Econ 301 - Microeconomic Theory 2 **Winter 2018**

Lecture 4: January 15, 2018

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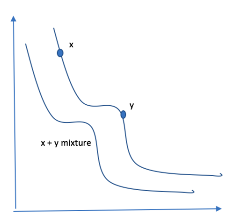
4.1 Consumer Choice Continued

- We often impose additional assumptions on preferences to yield "nice" (201) indifference curves

Definition 4.1 *The preference relation* $\succeq$ *on* $\mathbb{R}^2_+$ *is*

1. *Monotone if for all* $x, y \in \mathbb{R}^2_+$ *such that* $x_1 > y_1$ *and* $x_2 > y_2$. *We have that* $x \succ y$
2. *Convex if for all* $x, y \in \mathbb{R}^2_+$ *such that* $x \sim y$ *and for all* $0 \leq \alpha \leq 1$. *We have that* $\alpha x + (1-\alpha) ygeqx$

- Monotonicity states that bundles containing strictly more goods are strictly preferred by the consumer
  - This rules out "thick" indifference curves
- Convexity ensures "nicely" curved indifference curves.
  - Represents a preference for diversity
  - States that mixture of bundles never make the consumer worse off
- Indifference curves that violate convexity :



- Convexity assumptions induce convenient properties in consumers optimisation problem
  - Ensures that sufficient or "second-order" conditions are satisfied

4.1.1 Utility

In class numbering : 1.1.4

- A utility function is a tool for representing preference relations.

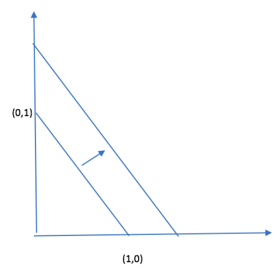
Definition 4.2 *A function* $u : \mathbb{R}^2_+ \to \mathbb{R}$ *is a utility function representing preference relation* $\succeq$ *if for all* $x, y \in \mathbb{R}^2_+$

$$u(x) \leq u(y) \iff x \succeq y$$

- Note that $u(x) > u(y) \iff x \succ y$ and $u(x) = u(y) \iff x \sim y$
- "Utility" is not some physical quantity. Meaning is attached to utility numbers only in so that they allow us to reconstruct preference statements

Example 4.3 *Suppose that goods 1 and 2 are perfect substitutes*

$$x \succeq y \iff x_1 + x_2 \geq y_1 + y_2$$



$u(x_1, x_2) = x_1 + x_2$ *is a utility function representing* $\succeq$*, but so is* $u(x_1, x_2) = ln((x_n + x_2)^2) + 36$

- Any transformation of utility numbers that maintains their order which represents the same preference relation
- Consider a strictly increasing function

  $$f : \mathbb{R} \to \mathbb{R}_+ .then f(u(x)) \geq f(u(y)) \iff u(x) gequ(y) \iff x \succeq y$$

  So that $f(u(\cdot))$ is a utility function representing $\succeq$
- Utility functions represent the ordinal information contained in preferences
- Important question : Can any preference relation be represented by a utility function.
  - No if preferences are not complete.
    Proof By contradiction : suppose not $x \succeq y$ and not $y \succeq x$, but u represents $\geq$. Then either Contradiction $u(x) \geq u(y)$ or $u(y) \geq u(x)$ or $u(x) \geq u(y)$, thus $x \succeq y$ or $y \succeq x$. Contradiction.
  - No if preferences are not transitivity
  - Yes if preferences are complete, transitive, and satisfy additional continuity assumptions

4.1.2 Optimal consumer choice

In class numbering : 1.1.5

- Consumers choice problem has been reduced to constrained optimization problem:

$$max_{x_1, x_2 \geq 0}\ u(x_1, x_2) \text{ subject to } p_1 x_1 + p_2 x_2 \leq m$$