3 Consumer Choice - Part 1

ECO202 Spring 2019

February 28, 2019

Outline

Key Idea

Most preferred, affordable bundle

Consumers allocate income to bundles of different goods to maximize their utility

Preferences: How much consumers like each good = utility of each good

Budget constraint: How much consumers can afford of each good, given spending on other goods

Combine these two parts

Understanding consumer choice

Key idea: max **U** subject to **M**

Ways to think about consumer choice:

1. Intuition: how you buy things
2. With pictures
3. With equations

Consumer Preferences

Which bundles do you prefer?

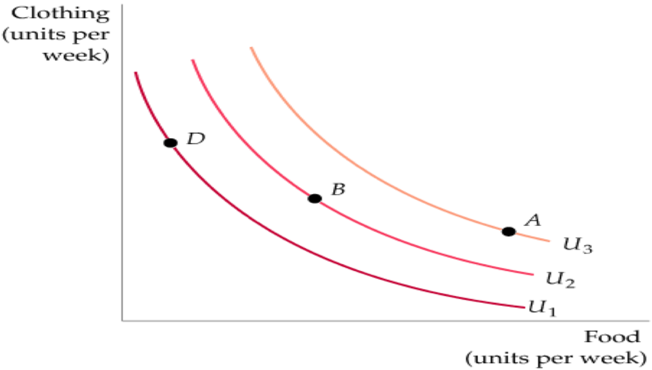
Imagine a bundle of food and clothing (F,C)

What does a preferred bundle look like?

1. Similar amounts of F and C
2. Lots of F, not much C
3. Lots of C, not much F

Draw bundles in (F,C) space

Equally preferred bundles



Indifference curve:

Locus of bundles that are equally preferred

Further out indifference curves show more preferred

Preferences are not random

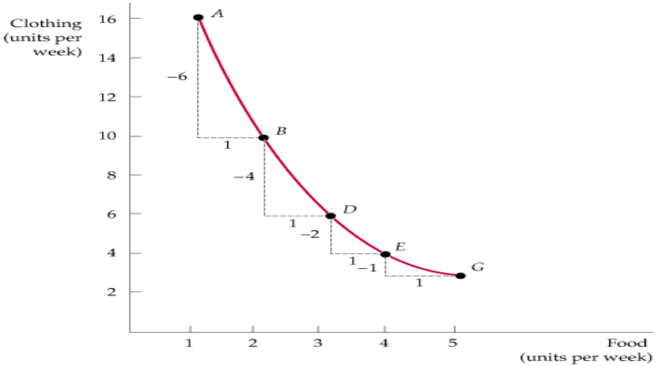
Preferences should be well-behaved:

- *Complete:* Consumers must be able to compare and rank all bundles
- *Transitive:* If bundle X is preferred to bundle Y, which in turn is preferred to bundle Z; then bundle X must be preferred to bundle Z
- *Non-satiated:* Bundles with more of both F and C must be preferred

Substitutions within a bundle

- **Marginal Rate of Substitution MRS**: Maximum amount of a good that a consumer is willing to give up in order to obtain one additional unit of another good
- Exchange F for C, keeping utility constant
- MRS diminishes as we move down an indifference curve (convexity)

Seeing MRS



If you have a lot of F, then you will give a lot of it for some more C

Utility: A way of describing preferences

- Utility is satisfaction, happiness, or well-being
- Numerical U(10)$>$U(5) or ordinal U(A)$>$U(D)
- U function is an equation linking items in a bundle to utility; general form is U$=$f(F,C)
- Each U function describes specific preferences

$$U = \alpha FC$$
$$U = \beta F^2 C^3$$
$$U = \gamma F^\alpha C^\beta$$

Marginal utility

Marginal utility is the change in utility from extra amounts of one good (holding the other good constant)

$$U = \gamma F^{\alpha} C^{\beta}$$
$$MU_F = \gamma \alpha F^{(\alpha-1)} C^{\beta}$$
$$MU_C = \gamma \beta F^{\alpha} C^{\beta-1}$$

MRS and marginal utility

The total change in utility equals the marginal utility of each good times the extra amount of each good

$$\Delta U = MU_F F + MU_C C$$

On an indifference curve, utility is constant $\Delta U = 0$

$$\begin{aligned} 0 &= MU_F \Delta F + MU_C \Delta C \\ -MU_C \Delta C &= MU_F \Delta F \\ -\Delta C / \Delta F &= -MU_F / MU_C \end{aligned}$$

Budget Constraint

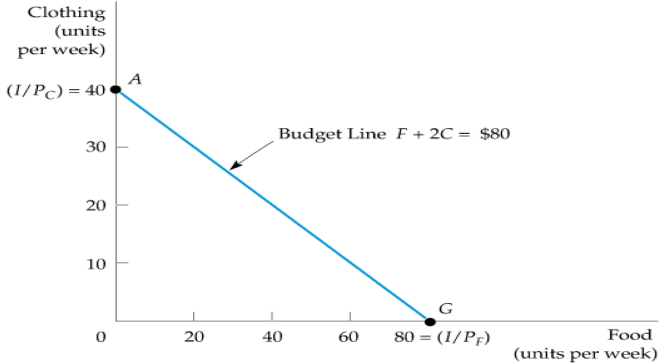
Cannot afford infinity bundle

Budget is constrained by income M and by prices of each good P_F and P_C

$$\text{Budget line: M} = P_F\text{F} + P_C\text{C}$$

Assume M=\$80, P_F=2, P_C=1, what can the consumer buy?

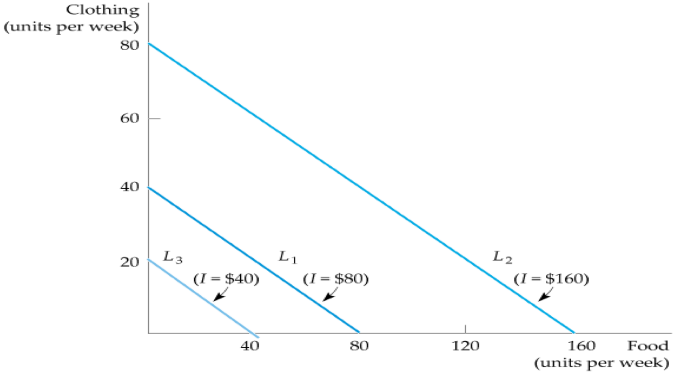
Equally affordable bundles



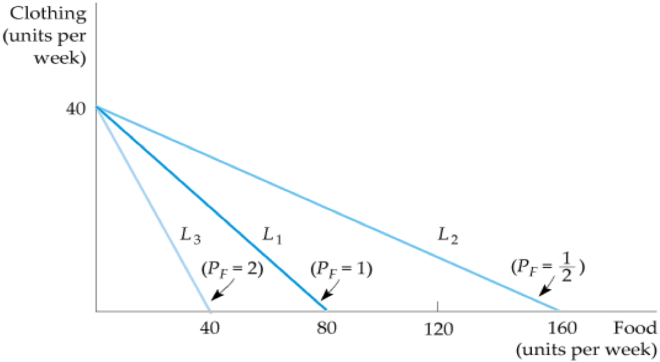
$$C = (M/P_C) - (P_F/P_C)F$$

$$C = \alpha - \beta F$$

Higher incomes shift out budget line



Changes in prices pivot budget line



Optimal Consumer Choice

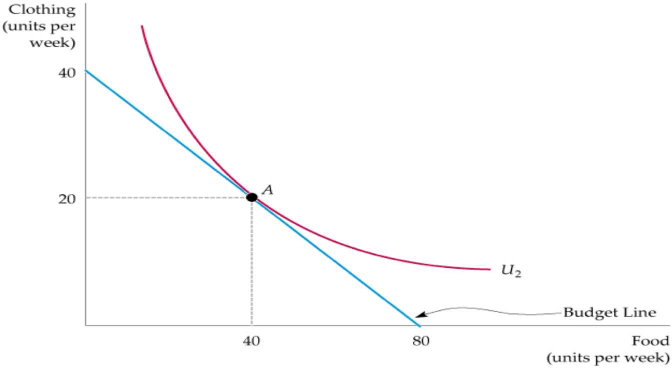
Most preferred, affordable bundle

The utility-maximizing bundle must satisfy two conditions:

1. on the budget line
2. on the furthest out indifference curve

This is the **optimality condition**

Optimal consumption bundle



Optimality is equal slopes

Slope of budget line: $-P_F/P_C$

Slope of indifference curve: MRS $= -MU_F/MU_C$

Optimality: $$\frac{MU_F}{MU_C} = \frac{P_F}{P_C}$$

When this equation holds, the consumer has chosen their most preferred, affordable bundle

Two equations, two unknowns

$$10 = y + 2x$$
$$1 = y - x$$

Solve for x, y

Simple Example 1/3

$$U = \gamma F^{\alpha} C^{\beta}$$

$$\frac{MU_F}{MU_C} = \frac{\gamma \alpha F^{(\alpha-1)} C^{\beta}}{\gamma \beta F^{\alpha} C^{\beta-1}} = \frac{\alpha C}{\beta F}$$

Setting MRS equal to price ratio:

$$\frac{\alpha C}{\beta F} = \frac{P_F}{P_C}$$

$$C = (F\beta/\alpha)(P_F/P_C)$$

Simple Example 2/3

$$C = (F\beta/\alpha)(P_F/P_C)$$

Put in budget line:

$$M = P_F F + P_C C$$
$$M = P_F F + P_C(F\beta/\alpha)(P_F/P_C)$$

Solve for F:

$$M = P_F F[1 + \beta/\alpha] = P_F F[(\alpha + \beta)/\alpha]$$
$$F^* = (M/P_F)(\alpha/(\alpha + \beta))$$

Simple Example 3/3

$$F^* = (M/P_F)(\alpha/(\alpha + \beta))$$
$$C^* = (M/P_C)(\beta/(\alpha + \beta))$$

Choice per good depends on income (positively) and price of that good (negatively), weighted by α, β

These equations are **demand functions**

Two equations, two unknowns

- Get ratio of marginal utilities from utility function
- Equate **ratio of MUs to ratio of prices**
- Substitute into the **budget constraint**
- Solve for each good as a function of income and prices

What is the INTUITION?

Another Example 1/2

$$U = (X, Y)$$
$$U = (X + 2)(Y + 10)$$

Derive the demand functions for X and Y in terms of the price of X (P_X), price of Y (P_Y), and income (M)

Another Example 2/2

$$X^* = \frac{M - 2P_X + 10P_Y}{2P_X}$$
$$Y^* = \frac{M + 2P_X - 10P_Y}{2P_Y}$$

Changes in Income

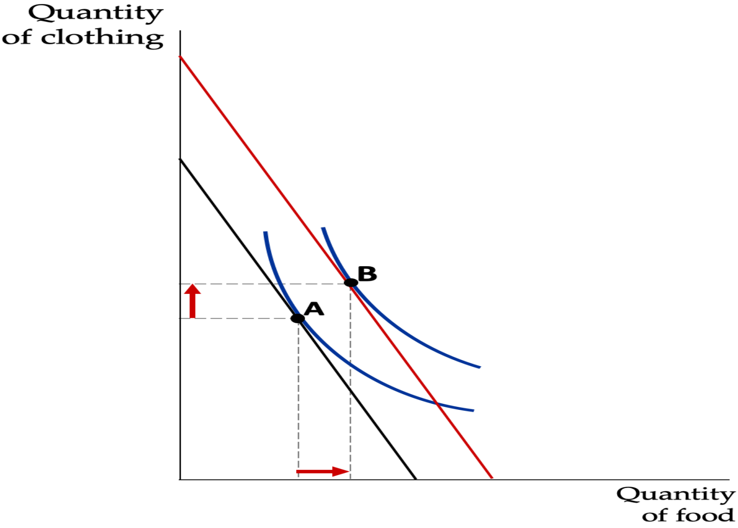
Changes in income affect demand

If income goes up, budget constraint shifts out

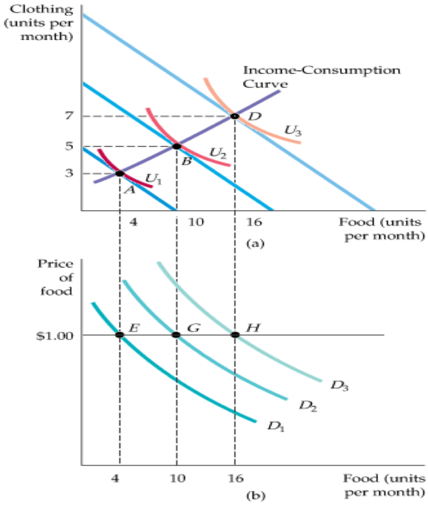
If both goods are normal: consumer buys more of both goods

If one good is inferior: consumer buys less of that good

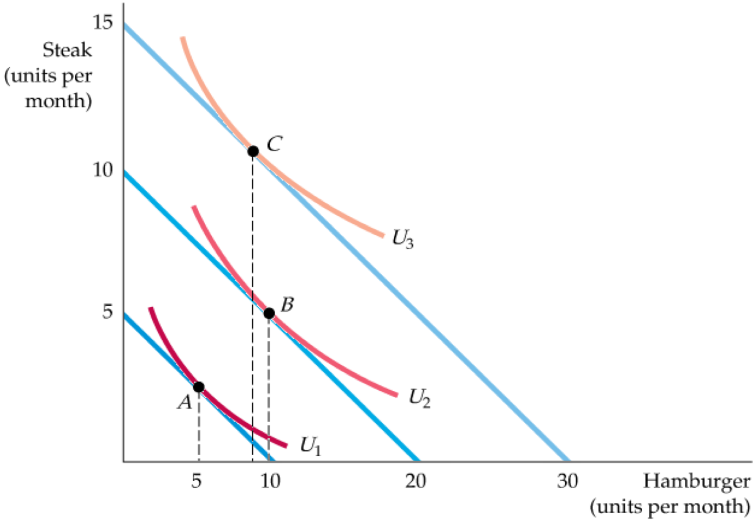
Optimal consumption if income rises



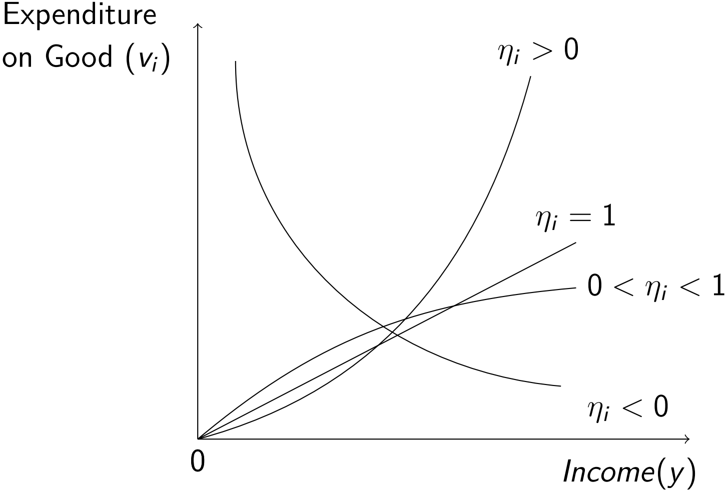
Income consumption curve: normal good



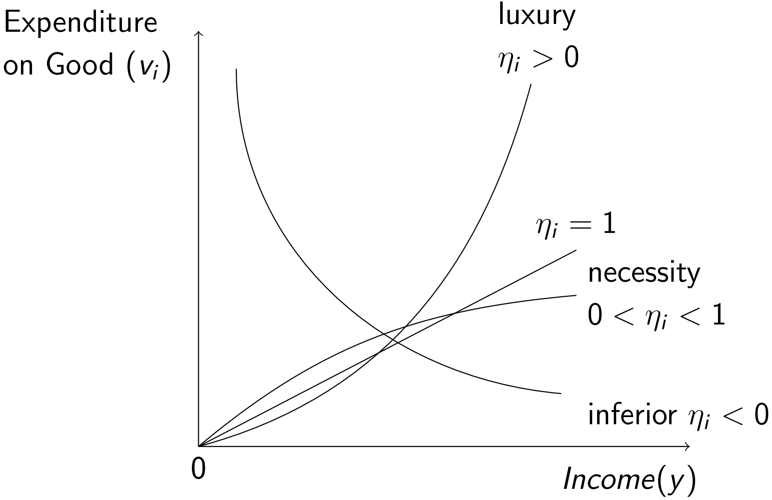
Income consumption curve: inferior good



Engel curve links income to expenditure



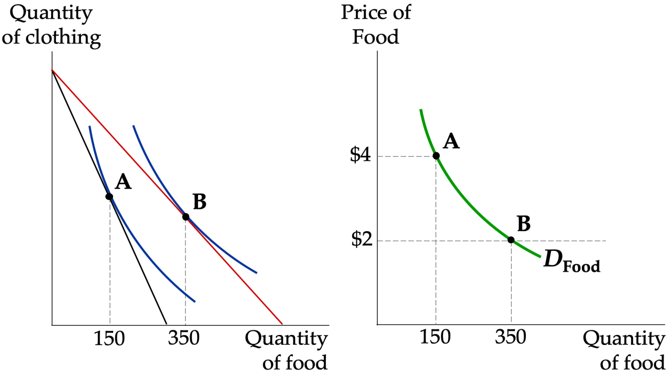
Engel curve



Expenditure on Good (v_i)
luxury
$\eta_i > 0$
$\eta_i = 1$
necessity
$0 < \eta_i < 1$
inferior $\eta_i < 0$
0
Income(y)

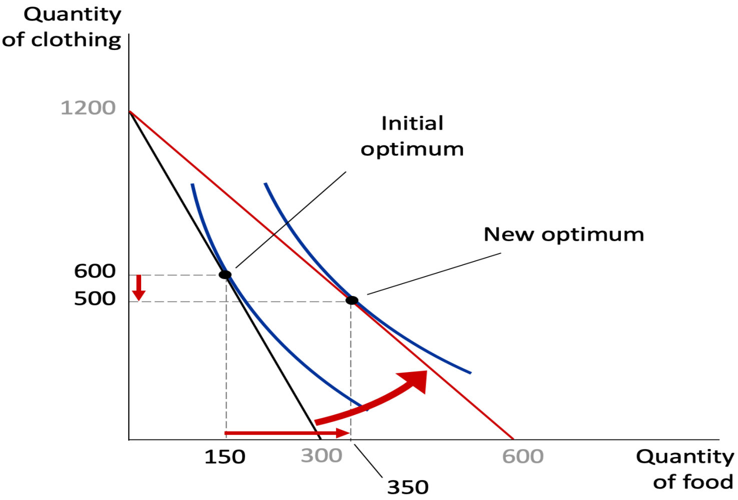
Changes in Prices of Goods

Changes in prices affect demand



Decomposing Demand Changes

Changes in prices affect demand



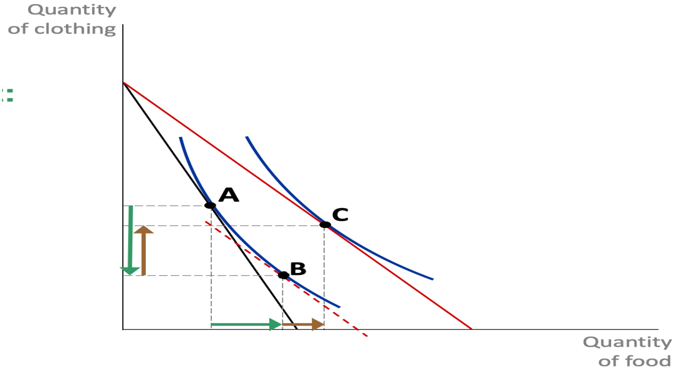
Decomposition of change

Fall in price of food has two effects on optimal consumption of both goods:

- **Substitution effect:** If $P_F \downarrow$, clothing is more expensive relative to food: buy less C, more F
- **Income effect:** If $P_F \downarrow$, then purchasing power of income $\uparrow$; buy more F and more C

Substitution effect is always easy: If $P_F \downarrow, \Delta F > 0$
Income effect is not straightforward: If $P_F \downarrow$, are F and C normal or inferior goods?

Changes in prices affect demand



Green: substitution effect

Brown: income effect

SE and IE

Substitution effect is about relative prices
Income effect is about changes in purchasing power

Both are important but typically SE is first-order, IE is second-order

Any Questions?