

# Electronic Commerce

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Economics

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## Abstract

A summary of prerequisite knowledge of microeconomics.

# Introduction to Consumer Theory

- We gave a sorting argument for upward sloping supply. Similarly demand would slope downward. But this depends on each agent trading one unit. What about agents who trade multiple units, or even in continuous domains?
- We implicitly discuss tradeoffs of work and money for leisure. But this is not very satisfactory, we would like an explicit theory.
- In the apartment case, supply was vertical. This is perhaps plausible. But vertical demand is not. Eventually you run out of money! We need to integrate this constraint with consumer preferences.
- Sometimes the sorting condition fails (*e.g.*, minimum wage).

# Goals and Methods of Consumer Theory

- The goal of consumer theory is to relate consumers' directly unobservable tastes/goals to their mostly observable resources and constraints, to market prices, and to decisions.
- We carefully define the budget, which is the constraint defined by the consumer's income and prices.
- The budget defines tradeoffs in the set of feasible *bundles*, that is, consumption plans.
- Consumers' tastes also define tradeoffs among bundles, and therefore implicitly of one good for another.
- We relate preferences to prices through *marginal analysis* of the consumer's *optimization problem*.

# Basic Behavior of Consumers

- All economic agents buy and sell goods on markets.
- Consumers own resources. Their goals are defined by what they like. They do not produce outputs from inputs. (Firms differ.)
- There are many goods the consumer might want: meats and sheets, coats and boats, houses and blouses. We bundle them up, listing quantities of all goods that consumer might conceivably buy. If needed, explicitly write zero. Also called a “vector”.
  - Typically we use 2 goods. (Mathematically we can handle any number. Graphs of more than 2-good bundles are hard.)
  - Anything not spent on goods explicit in the bundle is thrown away (not “saved”). To account for saving, put “future consumption” in the bundle.

# Budget Constraint

- The consumer is *endowed* with a sum of money, called *income* or *wealth*.
- The consumer buys goods in the market, at the price in the market for each good, and expenditure must not exceed income:

$$p_1x_1 + p_2x_2 \leq m.$$

- Where the expenditure equals income we have

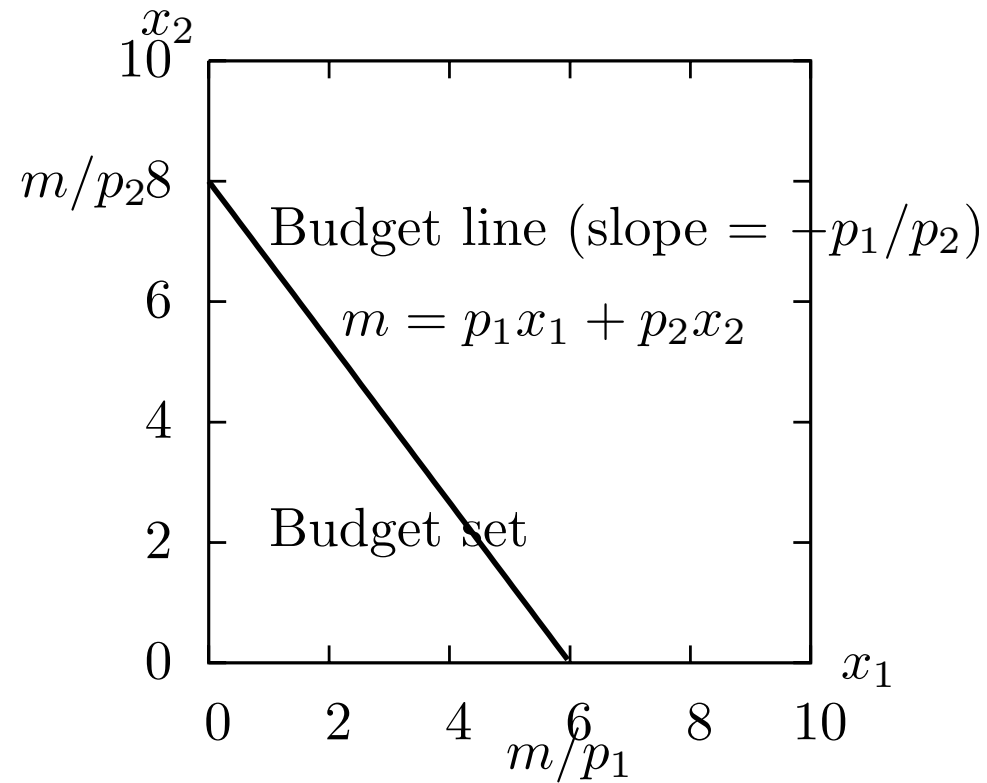
$$p_1x_1 + p_2x_2 = m$$

which is the equation of a line, called the *budget line*.

- The affordable bundles are those below the budget line (consider buying nothing!); the triangle bounded by the two axes and the budget line is the *budget set*. Budget sets need not be triangular.

- The explicit mention of units is a good habit; the U.S. space agency NASA recently lost a probe worth hundreds of millions of dollars because one programmer wrote a subroutine assuming “feet per second,” and another fed it data in “meters per second.”

# Budget Constraint Graph



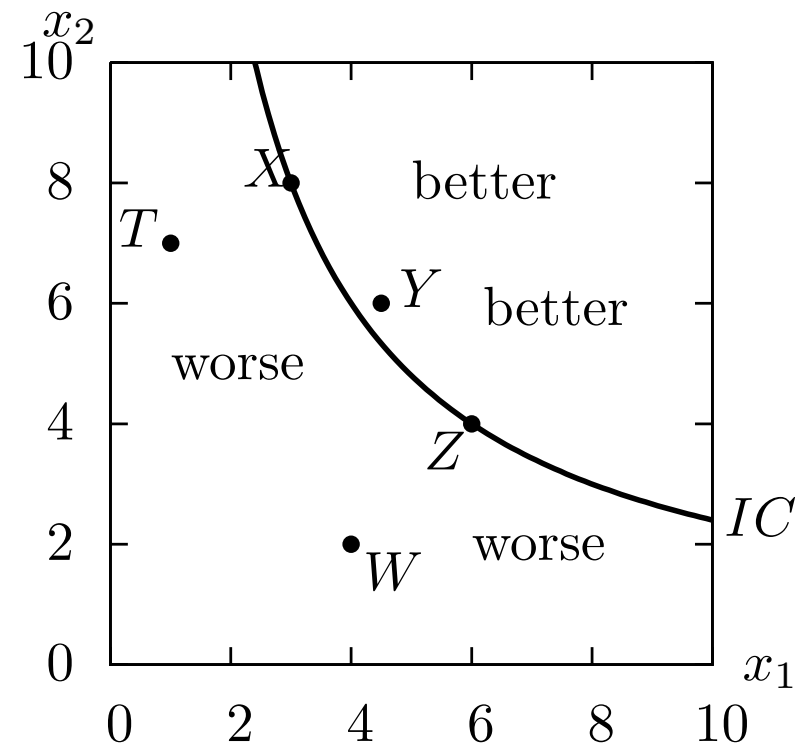
# Indifference Curves

- Graphical presentation of preference
- $\{Y : Y \succeq X\}$  is the *weakly preferred set* (aka the “upper contour set”) of  $X$
- $\{Y : X \succeq Y\}$  is the *weakly less preferred set* (aka the “lower contour set”) of  $X$
- $\{Y : Y \sim X\}$  is the *indifference curve* (aka the “indifference set”) through  $X$
- $\{Y : Y \succ X\}$  is the *strictly preferred set* (aka the “strict upper contour set”) of  $X$
- For an optimal choice  $X$ , “ $X$  is feasible and the strictly preferred set of  $X$  is disjoint from the feasible set,” or “ $X$  is feasible and the feasible set is contained in the lower contour set of  $X$ .”

# Typical Indifference Curve

In the graph at right

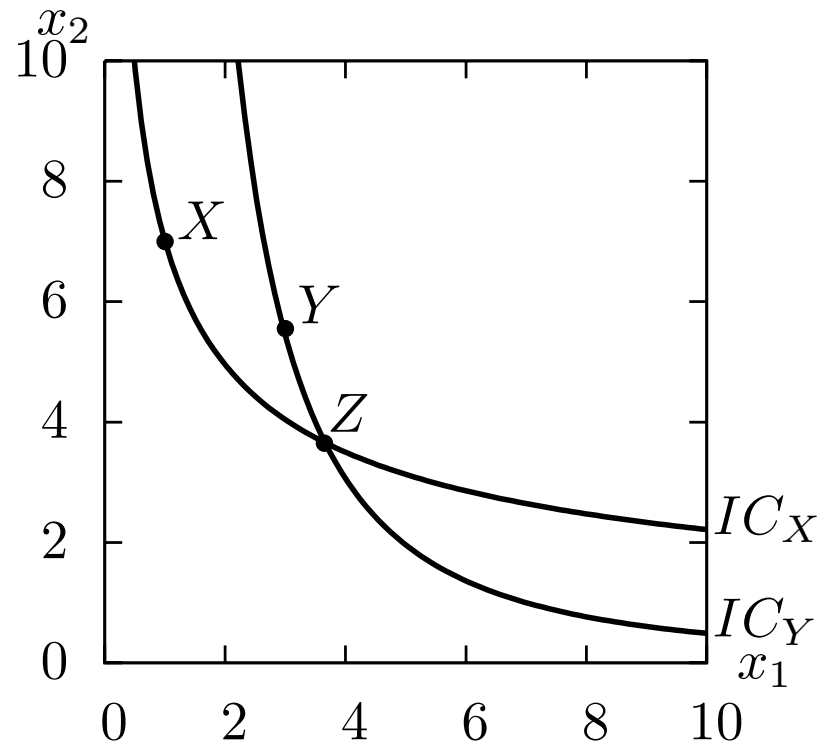
- $Z \sim X$ ,  $Y \succ X$ , and  $X \succ W$  (by position relative to IC)
- $Y \succ T$  (by transitivity)
- *This* IC does not show how to compare  $W$  and  $T$ , but both  $W$  and  $T$  have their own indifference curves (not shown)



# Indifference Curves May Not Cross

- Suppose there is a bundle  $X$  and another bundle  $Y$ , such that not  $X \sim Y$ .
- Then  $X$  is not on  $Y$ 's indifference curve, and  $Y$  is not on  $X$ 's indifference curve.
- Suppose they cross. Then there exists  $Z$  on both indifference curves (see following graph).
- By definition of indifference, we have  $X \succeq Z \succeq Y$  and  $Y \succeq Z \succeq X$ .
- Transitivity and the definition of indifference give  $X \sim Y$ , so the assumption that  $IC_X$  and  $IC_Y$  cross is not compatible with the assumption that they are different ICs.

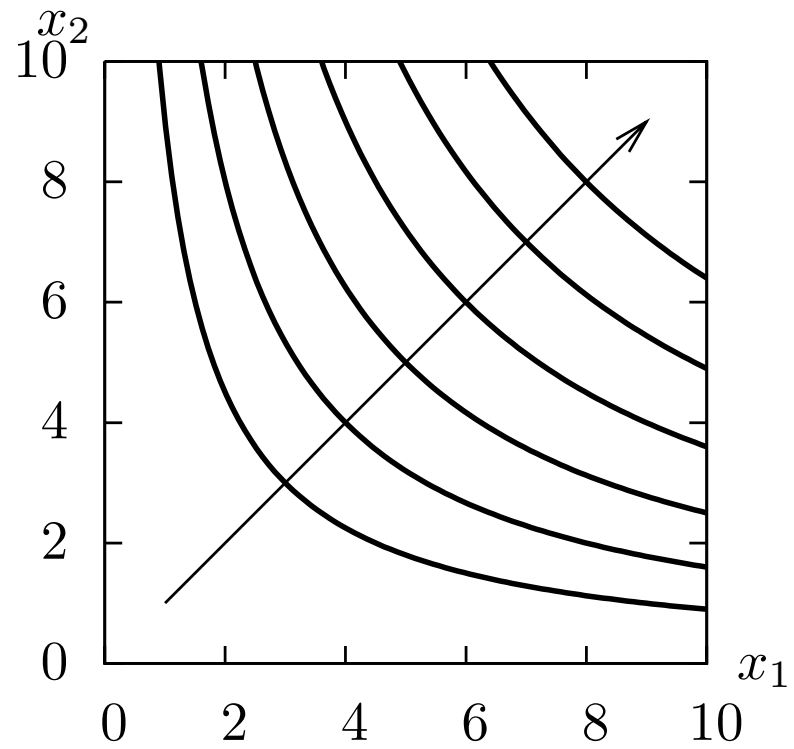
# Crossing Indifference Curves?



# More About Indifference Curves

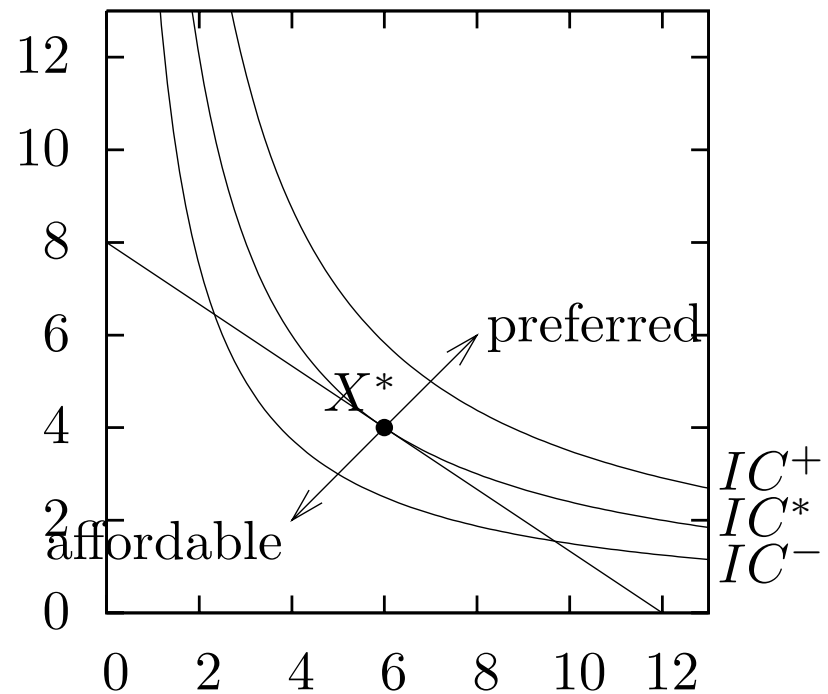
- We cannot (yet) rule out a “4-armed” shape for the indifference “curve” through  $Z$ , but in that case  $X \sim Y$ .
- This implies that indifference curves are locally well-ordered as on a topographical contour map (see following graph).

# Ordered Indifference Curves

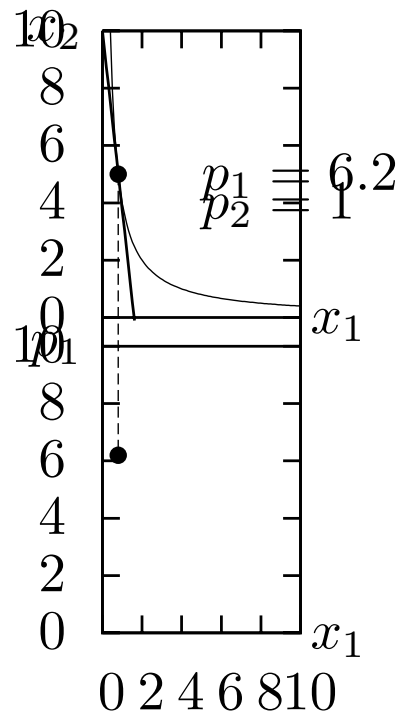


# The Consumer's Optimum Graphically

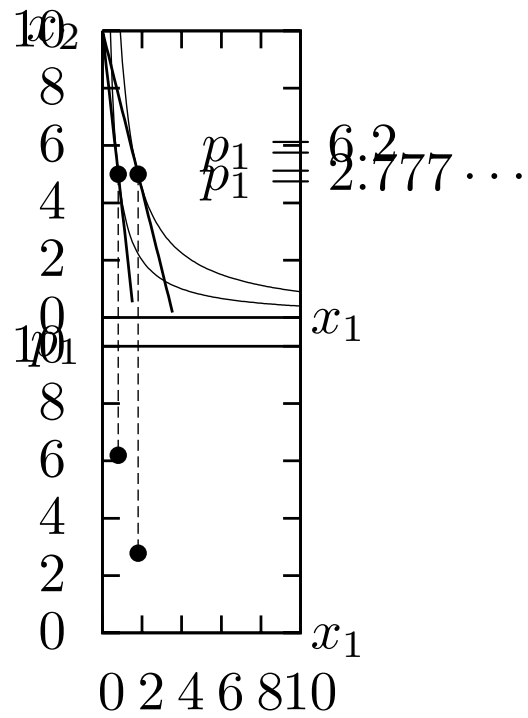
The point  $X^*$  divides the plane into 3 areas: *affordable* (the budget set), *strictly preferred* to  $X^*$  (the upper contour set), and “neither.” Since nothing is affordable *and* strictly preferred,  $X^*$  is optimal.



# Deriving the Demand Curve: 1

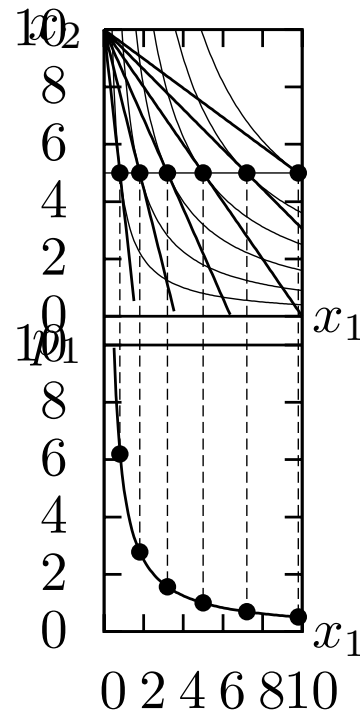


# Deriving the Demand Curve: 2



# Deriving the Demand Curve: 3

- The set of optimal points for different budget lines defined by various prices of good 1 is called the *offer curve*.
- The graph of prices and quantities of good 1 corresponding to the offer curve is the *demand curve*.



# Deriving the Demand Curve

1. Pick  $p_2$  and  $m$ .
2. Pick a new  $p_1$ .
3. Plot the budget set on top.
4. Find the tangent IC and optimum.
5. Plot  $p_1$  and  $x_1^*$  on the demand curve.
6. Return to step 2.

