Lecture 3: Demand
Neoclassical Theory of Consumption

Economics II: Microeconomics

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Economics II: Microeconomics

- Consumers:
    - People.
    - Households.
    - Applications.
- Firms:
    - Internal Organisation.
    - Industrial Organisation.
- Equilibrium:
    - Holds.
    - Does not hold.

Microeconomics

- Consumers:
  - `People.` $\twoheadleftarrow$ `Now`
  - Households.
  - Applications.
- Firms:
  - Internal Organisation.
  - Industrial Organisation.
- Equilibrium:
  - Holds.
  - Does not hold.

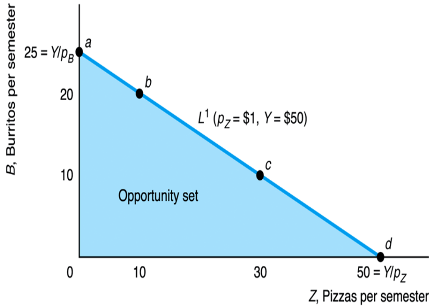
PEOPLE CHOOSE THE BEST THINGS THEY CAN AFFORD.

PEOPLE CHOOSE THE MOST PREFERRED BUNDLE THEY CAN AFFORD.

Consumers CHOOSE THE MOST PREFERRED BUNDLE *THEY CAN AFFORD*.

Definition

A consumer is an economic agent who makes a decision on consumption.



Definition

Budget constraint:

The bundles of goods that can be bought if the entire budget is spent on those goods at given prices.

Example

Budget constraint:

$$p_1 x_1 + p_2 x_2 = m$$

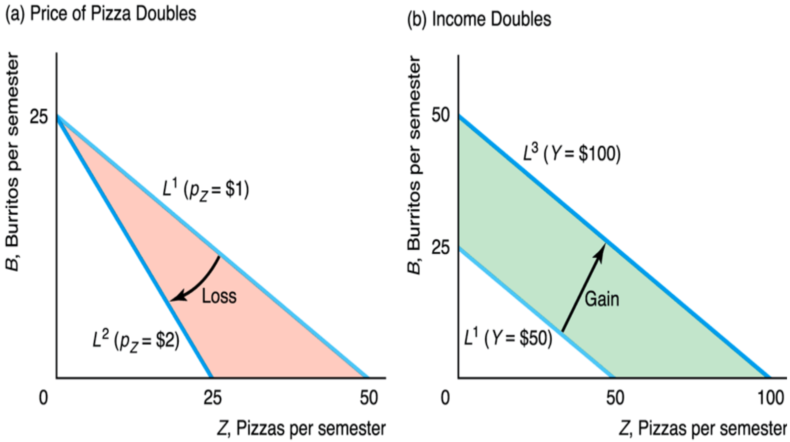
.

$$x_2 = \underbrace{\frac{m}{p_2}}_{intercept} \underbrace{- \frac{p_1}{p_2}}_{slope} \cdot x_1$$

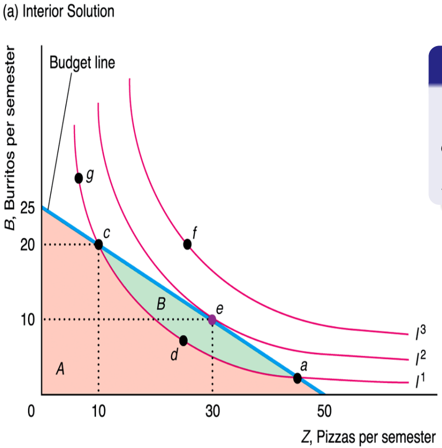
Fact

The slope of BC $= -\frac{p_z}{p_B}$.

Budget Constraint
Shifts in prices and income

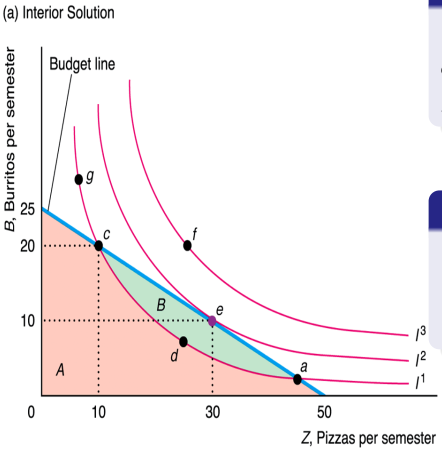


CONSUMERS *CHOOSE* THE MOST PREFERRED BUNDLE FROM THEIR BUDGET SET.



Fact

Consumers' choice is a combo of their preferences and budget.



Fact

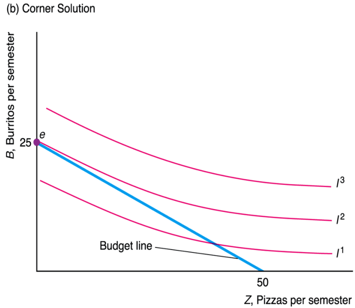
Consumers' choice is a combo of their preferences and budget.

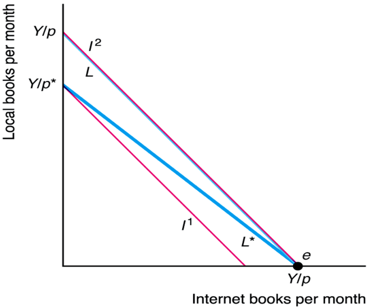
Lemma

Consumer chooses the bundle where the indifference curve is tangent to the budget line.

Neoclassical theory of consumption

Consumer's choice





Problem

$$\max_{x_1, x_2} U(x_1, x_2),$$

$$s.t. \qquad p_1 x_1 + p_2 x_2 = m$$

Problem (Lagrange function)

$$\max_{x_1, x_2, \lambda} \mathcal{L} = U(x_1, x_2) + \lambda (m - p_1 x_1 - p_2 x_2)$$

Problem

$$\max_{x_1, x_2, \lambda} \mathcal{L} = U(x_1, x_2) + \lambda(m - p_1 x_1 - p_2 x_2)$$

Solution

First order conditions:

$$\frac{\partial \mathcal{L}}{\partial x_1} = 0 : \frac{\partial U(x_1, x_2)}{\partial x_1} - \lambda p_1 = 0 \tag{1}$$

$$\frac{\partial \mathcal{L}}{\partial x_2} = 0 : \frac{\partial U(x_1, x_2)}{\partial x_2} - \lambda p_2 = 0 \tag{2}$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 0 : m - p_1 x_1 - p_2 x_2 = 0 \tag{3}$$

Neoclassical theory of consumption

Consumer optimisation problem (Cont'd)

Problem

Solution

From (1) and (2):

$$\left[\frac{MU_{x_1}}{MU_{x_2}} =\right] \frac{\frac{\partial U(x_1,x_2)}{\partial x_1}}{\frac{\partial U(x_1,x_2)}{\partial x_2}} = \frac{p_1}{p_2} \tag{4}$$

Equations (3) and (4) give the solution: $x_1^* (p_1, p_2, m)$ *and* $x_2^* (p_1, p_2, m)$

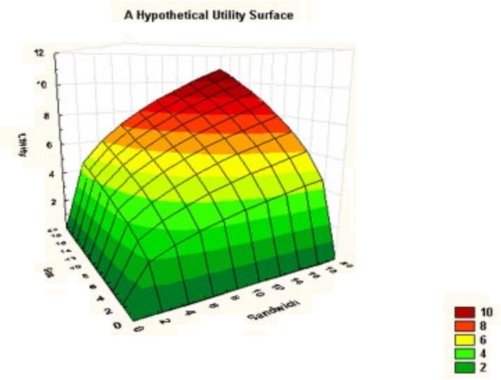
Definition

The pair (x_1^*, x_2^*) is the optimal choice of the consumer.

Definition

Demand function: $x = x(p_1, p_2, m)$

Utility function and indifference curves



The indifference curve is the utility function on a fixed level.

Consumer Optimisation Problem

Full derivative of the utility function $U(x_1, x_2)$:

$$dU = \frac{\partial U}{\partial x_1} \cdot dx_1 + \frac{\partial U}{\partial x_2} \cdot dx_2 \quad (5)$$

Fact

The indifference curve is the utility function on a fixed level.

So (5) can be rewritten as:

$$\frac{\frac{\partial U(x_1, x_2)}{\partial x_1}}{\frac{\partial U(x_1, x_2)}{\partial x_2}} = -\frac{dx_2}{dx_1} \quad (6)$$

Corollary

From (4) and (6) we have:

$$MRS = \frac{p_1}{p_2} \quad (7)$$

Fact

The internal rate of change is equal to the external rate of change.

Consumer Optimisation Problem

Necessary condition

$$
\begin{aligned}
MRS &= \frac{p_1}{p_2} \\
\textit{internal RCh} &= \textit{external RCh} \\
\textit{slope IC} &= \textit{slope BC}
\end{aligned}
$$

benefit of consuming x_1 as *opposed* to x_2 = *opportunity* cost of x_1 in *terms* of x_2

Next lecture

Further studies in Neoclassical Theory!

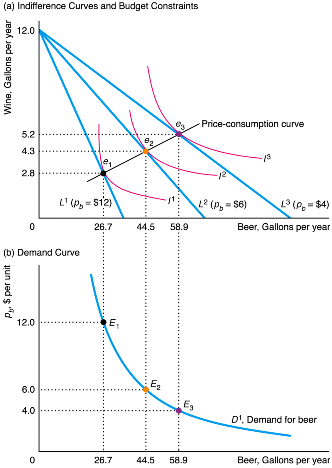
Thank you!

Definition

Demand:
The quantity demanded at each possible price.

- Demand function:

$$x_1 = x_1\left(p_1, \bar{p}_2, \bar{m}\right)$$



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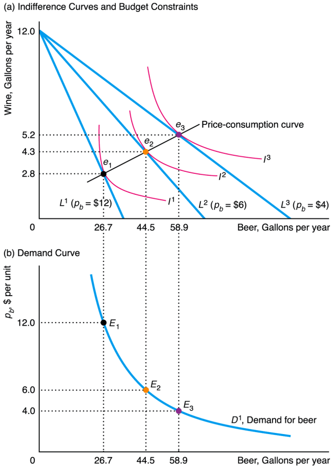
- Comparative statics



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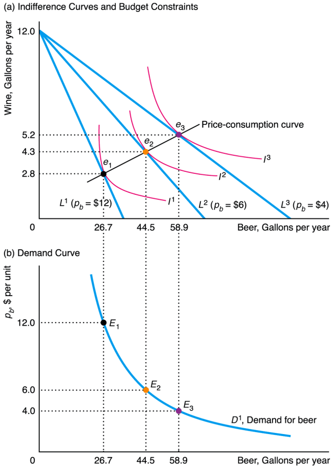
- Comparative statics
  - Shifts in m.



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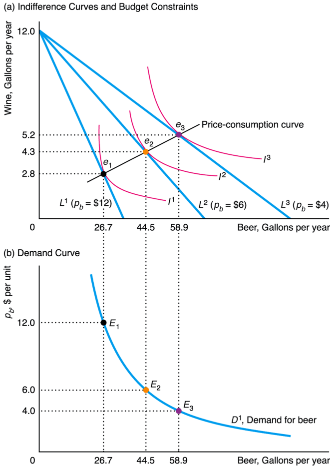

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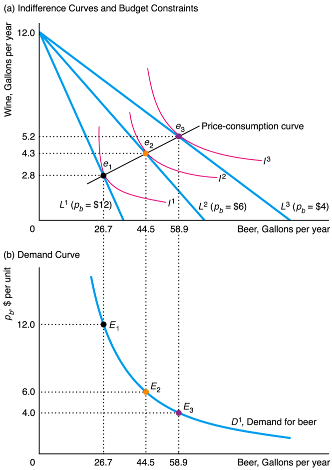
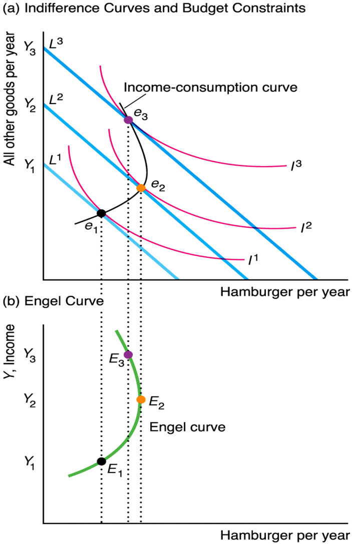


Income expansion path and Engel curve

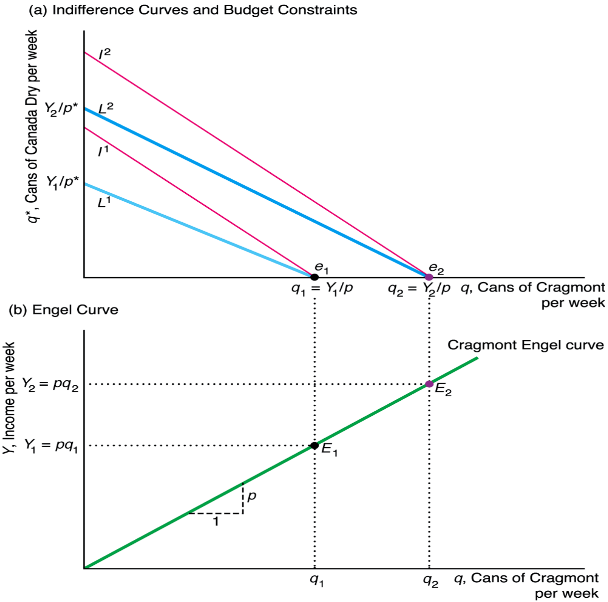
- Income expansion path
  - Bundles demanded at different income levels
  - Income-consumption curve
  - income offer curve
- Engel curve

$$x_1 = x_1\left(\bar{p}_1, \bar{p}_2, m\right)$$

  - Demand as a function of income only!
- Q: Shape of IEP and EC



Engel curve for perfect substitute



Income elasticity & Engel curve

Definition

The income elasticity of demand (or income elasticity) is the precentage change in the quantity demanded in response to a given percentage change in income.

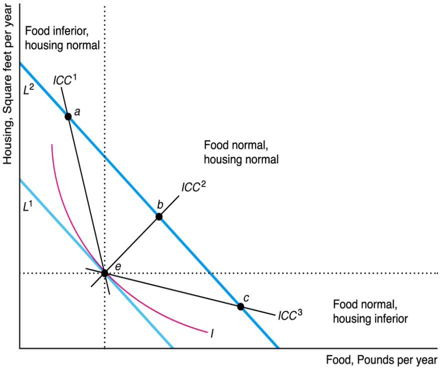
$$\begin{aligned} \varepsilon_M &= \frac{\%\Delta x_1}{\%\Delta m} \\ &= \frac{\frac{\Delta x_1}{x_1}}{\frac{\Delta m}{m}} = \frac{\frac{x_1' - x_1}{x_1}}{\frac{m' - m}{m}} \\ &= \frac{\partial x_1}{\partial m} \cdot \frac{m}{x_1} \end{aligned}$$

- Note:

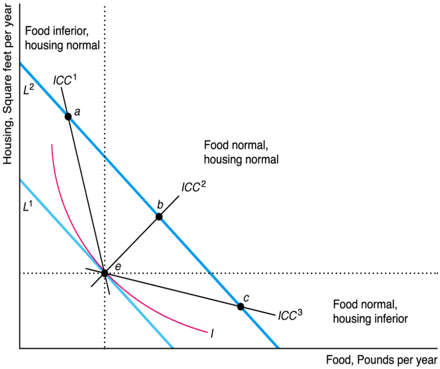
$$\varepsilon_M \neq \frac{\Delta x_1}{\Delta m}$$

Income elacticity & Engel curve

- Normal good : $\varepsilon > 0$

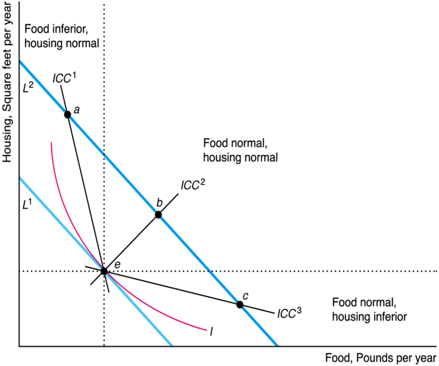


- Normal good : $\varepsilon > 0$
- Inferior good: $\varepsilon < 0$



Income elacticity & Engel curve

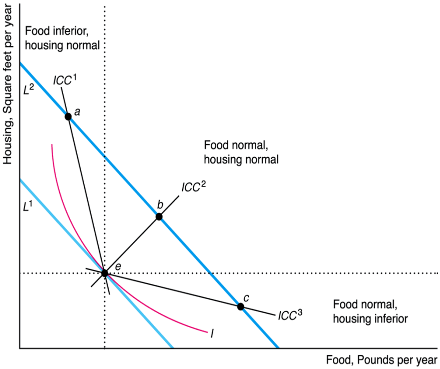
- Normal good : $\varepsilon > 0$
- Inferior good: $\varepsilon < 0$
- Quasilinear: $\varepsilon = 0$



Income elacticity & Engel curve

- Normal good : $\varepsilon > 0$
- Inferior good: $\varepsilon < 0$
- Quasilinear: $\varepsilon = 0$

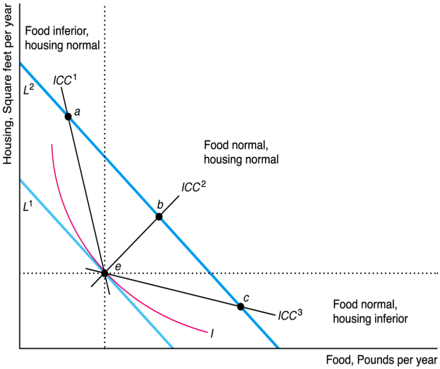
- Luxury goods: $\varepsilon > 1$



Income elacticity & Engel curve

- Normal good : $\varepsilon > 0$
- Inferior good: $\varepsilon < 0$
- Quasilinear: $\varepsilon = 0$

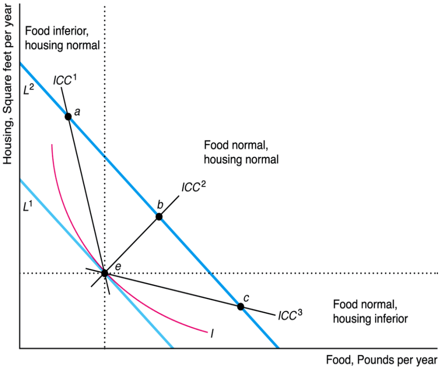
- Luxury goods: $\varepsilon > 1$
- Necessities: $\varepsilon < 1$



Income elacticity & Engel curve

- Normal good : $\varepsilon > 0$
- Inferior good: $\varepsilon < 0$
- Quasilinear: $\varepsilon = 0$

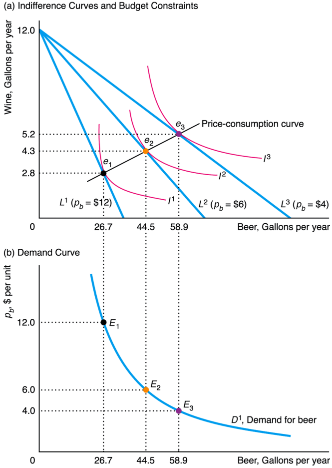
- Luxury goods: $\varepsilon > 1$
- Necessities: $\varepsilon < 1$
- Homothetic: $\varepsilon = 1$



- Demand function:

$$x_1 = x_1\left(p_1, \bar{p}_2, \bar{m}\right)$$

- Comparative statics
  - Shifts in m.
  - Shifts in p_1.
  - Shifts in p_2.
- Relative price as well as income change!



Income and Substitution Effect

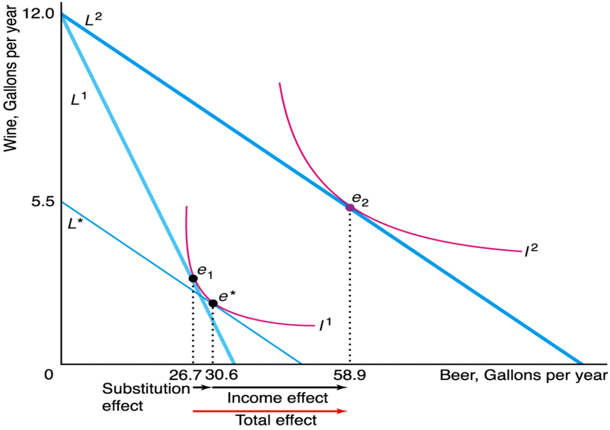
Definition

The change in demand due to the change in the rate of exchange between the two goods is called **substitution effect.** (changed own price, other prices and utility constant).

Definition

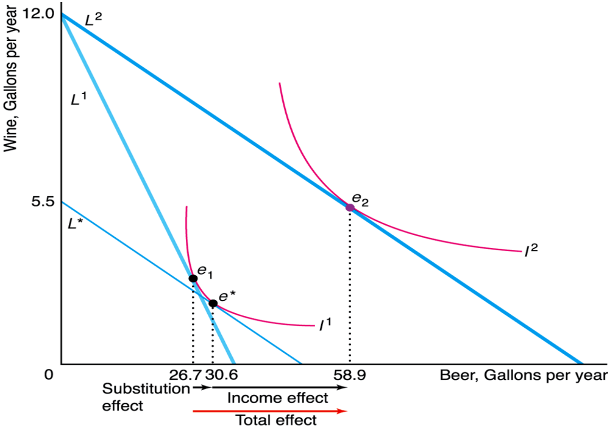
The change in demand due to the change in purchasing power is called **income effect.** (prices are hold constant)

Income and Substitution Effect

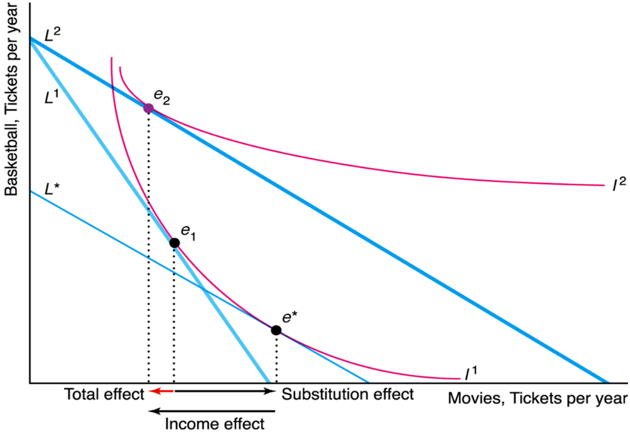


- Substitution effect is always negative due to the 'well-behaved' indifference curves!

Income and Substitution Effect



- Substitution effect is always negative due to the ‘well-behaved’ indifference curves!
- What about the direction of the income effect?



Giffen goods (Inferior)

Price and cross-price changes

- Own price change

Price and cross-price changes

- Own price change
  - Ordinary goods:

$$\frac{\partial x_1}{\partial p_1} < 0$$

Price and cross-price changes

- Own price change
  - Ordinary goods:
$$\frac{\partial x_1}{\partial p_1} < 0$$
  - Giffen goods:
$$\frac{\partial x_1}{\partial p_1} > 0$$

Price and cross-price changes

- Own price change
  - Ordinary goods:
$$\frac{\partial x_1}{\partial p_1} < 0$$
  - Giffen goods:
$$\frac{\partial x_1}{\partial p_1} > 0$$
- Cross price change

Price and cross-price changes

- Own price change
  - Ordinary goods:

$$\frac{\partial x_1}{\partial p_1} < 0$$

  - Giffen goods:

$$\frac{\partial x_1}{\partial p_1} > 0$$

- Cross price change
  - substitute (not perfect)

$$\frac{\partial x_1}{\partial p_2} > 0$$

Price and cross-price changes

- Own price change
  - Ordinary goods:
$$\frac{\partial x_1}{\partial p_1} < 0$$
  - Giffen goods:
$$\frac{\partial x_1}{\partial p_1} > 0$$
- Cross price change
  - substitute (not perfect)
$$\frac{\partial x_1}{\partial p_2} > 0$$
  - complement (not perfect)
$$\frac{\partial x_1}{\partial p_2} < 0$$

Next lecture

Further applications!

Thank you!