

# Principles of Economics

## Chapter 2: Consumption and Demand

Dr. Christian Feilcke

TUM School of Management

Winter Term 2022-2023

# Agenda

## 2 Consumption and Demand

- Optimal Consumption
- Individual Demand
- Market Demand

### Reading:

- Mankiw/Taylor (2020), Chapter 4
- Varian (2014), Chapters 2-6, 8, 9

# Model

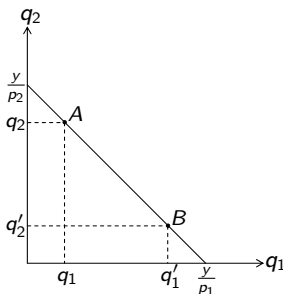
**Framework:** Consider a representative individual.

- 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 resource endowment)  $y = p_1 q_1 + p_2 q_2$  is given.

# Budget Constraint

**Budget Line:** Locus of all consumption bundles  $(q_1, q_2)$  which the individual can obtain spending her entire budget;

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

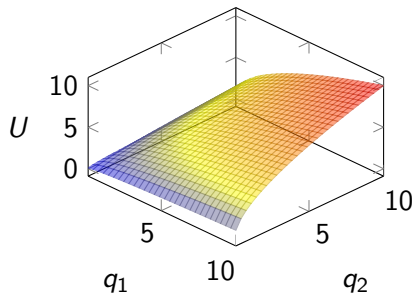


**Price Ratio:** Rate at which the individual can substitute one good for another at constant expenses

# Utility

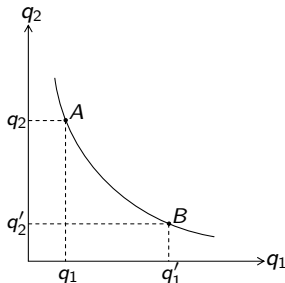
**Utility Function:** The function  $U(q_1, q_2)$  represents the individual's preference order with respect to all consumption bundles  $(q_1, q_2)$ .

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



# Utility

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



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

$$MRS_{1,2} = \frac{\partial U / \partial q_1}{\partial U / \partial q_2}$$

# 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  $C$ , she also prefers  $A$  to  $C$ . Equally, if the individual is indifferent between  $A$  and  $B$  as well as  $B$  and  $C$ , 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  $B$ , 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 weighted average of  $A$  and  $B$  is at least as good as  $A$  or  $B$ . If any weighted average of  $A$  and  $B$  is better than  $A$  or  $B$ , preferences 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.

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

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

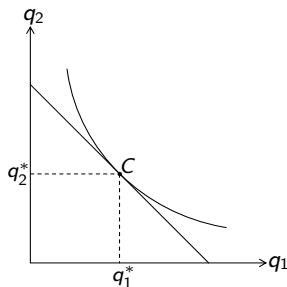
$$y = p_1 q_1 + p_2 q_2,$$

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

# 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.

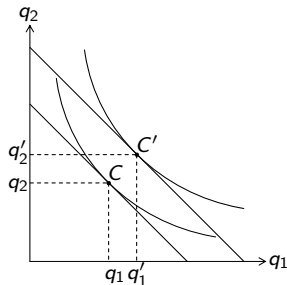
- In the optimal consumption bundle, the slope of the indifference curve equals the slope of the budget line.



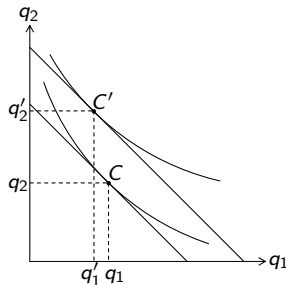
# Change in Income

**Normal Good:** A good for which an increase in income causes an increase in consumption and vice versa;  $\frac{dq_i}{dy} > 0$

**Inferior Good:** A good for which an increase in income causes a decrease in consumption and vice versa;  $\frac{dq_i}{dy} < 0$



Both goods normal



Good 1 inferior, good 2 normal

# Change in Prices

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

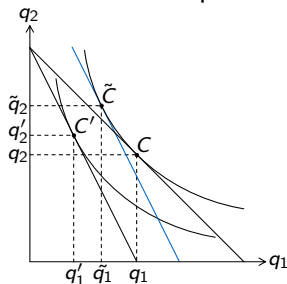
**Income Effect:** Ceteris paribus, an increase in prices decreases the individual's purchasing power and vice versa.

- Ceteris paribus, a decrease in purchasing power induces the individual to consume less of normal and more of inferior goods and vice versa.

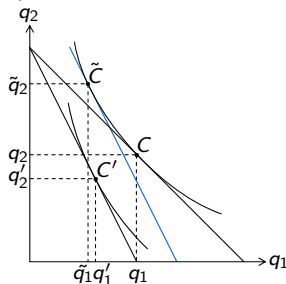
# Change in Prices

**Example:** Total effect of an increase in the price of good 1 on the optimal consumption bundle;  $C \rightarrow C'$

- Substitution Effect: Change of consumption resulting from a change in the price ratio;  $C \rightarrow \tilde{C}$
- Income Effect: Change of consumption resulting from a change in the individual's purchasing power;  $\tilde{C} \rightarrow C'$



Both goods normal



Good 1 inferior, good 2 normal

# Change in Prices

**Ordinary Good:** A good for which a price increase causes a decrease in consumption and vice versa;  $\frac{dq_i}{dp_i} < 0$

- 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 a price increase causes an increase in consumption and vice versa;  $\frac{dq_i}{dp_i} > 0$

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

# Change in Prices

**Substitutes:** Two goods for which a price increase of the first causes an increase in consumption of the second and vice versa;  $\frac{dq_j}{dp_i} > 0$

- 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.

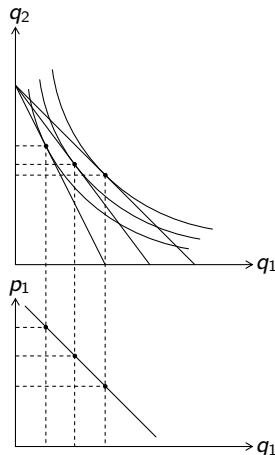
**Complements:** Two goods for which a price increase of the first causes a decrease in consumption of the second and vice versa;  $\frac{dq_j}{dp_i} < 0$

- 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:** Downward sloping individual demand curve;  $\frac{dq_i}{dp_i} < 0$

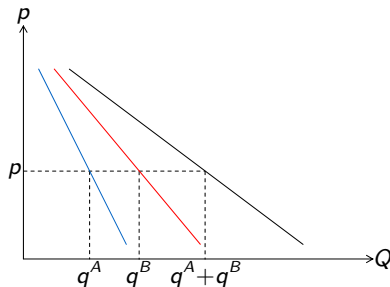


Optimal Consumption & Individual Demand Curve

# 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 when its price increases;  $\frac{dQ}{dp} < 0$