

ECON3113

Microeconomic Theory I

Tutorial #8:

- (i) Revealed Preference Theory
- (ii) Social Choice
- (iii) Online Assessment #3

Today's tutorial

- Re-Cap of previous lectures:
 - Revealed Preference Theory
 - Social Choice
- Online Assessment #3

Revealed Preference Theory

- Given some observed choice behaviours, what can we say about a consumer's utility function and preferences?
 - Given observed choices, how can decide whether a consumer is a utility-maximizer?
- To go further, we make three assumptions:
 - 1) The consumer's preferences are stable
 - 2) Given any budget set, the consumer chooses the most preferred bundle
 - 3) The most preferred bundle is unique

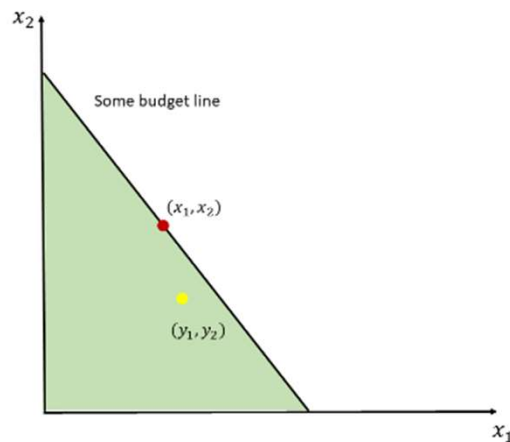
Direct and Indirect Revealed Preference

Direct Revealed Preference

Definition

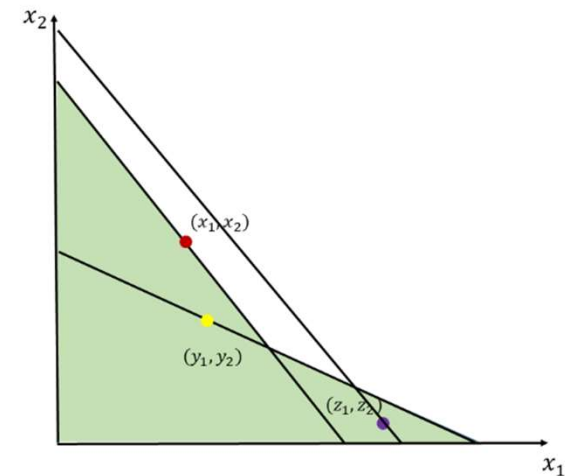
Bundle (x_1, x_2) is **directly revealed preferred** to bundle (y_1, y_2) if there is some budget set with which (x_1, x_2) is **chosen** and (y_1, y_2) is also affordable.

- If (x_1, x_2) is chosen when (y_1, y_2) is affordable, one thing we know is $p_1 y_1 + p_2 y_2 \leq p_1 x_1 + p_2 x_2$.



Indirect Revealed Preference

- If (x_1, x_2) is chosen when (y_1, y_2) is affordable, and (y_1, y_2) is chosen when (z_1, z_2) is affordable, then (x_1, x_2) is indirectly revealed preferred to (z_1, z_2)



The Principle of Revealed Preference

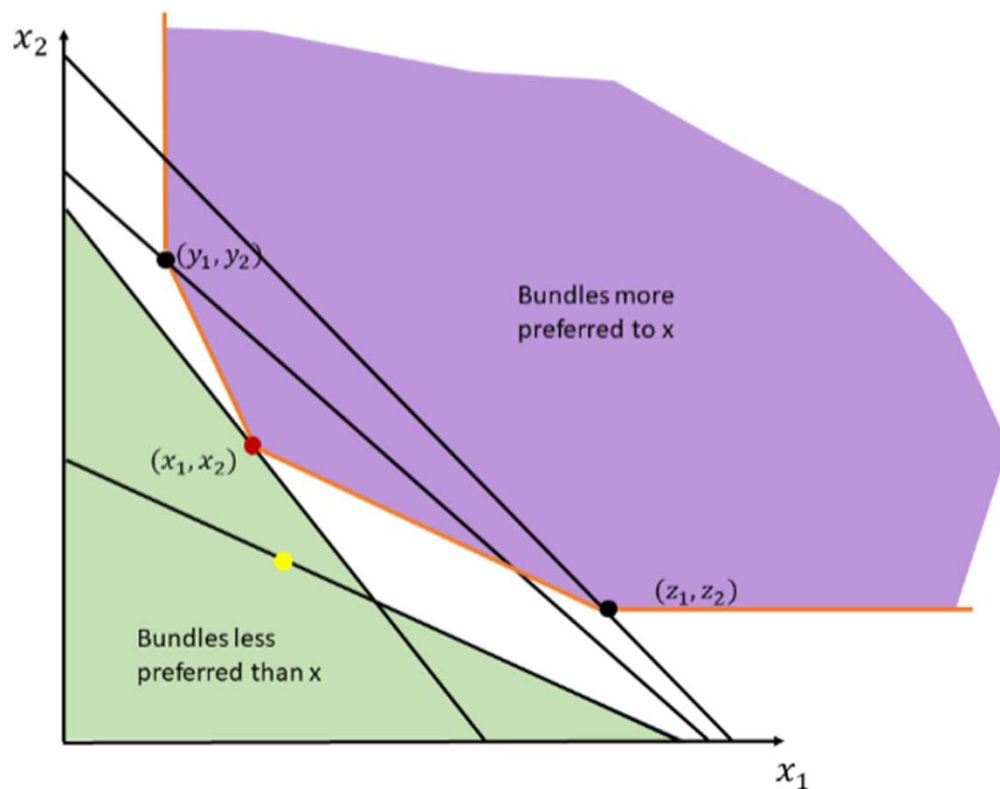
The Principle of Revealed Preference:

- From observed choices to preferences

Theorem (The Principle of Revealed Preference)

Suppose the consumer always chooses her most preferred bundle she can afford, based on a transitive preference. If (x_1, x_2) is directly or indirectly revealed preferred to (z_1, z_2) , then she ranks $(x_1, x_2) \succ (z_1, z_2)$.

Recovering preferences from choices: 'Trapping' the indifference curve

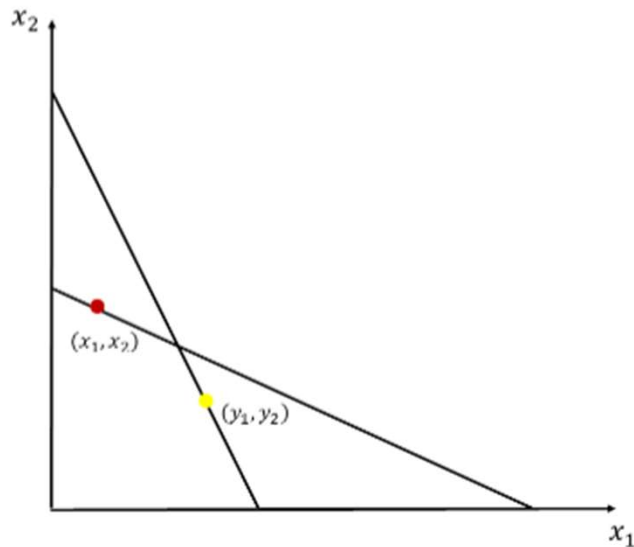


- Assume that preferences are strictly convex and monotone
- Then we may observe bundles that are less preferred than x
- And bundles that are more preferred to x
- In this way, we may identify the region through which an indifference curve through x must pass

The Weak Axiom of Revealed Preference (WARP)

Definition

The consumer's choices are said to satisfy the **Weak Axiom of Revealed Preference (WARP)** if the following property hold. Whenever (x_1, x_2) and (y_1, y_2) are distinct bundles and (x_1, x_2) is directly revealed preferred to (y_1, y_2) , then it cannot happen that (y_1, y_2) is directly revealed preferred to (x_1, x_2) .



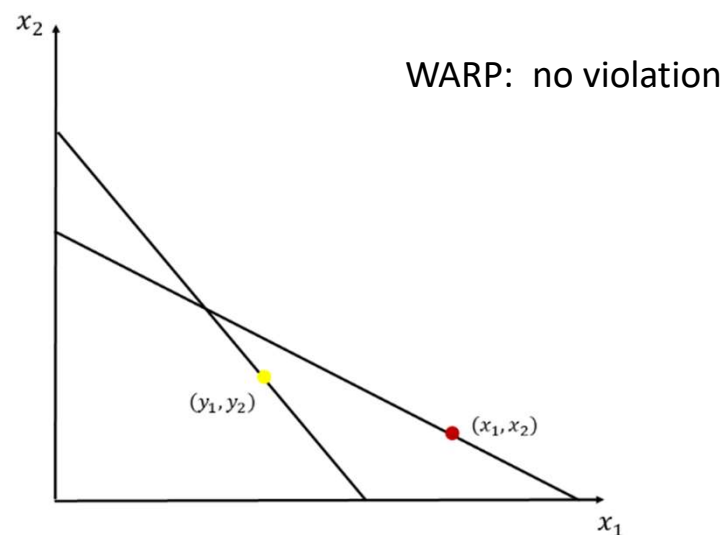
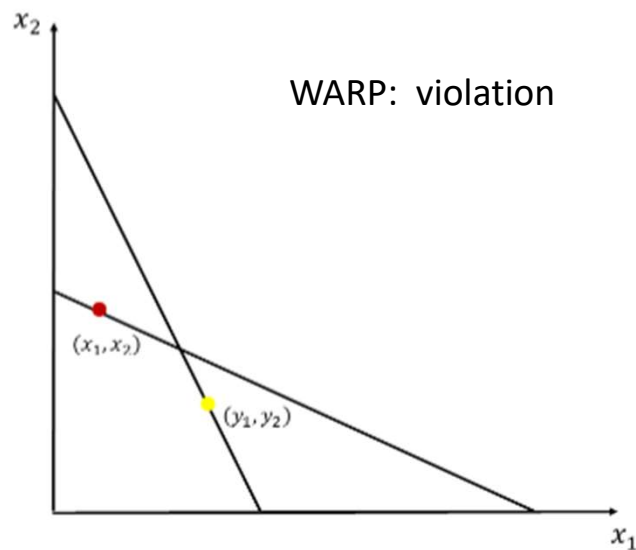
- If (x_1, x_2) is chosen when (y_1, y_2) is affordable, and (y_1, y_2) is chosen when (x_1, x_2) is affordable, then WARP is violated
- WARP deals with Direct Revealed Preference

The Weak Axiom of Revealed Preference (WARP)

Definition

The consumer's choices are said to satisfy the **Weak Axiom of Revealed Preference (WARP)** if the following property hold. Whenever (x_1, x_2) and (y_1, y_2) are distinct bundles and (x_1, x_2) is directly revealed preferred to (y_1, y_2) , then it cannot happen that (y_1, y_2) is directly revealed preferred to (x_1, x_2) .

- If (x_1, x_2) is chosen when (y_1, y_2) is affordable, and (y_1, y_2) is chosen when (x_1, x_2) is affordable, then WARP is violated
- WARP deals with Direct Revealed Preference



The Strong Axiom of Revealed Preference (SARP)

Definition

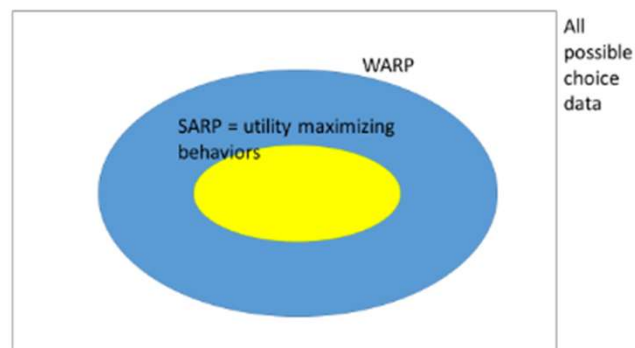
The consumer's choices are said to satisfy the **Strong Axiom of Revealed Preference (SARP)** if the following property hold. Whenever (x_1, x_2) and (y_1, y_2) are distinct bundles and (x_1, x_2) is directly or indirectly revealed preferred to (y_1, y_2) , then it cannot happen that (y_1, y_2) is directly or indirectly revealed preferred to (x_1, x_2) .

Theorem

The consumer's choices satisfy SARP if and only if she maximizes a strictly increasing, continuous and quasi-concave utility function.

- Note:
- (x_1, x_2) and (y_1, y_2) must be distinct bundles in any comparison
- Under SARP, (x_1, x_2) may be directly or indirectly revealed preferred to (y_1, y_2)
- Strong relationship between SARP and utility-maximising behaviour

A recipe to check utility-maximizing behaviour



- The relations suggest a conceptual recipe to analyze choice behaviors:
 - First check WARP (preliminary test). If violated, the data cannot be explained by utility maximization.
 - If WARP is not violated, check SARP (in-depth test). If SARP is violated, again the data cannot be explained by utility maximization.
 - If SARP is not violated, the data can be explained by utility max. Preference can be partially recovered by identifying bounds on where the indifference curves lie.

Navigation icons: back, forward, search, etc.

Social Choice: Definition of a Social Welfare Function

Definition: Social Welfare Function (SWF)

Definition

A **social welfare function** is a mathematical function which takes as an input the list of preferences $(\succ_1, \succ_2, \dots, \succ_n)$ and produces as an output a single preference ranking \succ^* .

Examples:

- Majority rule (2 alternatives, odd number of participants)
- Plurality rule (count the 'top' choices until all choices are ranked)
- Borda criterion (points counting system)
- Dictatorship

Social Choice

Definition: Social Welfare Function (SWF)

Definition

A **social welfare function** is a mathematical function which takes as an input the list of preferences $(\succ_1, \succ_2, \dots, \succ_n)$ and produces as an output a single preference ranking \succ^* .

Examples:

- Majority rule (2 alternatives, odd number of participants)
- Plurality rule (count the 'top' choices until all choices are ranked)
- Borda criterion (points counting system)
- Dictatorship

Requirements of a reasonable SWF:

- Should handle all lists of preferences
- Should respect unanimity
- How A is ranked versus B in the SWF should depend only on A and B and not on other options

Three requirements of a SWF

Definition

A SWF satisfies **Universal Domain (UD)** if every possible preference list input results in a well-defined social ranking output.

- Pairwise majority violates UD

Definition

A SWF satisfies **Pareto** if it respects unanimity. Specifically, whenever it happens that for some pair of alternatives A and B , every individual i ranks $A \succ_i B$, Pareto requires that the social ranking output also ranks $A \succ^* B$.

- Pareto ensures that preferences are always respected as long as there is unanimity

Definition

A SWF satisfies **Independence of Irrelevant Alternatives (IIA)** if the social ranking of A versus B depends only on the individuals' ranking of those two alternatives.

In formal terms, if we are given two lists of preferences which are identical in terms of each individual's ranking of A and B , then the SWF should output the same social ranking of A versus B .

- A Social Welfare function should satisfy UD, Unanimity and IIA at a minimum

Arrow's Impossibility Theorem

Theorem (Arrow's Impossibility Theorem)

If there are three or more alternatives, the only SWF that can satisfy UD, Pareto, and IIA is dictatorship.

- Arrow's Impossibility Theorem leaves precisely four alternatives in a social choice problem
 - Drop UD
 - Drop Unanimity
 - Drop IIA
 - Dictatorship