Intermediate Microeconomics

Part I: Welfare Economics

Session 1: Preferences and Utility

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INTRODUCTION

Before studying *how* well-being (or welfare) is evaluated in a microeconomic framework, it is first necessary to be familiar with:

- *What* is to be evaluated (namely, *utility*): this is often called the *informational basis* of welfare economics

This is useful so that a *criterion of well-being* can be defined based on this informational basis.

If we want to judge which situation is better than another one (and at the end, recommend/prescribe a public policy), we need:

1. To define *what* is to be evaluated (spoiler: *utility*)
2. To define *according to what* a situation is better than another one (spoiler: the *Pareto-criterion*, but there are also other criteria)

In this session, we will be concerned about 1.

INTRODUCTION

Our first goal is to define what utility is: the "thing" on which we will be able to compare different social states. **Where should we start from?**

From the basics of consumer theory, which describe individuals' behaviour through the concept of *preference*.

Rationality postulate: individuals always choose their most preferred alternative from their set of available alternatives.

In order to evaluate individuals' *well-being*, we must first model individuals' *preferences*, individuals' *utility*, and see what relation we can make between these three concepts :

$$preference \implies utility \implies well\text{-}being$$

PREFERENCE RELATIONS

Let us denote by x, y two consumption goods (e.g. a candy and an apple). Individuals can have:

- **Strict preferences:** x is preferred to y, denoted by $x \succ y$
- **Weak preferences:** x is at least as preferred as y, denoted by $x \succsim y$
- **Indifference:** x is exactly as preferred as y, denoted by $x \sim y$

Note 1: The operators $\succ, \succsim, \sim$ are called *preference relations*. They allow us (economists) to know how individuals rank their available alternatives (here x and y).

Note 2: These preference relations are *ordinal*, which means that they only represent the *order* in which consumption goods are preferred.

- Historically, economists used to see preferences as an intensity of pleasure/satisfaction towards goods, but most economists have abandoned this assumption for several reasons (to be discussed later)

PREFERENCES: CONSUMPTION BUNDLES

In microeconomics, the individual (or consumer) is represented by a set of *preferences* over some *consumption bundles*.

A consumption bundle is a complete list of the goods and services that are involved in the choice problem that we are investigating.

Taking only two goods in each bundle, these consumption bundles can be denoted as (x_1, x_2) and (y_1, y_2).

So $(x_1, x_2) \succsim (y_1, y_2)$ means that the consumption bundle (x_1, x_2) is at least as preferred as the consumption bundle (y_1, y_2).

PREFERENCES: AXIOMS

Economists usually make some assumptions about the "consistency" (or coherence) of consumers' preferences. In standard microeconomics, it is assumed that preference relations satisfy three axioms of rationality:

- **Completeness:** we assume that any two different bundles can be compared. That is, given any x-bundle and any y-bundle, we assume that $(x_1, x_2) \succsim (y_1, y_2)$, or $(y_1, y_2) \succsim (x_1, x_2)$, or both, in which case the consumer is indifferent between the two bundles: $(x_1, x_2) \sim (y_1, y_2)$.
- **Reflexivity:** we assume that any bundle is at least as good as itself: $(x_1, x_2) \succsim (x_1, x_2)$.
- **Transitivity:** if $(x_1, x_2) \succsim (y_1, y_2)$ and $(y_1, y_2) \succsim (z_1, z_2)$, then we assume that $(x_1, x_2) \succsim (z_1, z_2)$. In other words, if the consumer thinks that (x_1, x_2) is at least as good as (y_1, y_2) and that (y_1, y_2) is at least as good as (z_1, z_2), then the consumer thinks that (x_1, x_2) is at least as good as (z_1, z_2).

PREFERENCES: INDIFFERENCE CURVES

In order to represent preferences graphically, we can use **indifference curves**. They represent every bundle for which the individual is indifferent with another one.

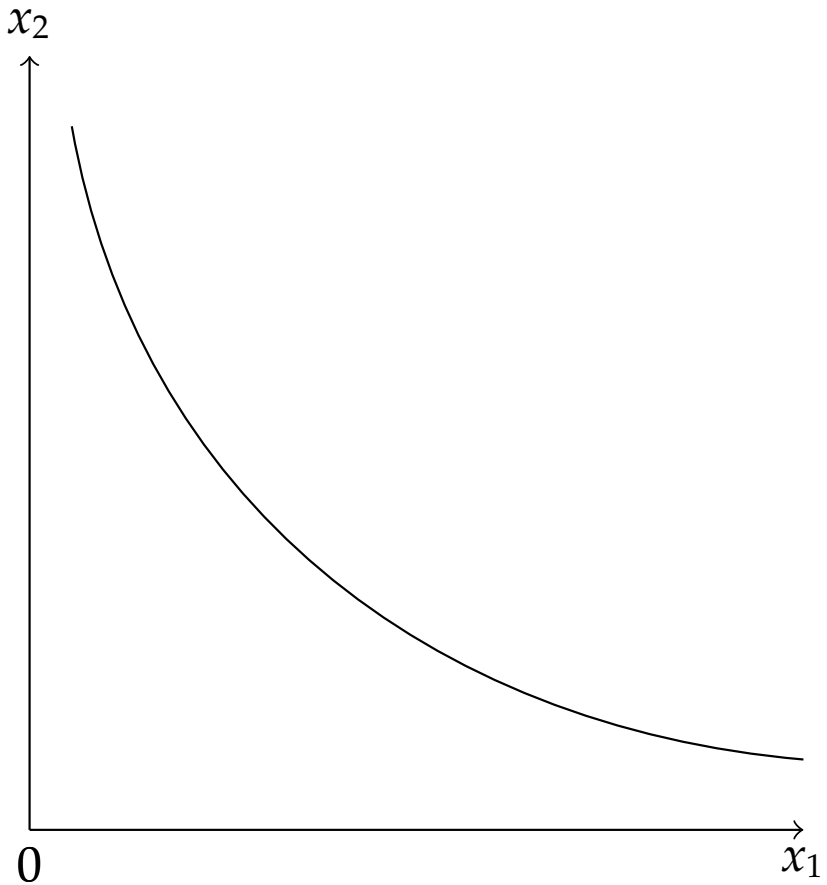


Figure: An indifference curve of every possible combination of (x_1, x_2)

PREFERENCES: INDIFFERENCE CURVES

Every point on the curve represents a consumption bundle for which the individual is indifferent with another consumption bundle.

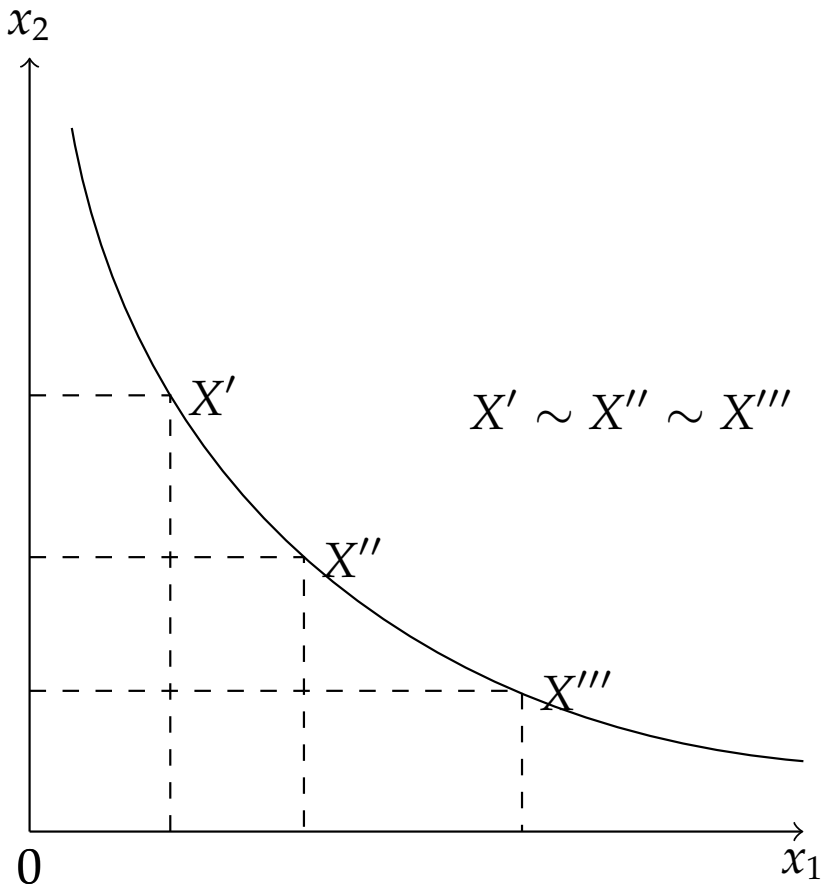
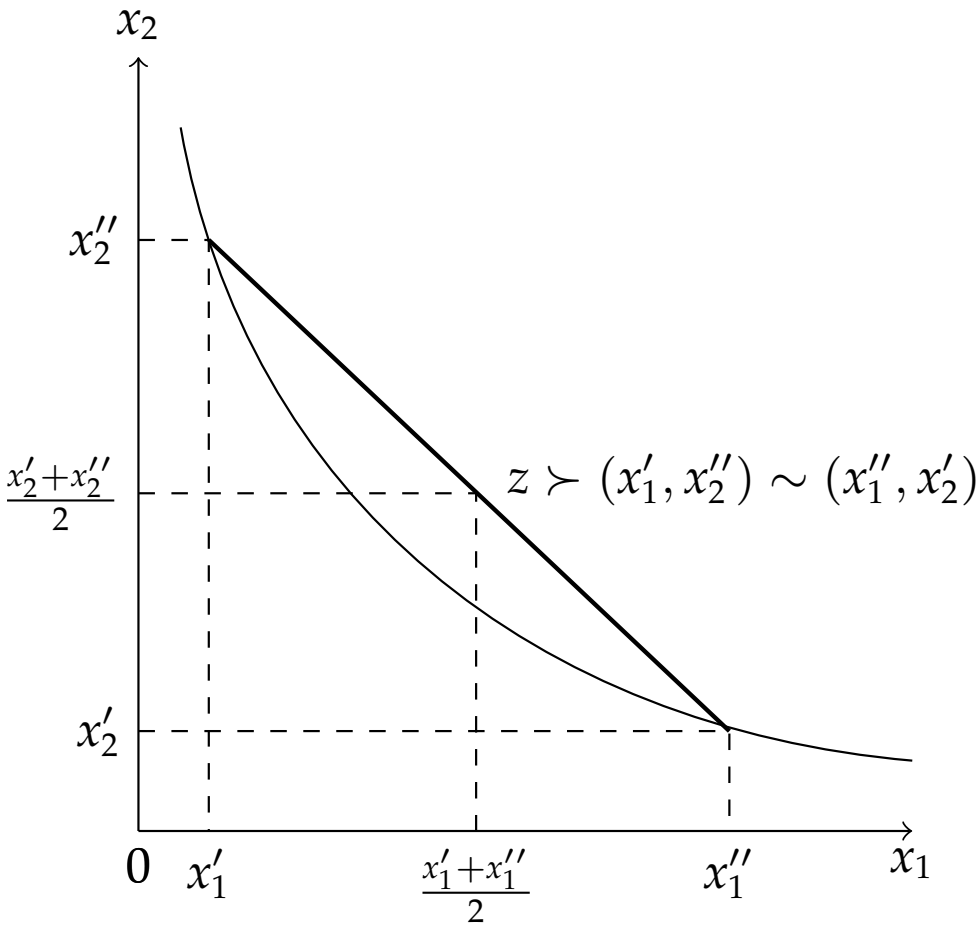


Figure: An indifference curve of every possible combination of (x_1, x_2)

PREFERENCES: CONVEXITY

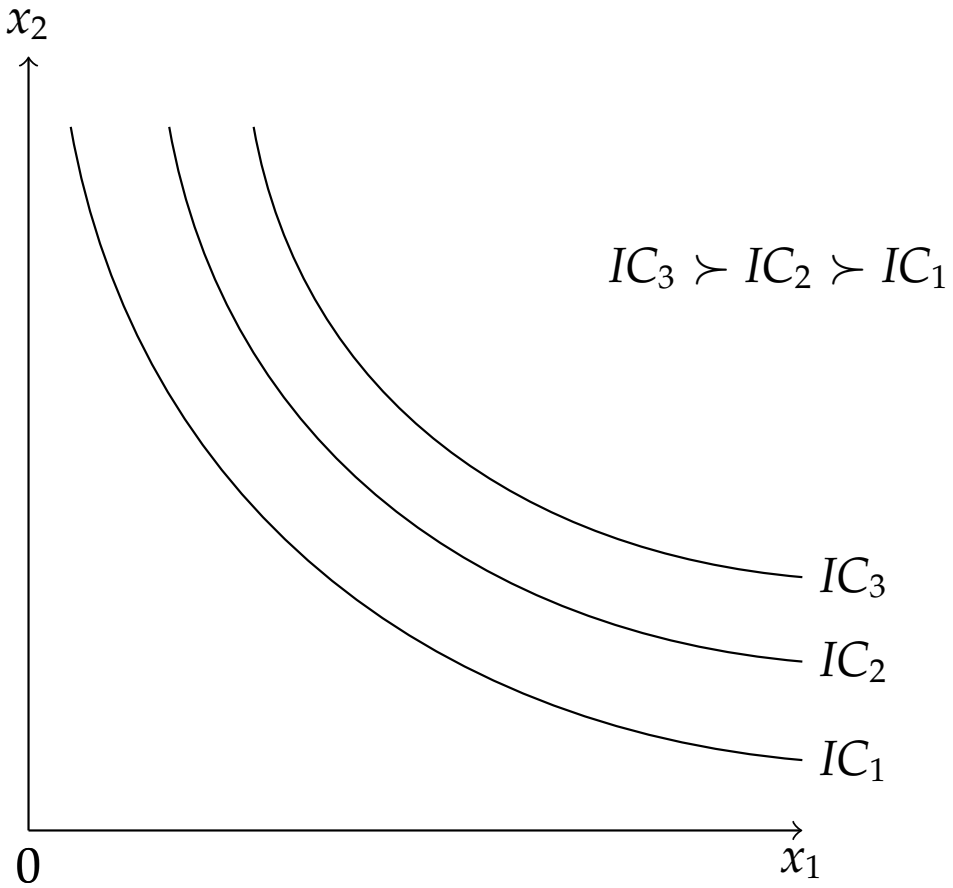
We generally assume that indifference curves are **convex** (see Varian (2014; Chap. 3) for other forms indifference curves can take).

Convexity means that individuals have a preference for a *mixture* of x_1 and x_2 than for exclusively x_1 or x_2. Graphically:



PREFERENCES: MONOTONICITY

We also assume that *more is better than less*, which is captured by the principle of **monotonicity**. Graphically, it means that an indifference curve (IC) which is higher than another one provides the individual with more satisfaction.



WELL-BEHAVED PREFERENCES

If preferences are:

- **Convex** (a mixture of goods is always preferable)
- **Monotonic** (more goods are preferred than less)

We say that preferences are *well-behaved*.

Remark: one may say that our framework is only relevant in situations where individuals have well-behaved (or rational) preferences. But how about situations where individuals do not have such kind of preferences?

- "Behavioural" turn in welfare economics: how to evaluate one's well-being when preferences are not *rational*? (Thaler and Sunstein 2003, 2008)
- Not covered in this course. A summary of the problem if you are interested: McQuillin and Sugden (2012)

INDIFFERENCE CURVES: PROS AND CONS

Indifference curves are helpful:

- To represent one's indifference between two goods, and to see which combination of bundles are preferred to others
- To represent a situation of exchange between two individuals and the gains of trade (covered in **sessions 2 and 3** with the *Edgeworth box*)

However, they are a limited tool to represent one's level of preference satisfaction because:

- They only show us bundles that individuals perceive as being indifferent to each other
- They don't show us directly which bundles are better and which bundles are worse (we have to compare two *IC* to see that)

We have just seen that a higher indifference curve represents more satisfaction to the individual than a lower one (monotonicity).
But can we do better?

UTILITY: DEFINITION

We can represent the level of one's preference satisfaction through the concept of *utility*, which is a way to describe one's preferences.

A utility function $u(X)$ represents a preference relation if and only if:

$$X' \succ X'' \implies u(X') > u(X'')$$

$$X' \prec X'' \implies u(X') < u(X'')$$

$$X' \sim X'' \implies u(X') = u(X'')$$

A utility function is a way of assigning a number to every possible consumption bundle such that more-preferred bundles get assigned larger numbers than less-preferred bundles. Example: $u(X') = 6 > u(X'') = 1$.

A bundle X' is preferred to a bundle X'' if and only if the utility of X' is larger than the utility of X''.

That is, $X' \succ X''$ if and only if $u(X') > u(X'')$.

A NOTE ON ORDINAL *versus* CARDINAL UTILITY

ORDINAL UTILITY.
Having ordinal utility of 3, 2, 1 for alternatives x, y, z (respectively), is the same as having 1000, 987, 0, which in turn is the same as having 102, 4, 3.

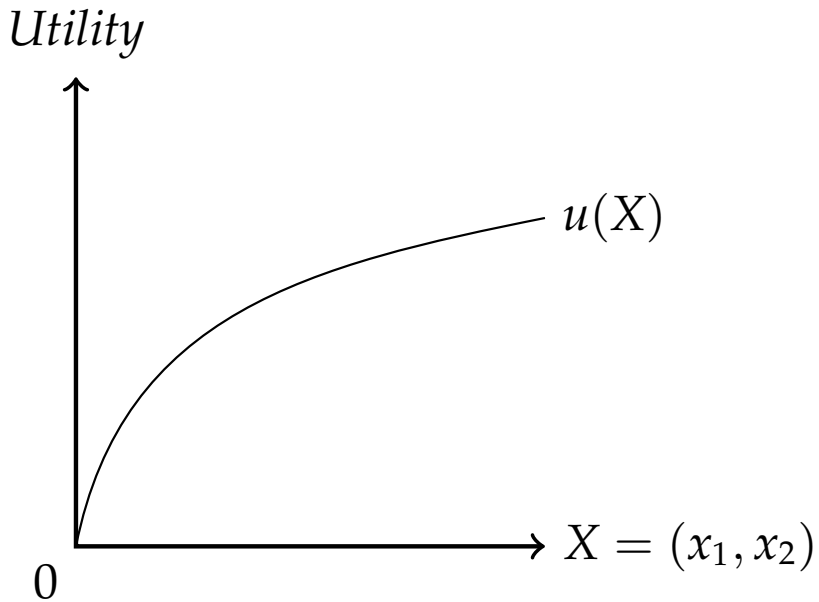
They all represent the ordering in which x is preferred to y, and y is preferred to z.

CARDINAL UTILITY.
Cardinal utility means more: having cardinal utilities of of 3, 2, 1 for alternatives x, y, z (respectively), is **NOT** the same as having 1000, 987, 0, which in turn is not the same as having 102, 4, 3.

Here utility has a meaning beyond just giving a ranking of alternatives. **It means the *intensity* of pleasure one attributes to the alternatives x, y and z** (we will come back to this later).

UTILITY: DEFINITION

If a preference relation is *complete*, *reflexive*, *transitive* and *continuous*, it can be represented by a continuous utility function (Hicks and Allen 1934).

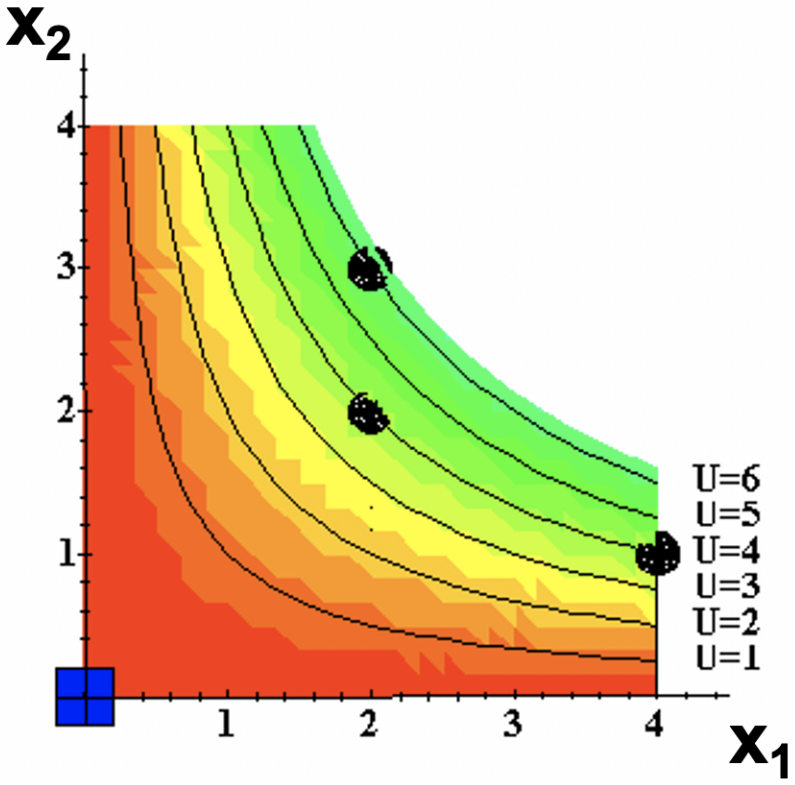


- **Continuity:** small changes to a consumption bundle cause only small changes to the preference level. Graphically, it means that a utility function cannot have a "gap"

UTILITY: GRAPHICAL REPRESENTATION

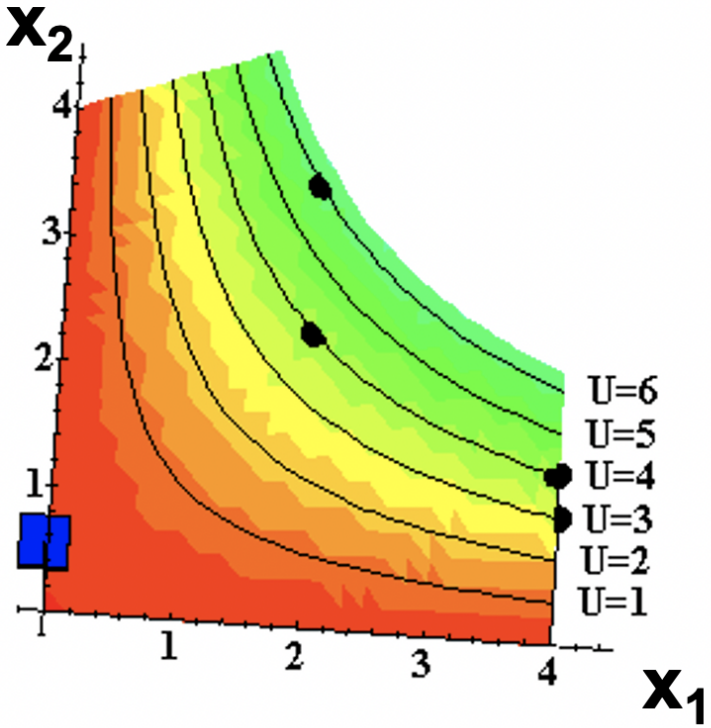
But where does the increasing utility function (depicted above) comes from?

Let us assume that we have the following indifference curves of an individual, which assign different utility levels $u(X') = 1, u(X'') = 2, ...$, and where a higher *IC* is preferred to a lower one.



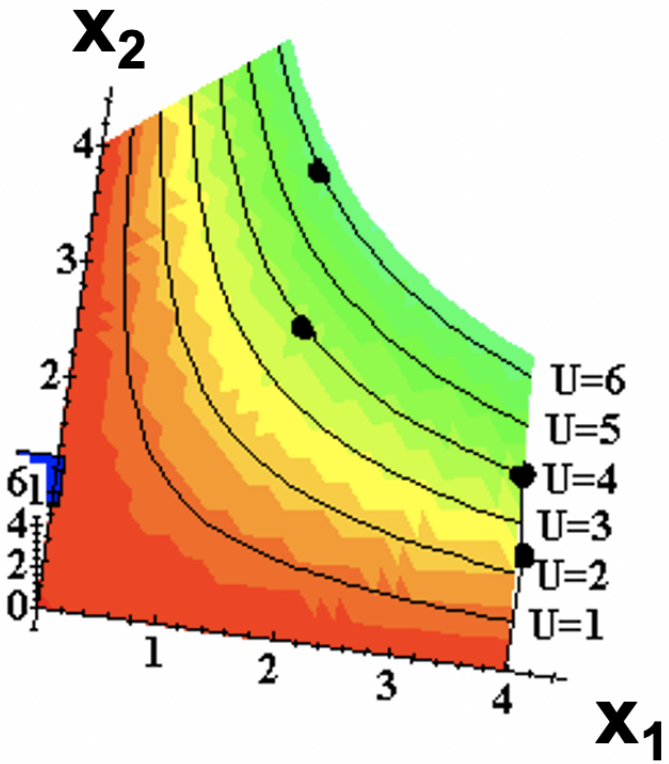
Six indifference curves of every possible combination of (x_1, x_2)

UTILITY: GRAPHICAL REPRESENTATION



Adding the third axis of utility

UTILITY: GRAPHICAL REPRESENTATION



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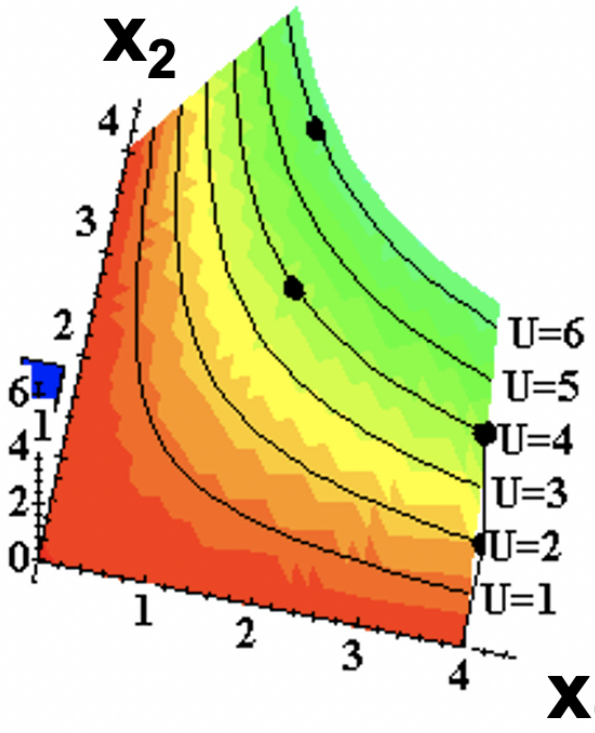

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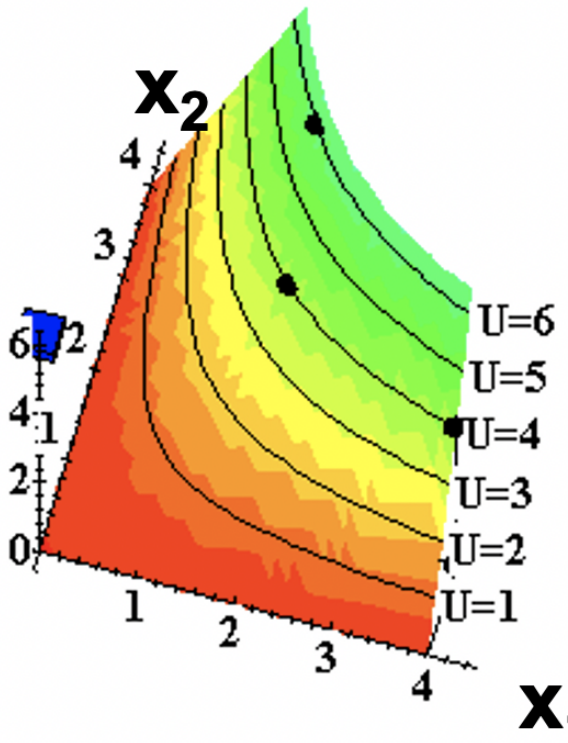

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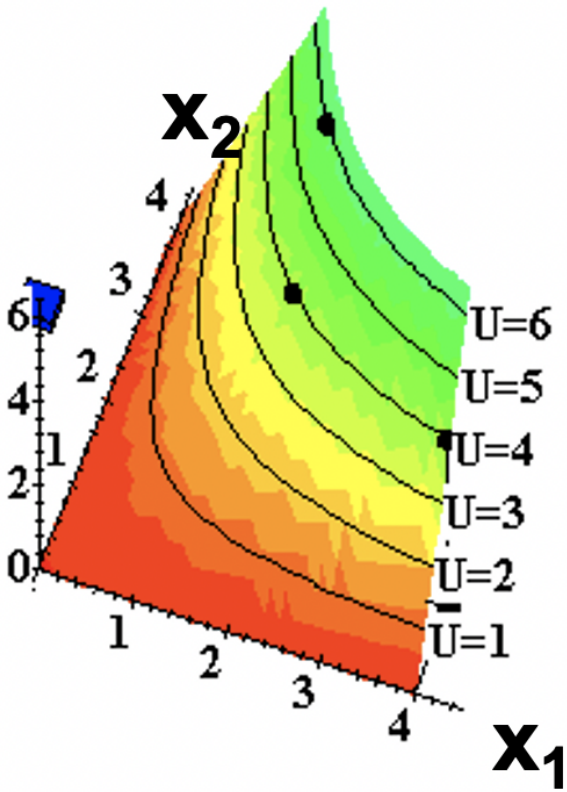

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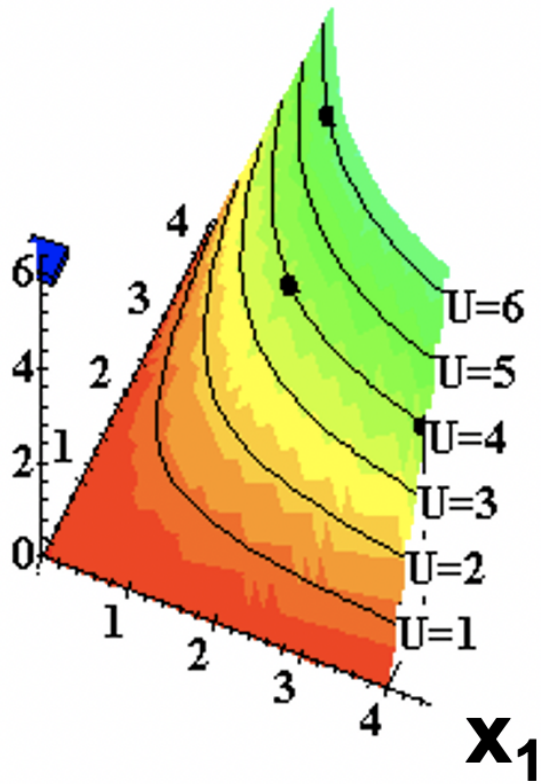

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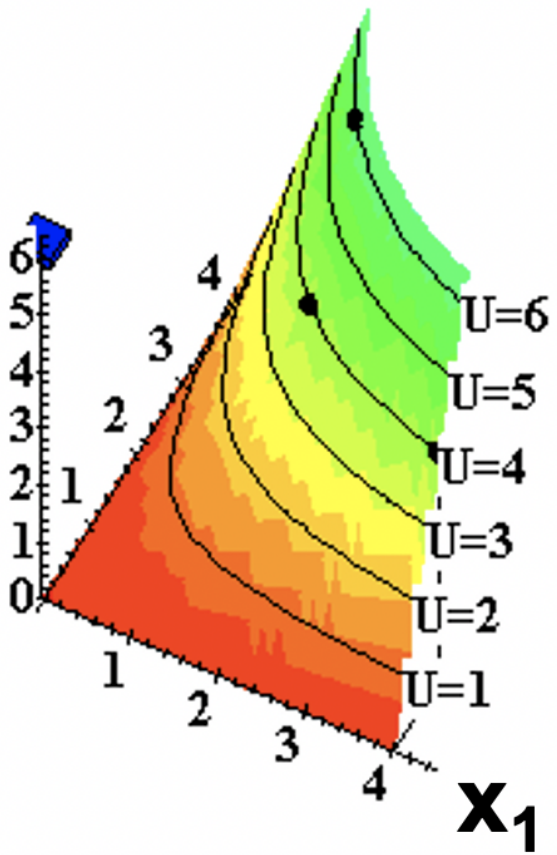

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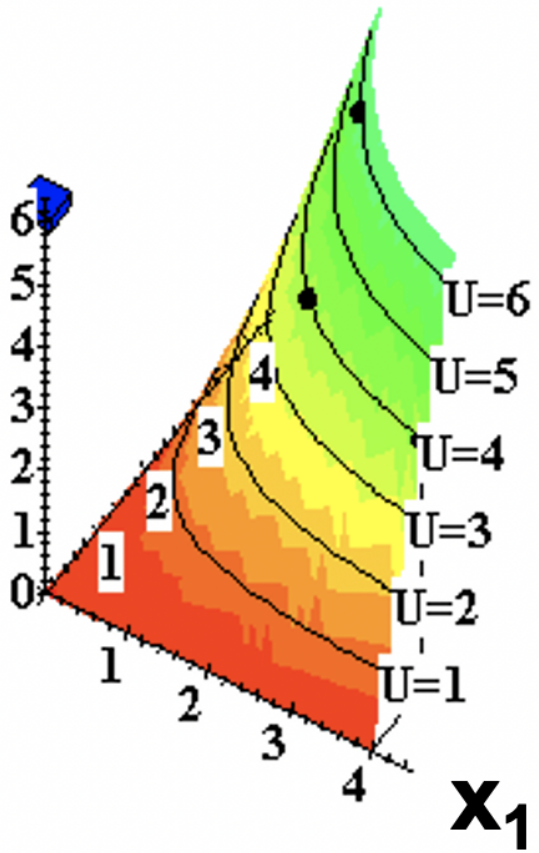

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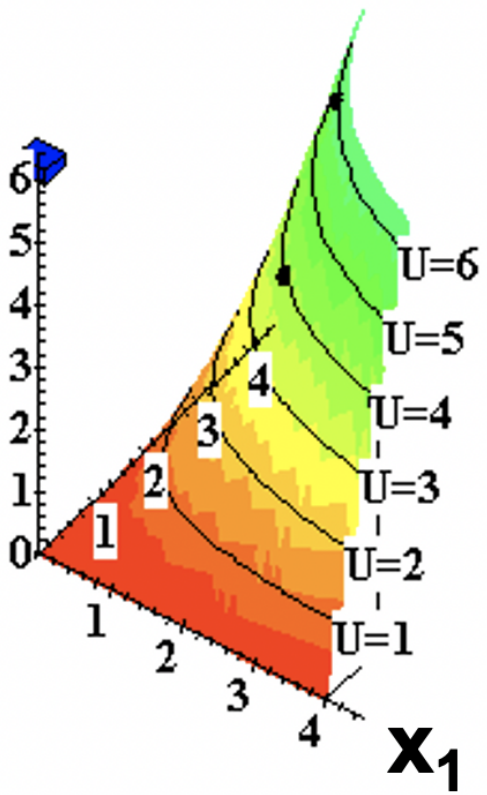

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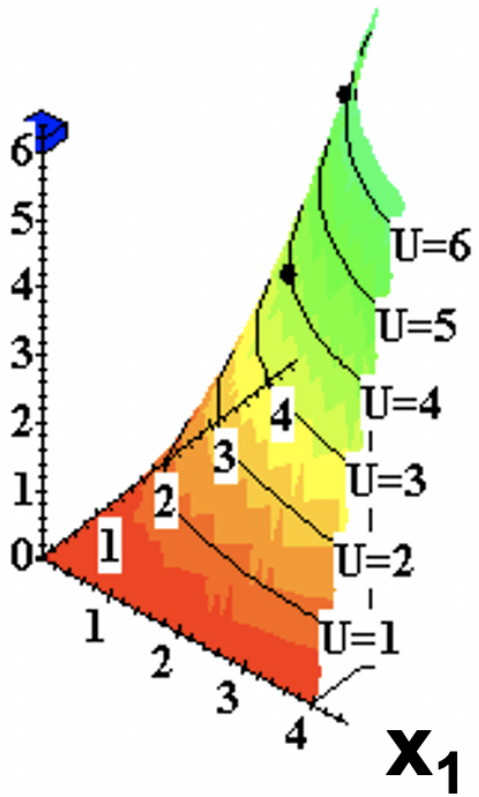

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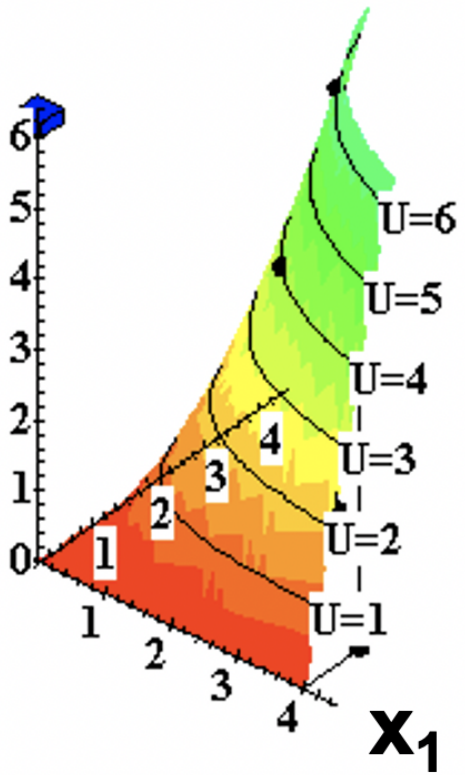

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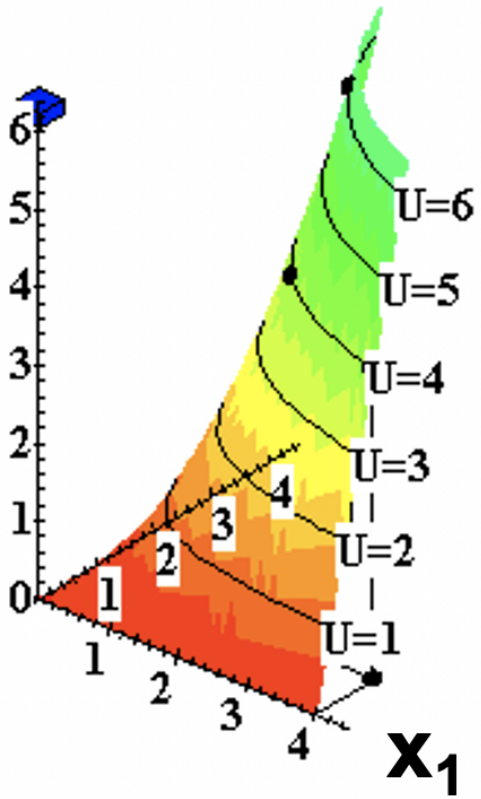

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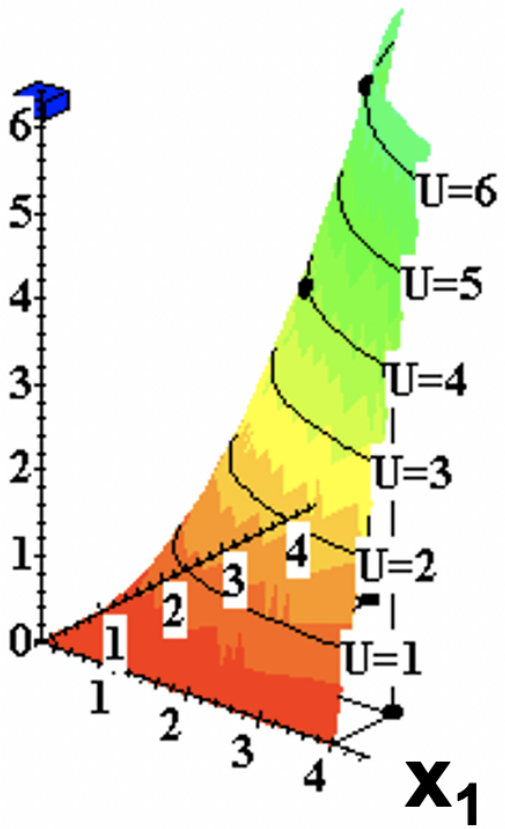

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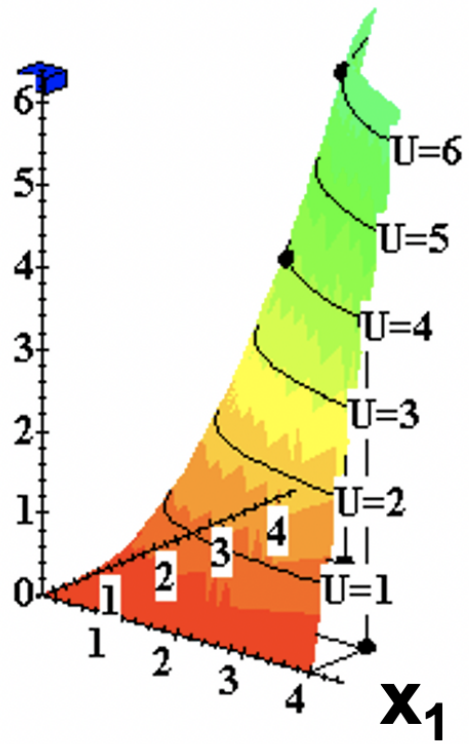

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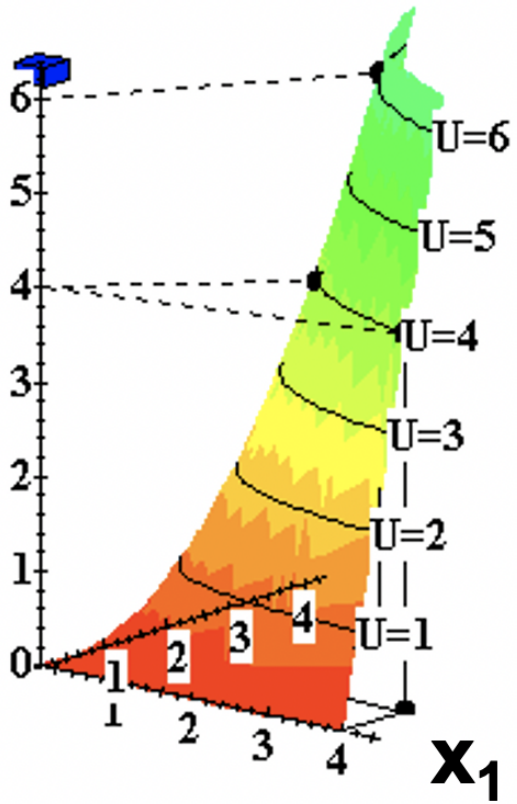
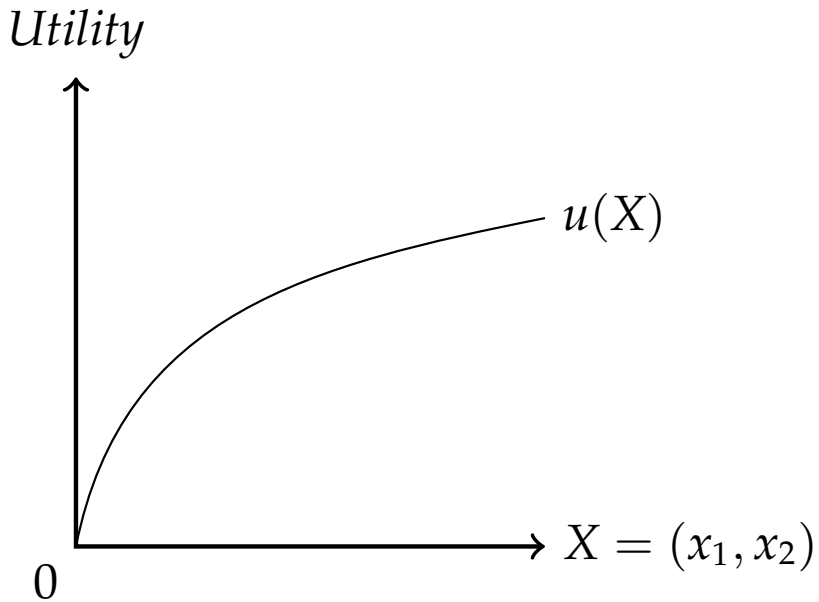


Adding the third axis of utility

UTILITY: GRAPHICAL REPRESENTATION

In order to have a 2D graph, we can simply put the consumption bundle $X = (x_1, x_2)$ on the x-axis and the the level of satisfaction (utility) on the y-axis, so that:



Note: We will not comment cases where utility functions are convex or linear. Just remind this: if preferences are well-behaved (and therefore convex), utility functions are concave.

UTILITY: SO WHAT?

Why have we defined all this? To characterise *what* is to be evaluated (the informational basis) in welfare economics, which is **UTILITY**.

But what is actually "utility"?

A concept that evolved through time:

- Bentham (1823, p. 2): "property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness"
- J.S. Mill (1861): the directive rule of human conduct (*utilitarianism*: a theory of ethics)
- Hicks and Allen (1934): the value of a function that represents an individual's preferences

UTILITY: PERHAPS THE MOST IMPORTANT CONCEPT OF ECONOMICS

Why eminent economists (Pareto even before Hicks and Allen) have avoided giving preferences, and therefore utility, a meaning of happiness (in particular) or even more generally, a meaning of one's psychological states?

Several reasons, but perhaps the most concerning one: it was hard to practically measure one's psychological states (such as happiness), especially at the time.

This does not mean that the contemporary meaning of "utility" is the "best" one (whatever "best" might mean here).

UTILITY: PREFERENCE, WELL-BEING, OR BOTH?

Which meaning of utility are we going to take in welfare economics?

- In order to evaluate social states, we have to make some minimal assumptions about what makes individuals better off (otherwise, what are we going to evaluate?)
- But economists are often disturbed by such a philosophical commitment: "better off", according to *what*? Or more directly, what is the *good* in all that?

Minimal commitment: the good consists in the satisfaction of one's preferences, so that, of two alternatives X' and X'', the one she prefers cannot fail to be better for her.

UTILITY: PREFERENCE, WELL-BEING, OR BOTH?

We can then see utility as a quantification of one's well-being through one's satisfaction of preferences.

It means that one's well-being is defined in terms of one's preference satisfaction, and therefore by one's level of utility.

In sum, well-being (or welfare) is simply measured by one's level of utility, at the "cost" of assuming that what one prefers is best for him/her.

UTILITY MEASUREMENT

If utility is not about happiness intensity but about one's preferences, a way to measure it is imply to collect one's preferences over all alternatives.

Unless we resort to some kind of mind reading technology like magnetic resonance imaging (*neuroeconomics*), the best measurement we could hope for would be a very long survey with questions like:

1. Would you prefer to live in a small apartment in Paris or in a big apartment in Lyon?
2. Would you prefer a chocolate cake or a pana cotta for dessert?
3. Would you prefer a two week holiday in Thailand or a three week holiday in Brazil?
4. If you went on a holiday to Thailand, would you prefer a chocolate cake or a pana cotta during your visit?
5. And so on...

UTILITY MEASUREMENT

The survey would need to include a large number of questions like this to know somebody's preferences accurately.

- In practice, it is hard to collect such a data about one's preferences
- In theory, we can however imagine that we have access to this survey data because our goal is to study the *implications* of individuals' preferences on social well-being

In short, we will pretend that individuals have utility functions because we would reach the same conclusions if we worked with survey data instead.

WHAT NEXT?

- Now we have defined *what* is to be evaluated in welfare economics, that is, *utility* **(session 1)**
- We can begin studying the results welfare economics has to offer about social *well-being* **(sessions 2 and 3)**

Intermediate Microeconomics

Part I: Welfare Economics

Session 1: Preferences and Utility

Lecturer: Ivan Mitrouchev

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