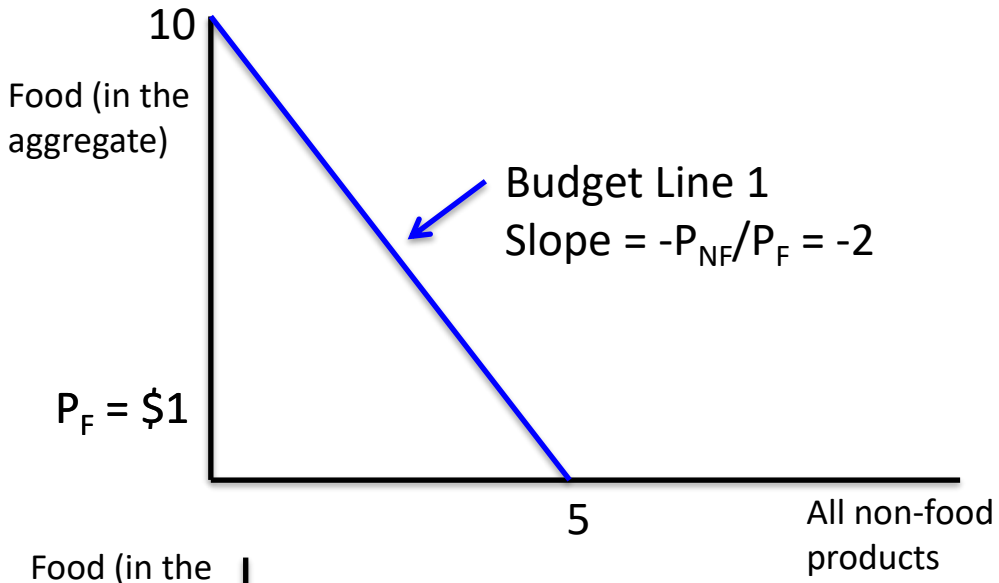
Draw the budget line and budget set for Total Expenditures = \$10, P_F = \$1, P_{NF}=\$2.

What happens when the price of food increases to P_F = \$2?

What happens when the price of food increases?

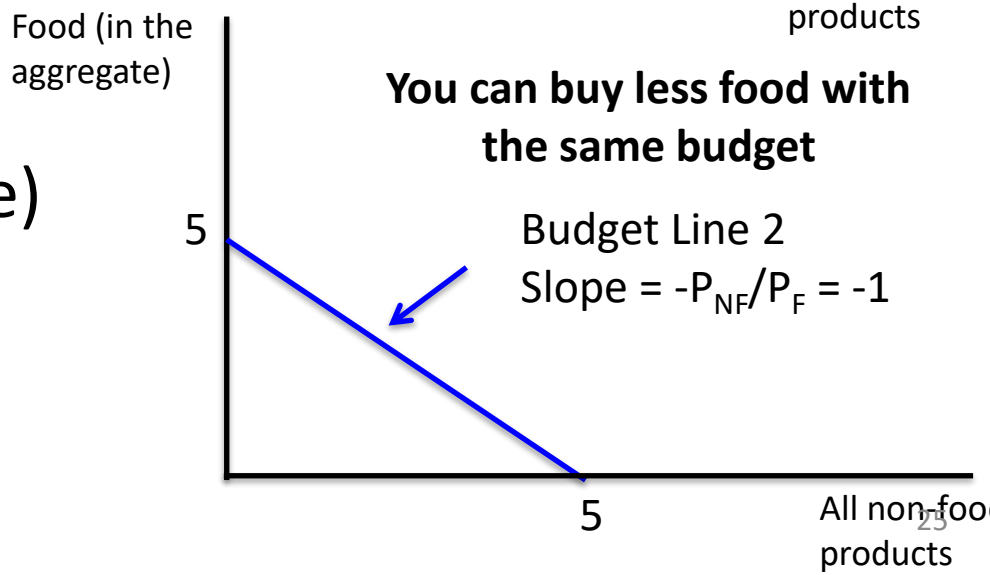
In state 1, assume:

- Income = $10
- P_F = $1
- P_{NF} = $2

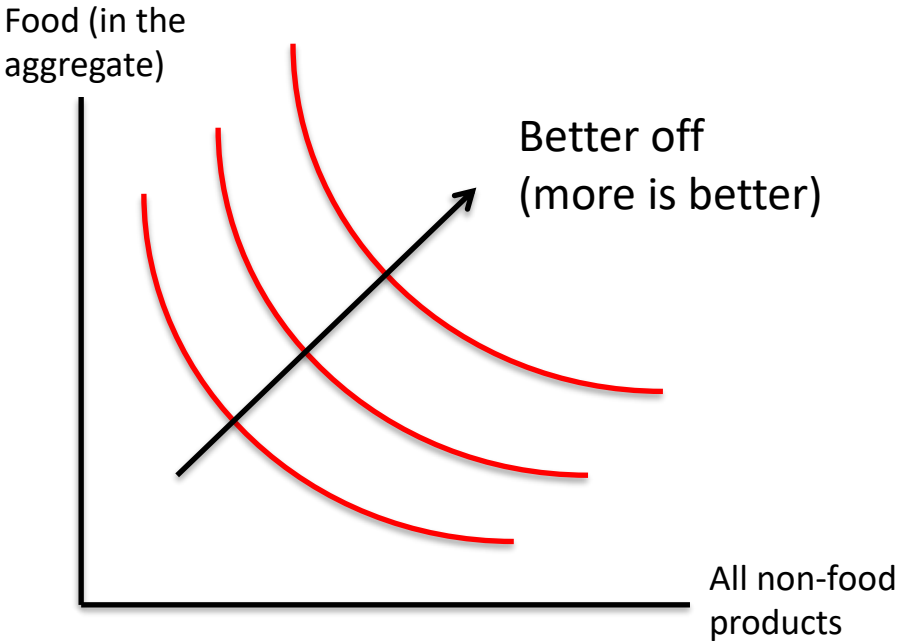


In state 2, assume:

- Income = $10 (same)
- P_F = $2 (increased)
- P_N = $2 (same)



Where on the budget line do consumers choose to operate?



Indifference Curves: equally satisfied along all points on the curve

- Indicate trade-offs, substitution
- Slope at given point = ΔF/ΔNF

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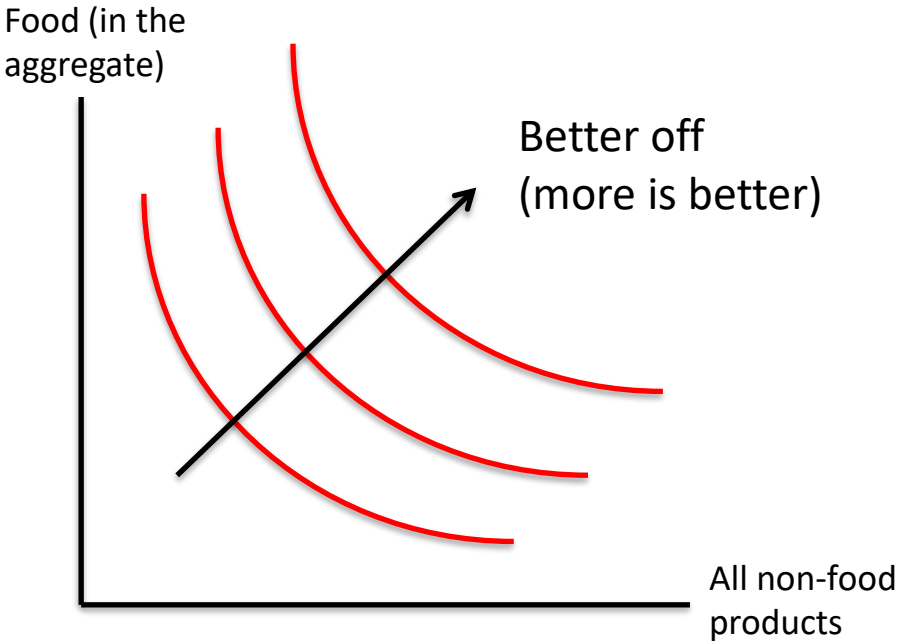

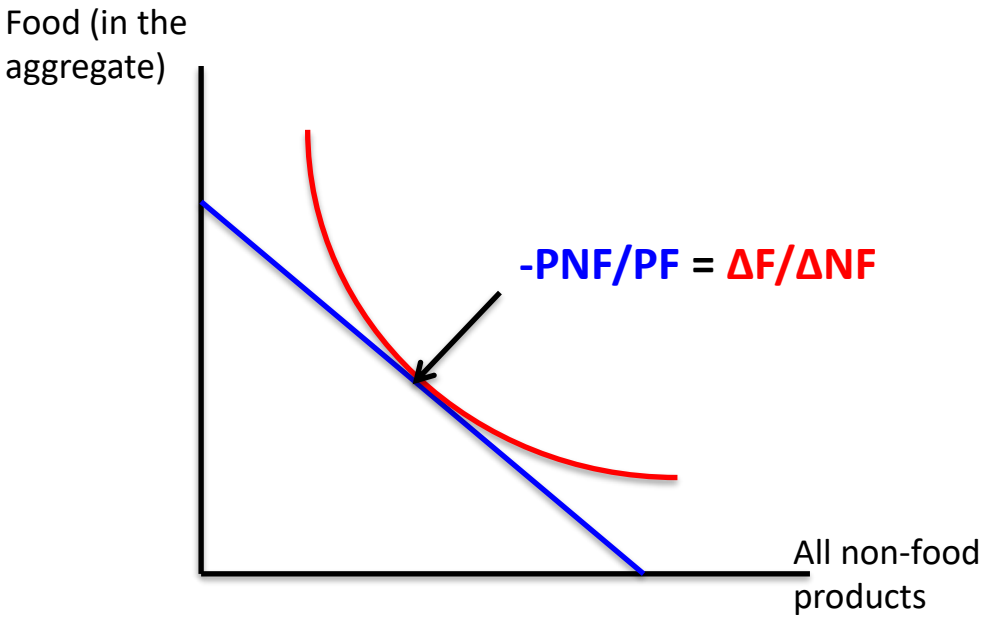

Indifference Curves: equally satisfied along all points on the curve

- Indicate trade-offs, substitution
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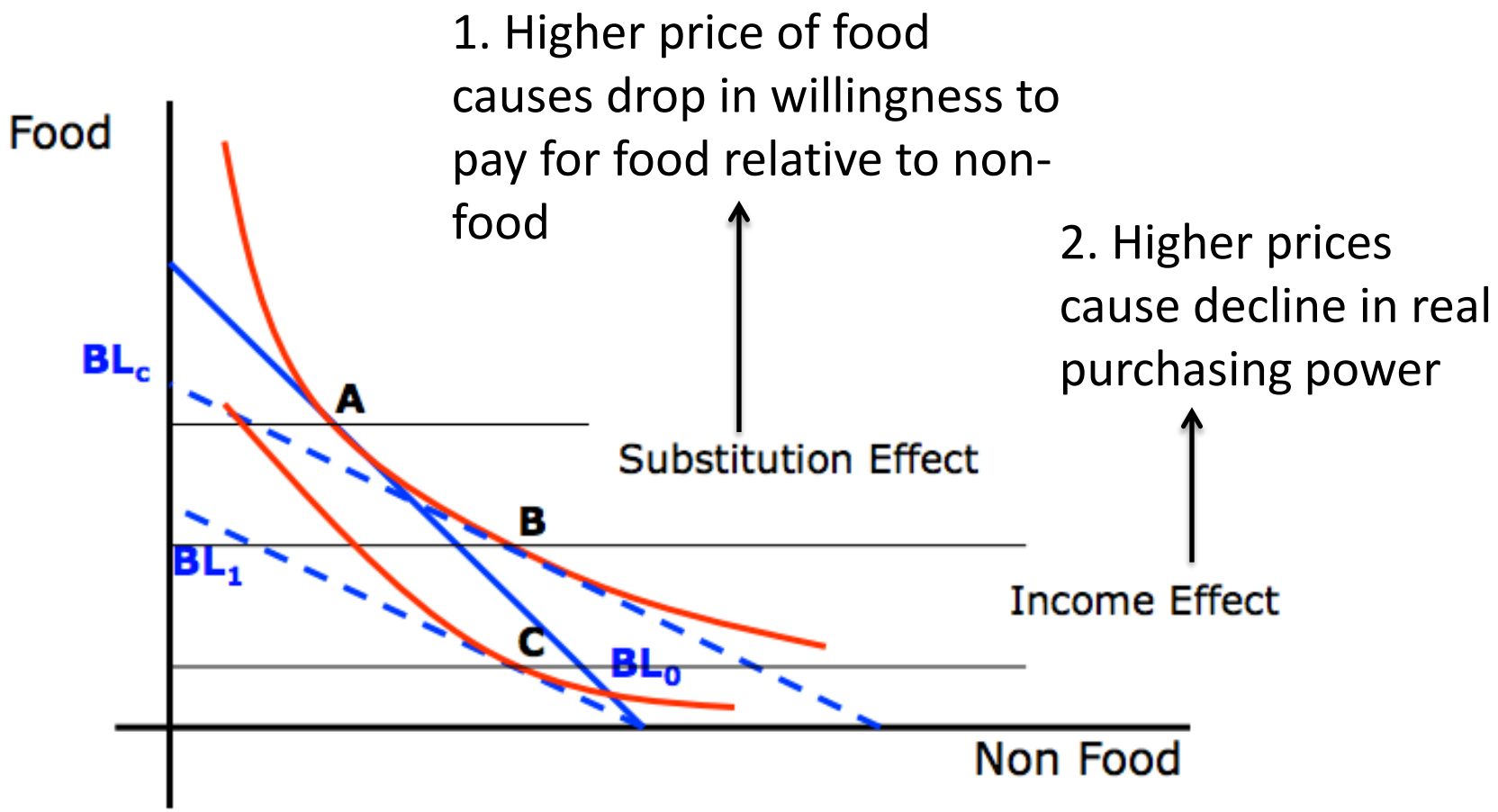
Operate where the indifference curve is tangent to the BL

- Highest (best) possible indifference curve

Substitution and Income Effects

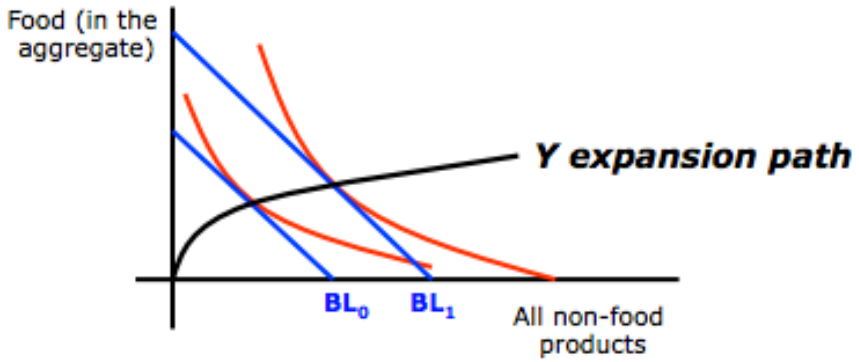


Income

Engel's Law

The proportion of household income spent on food in the aggregate declines *as* income rises

n = income elasticity of demand for food in the aggregate: $n = (\%\Delta E_{FOOD}) / (\%\Delta TE)$

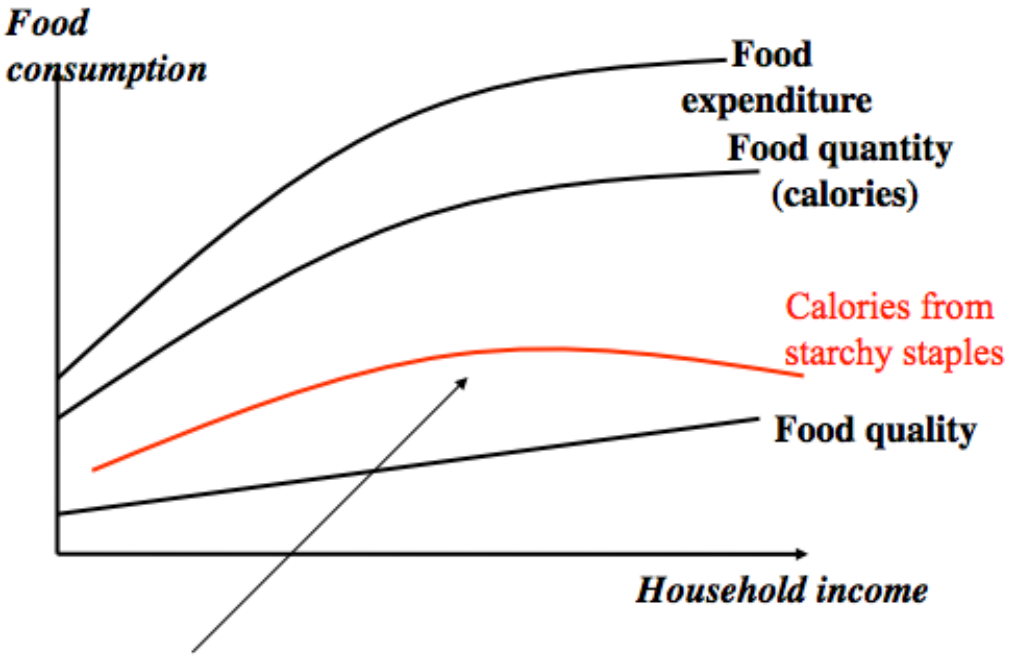


$n < 1$ and $n \Longrightarrow 0$ as Y increases

Income

Bennett's Law

The proportion of calories derived from starchy staples declines as income increases



*Income spent on starchy staples first rises, then falls

Relative Prices

Timmer's Law: Poor households are more sensitive to price changes than rich households (and often have fewer substitution options other than eating less)

What does this imply for demand price elasticities?

Consider the demand for corn, and let the own-price demand elasticity be η_R for rich households and η_P for poor households. How does η_R compare to η_P?

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Answer: $|\eta_R| < |\eta_P|$

4. Producer Theory

Producers operate at the margin (where MRTS = Price Ratio)

- Product-Product: what crops maximize revenue?

$$\mathbf{(\Delta corn)/(\Delta soy) = -(P_S/P_C)}$$

- Factor-Factor: what inputs minimize costs?

$$\mathbf{(\Delta labor)/(\Delta capital) = -(P_C/P_L)}$$

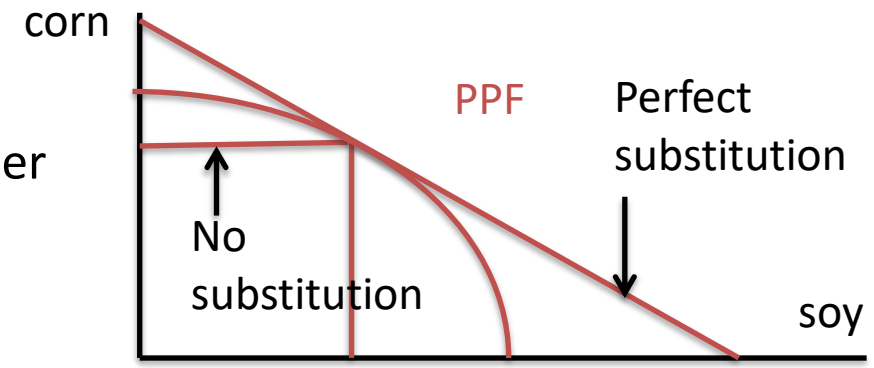
- Factor-Product: for a given crop, what inputs lead the the highest profits?

$$\mathbf{(\Delta wheat)/(\Delta fertilzer) = (P_F/P_W)}$$

4.1 Product – Product Decisions

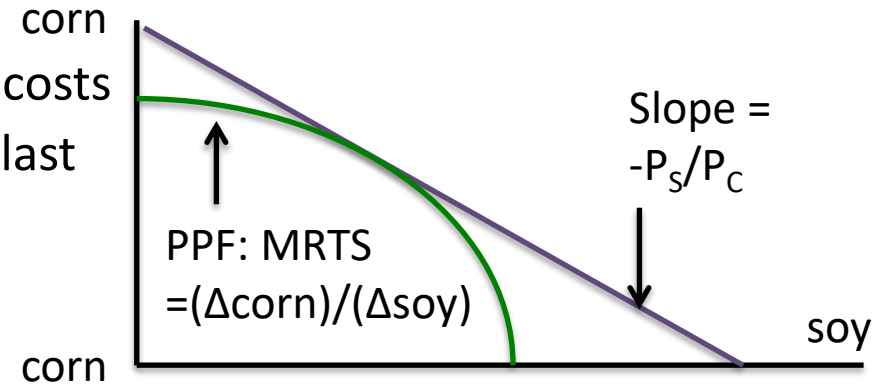
Technical feasibility

- PPF = Production Possibilities Frontier
- Curvature related to degree of substitutability



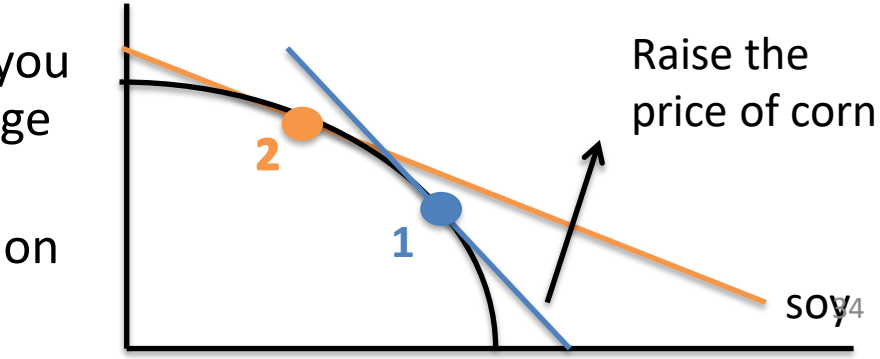
Economic profitability

- Depends on prices and opportunity costs
- Produce where profit from growing last unit of corn = revenue lost from not growing soy

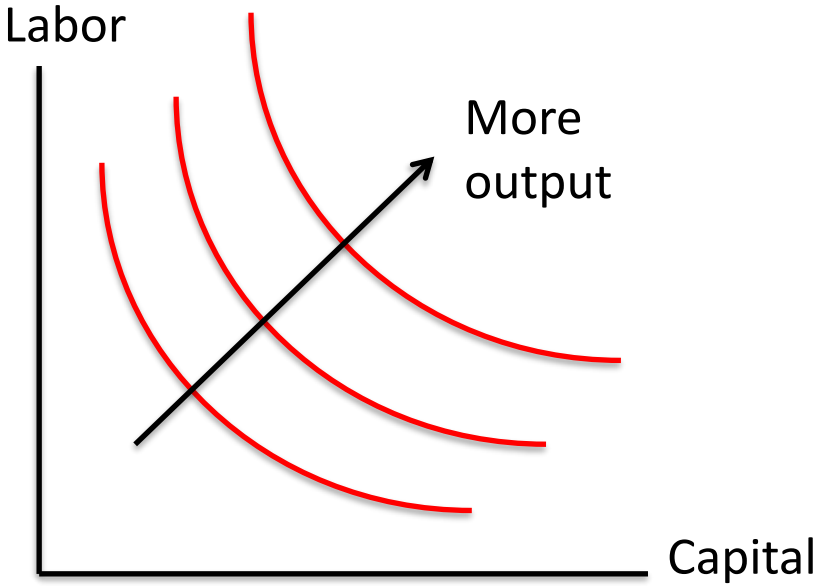


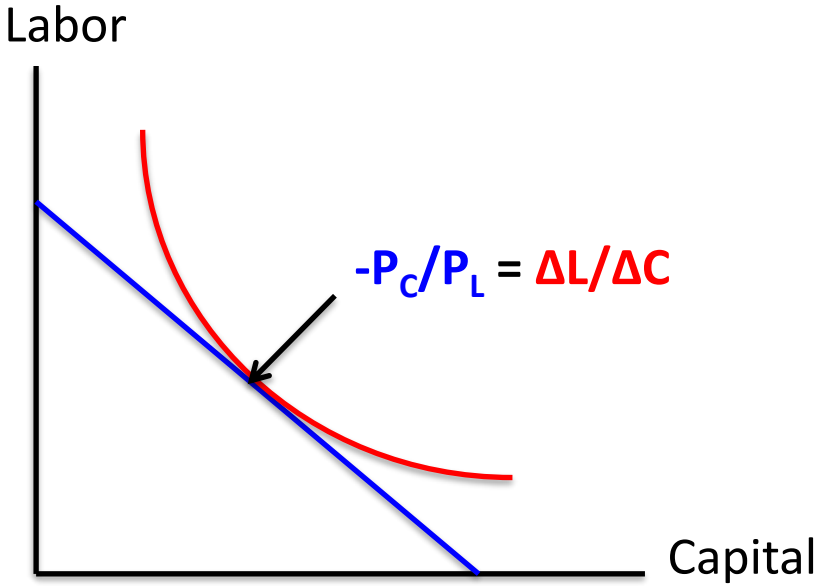
Social desirability

- If tangency is not socially desirable, you can raise the price of a good to change the outcome
- How much to change price depends on elasticities of supply



4.2 Factor – Factor Decisions





Isoquant: each point of curve represents a different combination of inputs that can produce a fixed level of output (Qs) with given technology

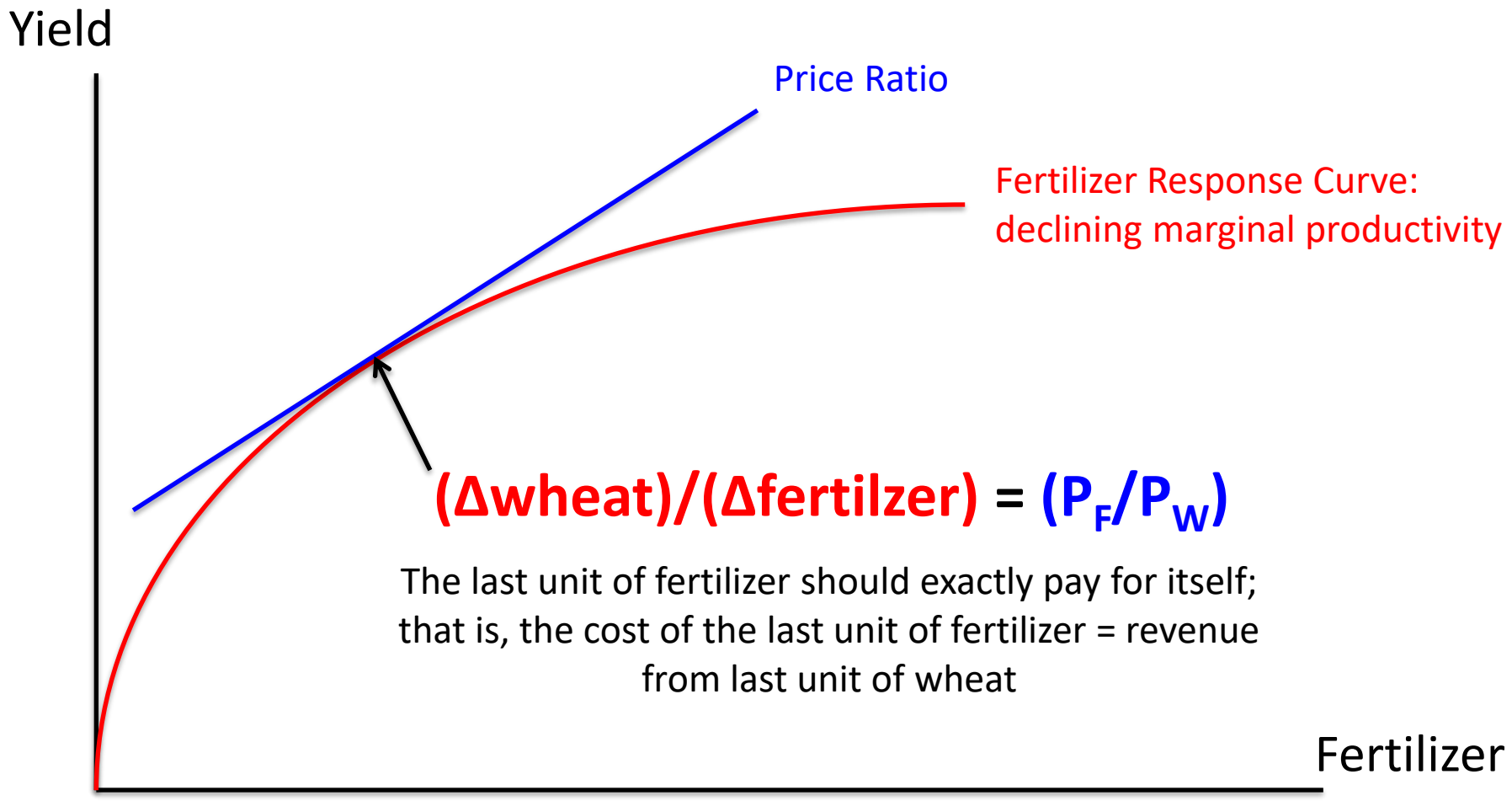
- Indicate trade-offs, substitution
- Slope at given point = $\Delta L/\Delta C$

Operate where the isoquant is tangent to the Budget Line

- Highest possible level of output subject to the budget constraint

Look familiar???

4.3 Factor – Product Decisions



Questions?