Principles of Economics

Chapter 2: Consumption and Demand

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Agenda

2. Consumption and Demand
   - Optimal Consumption
   - Individual Demand
   - Market Demand

Reading:

- Mankiw/Taylor (2023), Chapter 4
- Varian (2014), Chapters 2-6, 8, 9

Model

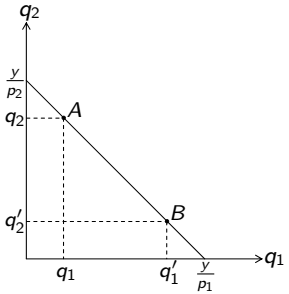
Framework: Consider a representative individual.

- The individual derives utility from the consumption of two goods; q_1 and q_2 denote the quantities of the two goods available to the individual.
- The individual is a price taker: She considers the prices p_1 and p_2 of the two goods as given.
- The individual's budget (initial endowment) $y = p_1 q_1 + p_2 q_2$ is given.

Budget Constraint

Budget Line: Locus of all consumption bundles (q_1, q_2) that the individual can obtain if she spends her entire budget;

$$q_2 = \frac{y}{p_2} - \frac{p_1}{p_2} q_1$$

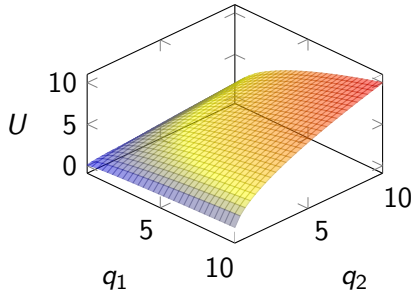


Price Ratio: Rate at which the individual can substitute one good for another at constant expenses

Utility

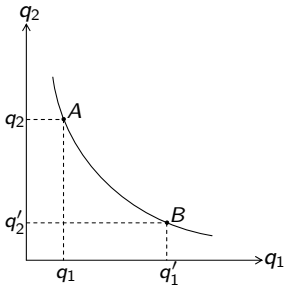
Utility Function: The function $U(q_1, q_2)$ represents the individual's preference order with respect to all consumption bundles (q_1, q_2).

Example: $U(q_1, q_2) = (q_1 \cdot q_2)^{\frac{1}{2}}$



Utility

Indifference Curve: Locus of all consumption bundles (q_1, q_2) that have the same rank in the individual's preference order and correspondingly yield the same utility level $U(q_1, q_2)$



Marginal Rate of Substitution: Rate at which the individual can substitute one good for another at constant utility

$$\mathrm{MRS}_{1,2} = \frac{\partial U / \partial q_1}{\partial U / \partial q_2}$$

Assumptions on Preferences

Completeness: The individual can compare any two consumption bundles A and B.

- If preferences are complete, then every consumption bundle is located on an indifference curve.

Transitivity: Consider any three consumption bundles A, B, and C. If the individual prefers A to B and B to C, then she also prefers A to C. Equally, if the individual is indifferent between A and B as well as between B and C, then she is also indifferent between A and C.

- If preferences are transitive, then indifference curves do not cross.

Assumptions on Preferences

Monotonicity: If consumption bundle A contains more of each good than consumption bundle B, then A is better than B. If consumption bundle A contains more of at least one good and not less of another, then A is at least as good as B. If in the latter case, A is always better than B, then preferences are strictly monotonous.

- If preferences are strictly monotonous, then indifference curves for two goods are negatively sloped.

Convexity: If the individual is indifferent between two consumption bundles A and B, then any convex combination of A and B is at least as good as A or B. If any strictly convex combination of A and B is better than A or B, then preferenes are strictly convex.

- If preferences are (strictly) convex, then indifference curves are (strictly) convex.

Extreme Cases of Preferences

Perfect Substitutes: Two goods the individual is willing to substitute for one another at a constant rate

- Linear indifference curves

Perfect Complements: Two goods the individual wants to consume in fixed proportions

- Orthogonal indifference curves

Utility Maximum

Optimization Problem: The individual maximizes utility with respect to the consumption of the two goods subject to the budget constraint.

$$\max_{q_1,q_2} \quad U(q_1,q_2) \quad \text{s.t.} \quad y \geq q_1 p_1 + q_2 p_2$$

Any interior solution of the maximization problem must satisfy the following conditions:

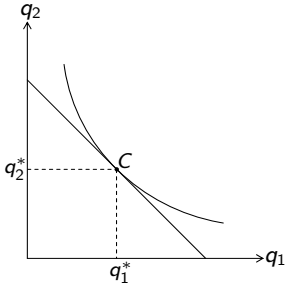
$$y = p_1 q_1 + p_2 q_2,$$

$$\text{MRS}_{1,2} = \frac{\partial U/\partial q_1}{\partial U/\partial q_2} = \frac{p_1}{p_2}.$$

Utility Maximum

Interior Solution: The rate at which the individual can substitute good 1 for good 2 at constant utility must equal the rate at which she can substitute good 1 for good 2 at constant expenses.

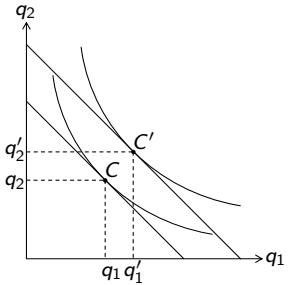
- In the optimal consumption bundle, the slope of the indifference curve equals the slope of the budget line.



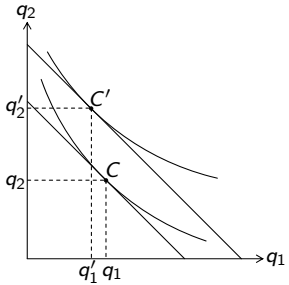
Change in Income

Normal Good: A good for which an increase (a decrease) in income causes an increase (a decrease) in consumption; $\frac{\partial q_i}{\partial y} > 0$

Inferior Good: A good for which an increase (a decrease) in income causes a decrease (an increase) in consumption; $\frac{\partial q_i}{\partial y} < 0$



Both goods normal



Good 1 inferior, good 2 normal

Change in Prices

Substitution Effect: Ceteris paribus, a change in the price ratio induces the individual to substitute the good that has become relatively more expensive with the other good that has become relatively less expensive.

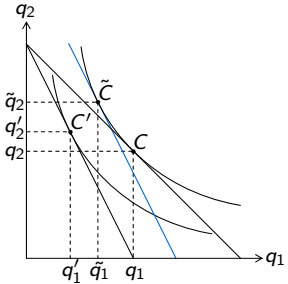
Income Effect: Ceteris paribus, an increase (a decrease) in prices decreases (increases) the individual's purchasing power.

- Ceteris paribus, a decrease (an increase) in purchasing power induces the individual to consume less (more) of normal and more (less) of inferior goods.

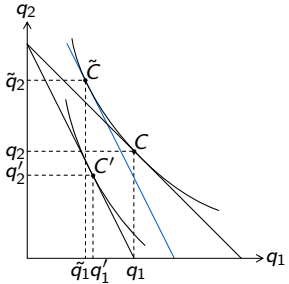
Change in Prices

Example: Total effect of an increase in the price of good 1 on the optimal consumption bundle; movement from C to C'

- Substitution Effect: Movement from C to $\tilde{C}$
- Income Effect: Movement from $\tilde{C}$ to C'



Both goods normal



Good 1 inferior, good 2 normal

Change in Prices

Ordinary Good: A good for which an increase (a decrease) in its own price causes a decrease (an increase) in consumption; $\frac{\partial q_i}{\partial p_i} < 0$

- If the ordinary good is normal, substitution and income effects work in the same direction.
- If the ordinary good is inferior, substitution and income effects work in opposite directions while the former prevails.

Giffen Good: A good for which an increase (a decrease) in its own price causes an increase (a decrease) in consumption; $\frac{\partial q_i}{\partial p_i} > 0$

- A Giffen good must be inferior, so that substitution and income effects work in opposite directions while the latter prevails.

Change in Prices

Substitutes: A good is a substitute for another if an increase (a decrease) in the price of the latter causes an increase (a decrease) in consumption of the former; $\frac{\partial q_j}{\partial p_i} > 0$

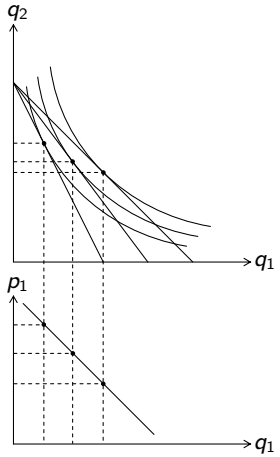
- If the substitute good is normal, substitution and income effects work in opposite directions with the former prevailing.
- If the substitute good is inferior, substitution and income effects work in the same direction.

Complements: A good is a complement to another if an increase (a decrease) in the price of the latter causes a decrease (an increase) in consumption of the former; $\frac{\partial q_j}{\partial p_i} < 0$

- A complementary good must be normal, so that substitution and income effects work in opposite directions with the latter prevailing.

Individual Demand Curve

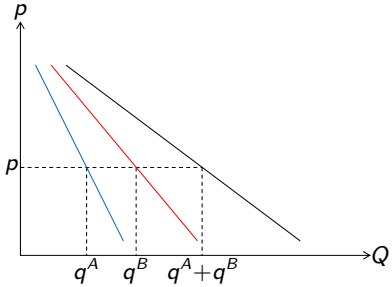
Ordinary Good: $\frac{\partial q_i}{\partial p_i} < 0$



Optimal Consumption & Individual Demand Curve

Market Demand Curve

Market Demand: Sum of individual demand quantities of a good; $Q = \sum q$



Individual & Market Demand Curves

Law of Demand: Empirical observation that, ceteris paribus, the market demand for a good decreases (increases) as its price increases (decreases); $\frac{\partial Q}{\partial p} < 0$