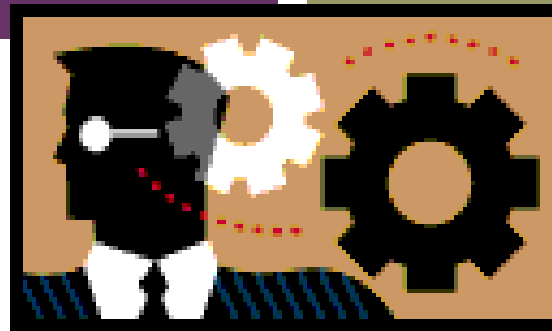




& Business Strategy

Chapter 4

The Theory of Individual Behavior





Overview

4-2



I. Consumer Behavior

- Indifference Curve Analysis
- Consumer Preference Ordering

II. Constraints

- The Budget Constraint
- Changes in Income
- Changes in Prices

III. Consumer Equilibrium

IV. Indifference Curve Analysis & Demand Curves

- Individual Demand
- Market Demand



Consumer Behavior – *“People choose the best things they can afford.”*

4-3



1) What he can afford -> Income defines his BUDGET CONSTRAINT

2) Best things → Preferences

- Consumer must have some Opportunities
 - The possible goods and services consumer can afford to consume.
- Consumer must have a Preference Ordering
 - Consumers can choose between goods

Language of preferences:

Given the choice between 2 bundles of goods a consumer either

- Prefers bundle X to bundle Y: $X \succ Y$.
- Prefers bundle Y to bundle X: $X \prec Y$.
- Is indifferent between the two: $X \sim Y$.



Terminology

- Consumption bundle: objects of consumer's choice....many
- For simplicity, we assume there are just two goods in a consumption bundle.
- One of them is defined as “all other goods”
- This brings n goods down to the two-dimensional plane.
- Consumption bundle $A = (X_1, X_2, X_3, X_4, \dots, X_n) = (X, Y)$
- Preferences can be shown graphically using a concept called Indifference Curves





Assumptions

- Consumer attaches a value to each good. We call this utility.
- Utility is captured mathematically by utility function
- $U_1 = f(X_1) = a + (X_1)^2$
- The higher the amount of each good, the higher the utility => utility is a positive/increasing function of X which implies slope of the $U(X)$ or $U(Y)$ function is positive.
- When there are more than one good, utility function for a bundle of goods

$U = U(X, Y), \quad U' > 0$ Partial derivative w.r.t X or Y > 0





Law of Diminishing Marginal Utility



- Utility function is a simple way to represent or **summarize a preference ordering of the consumer**. The numerical magnitudes of $U(X)$ have no intrinsic meaning but only used for ordering.

$U = U(X, Y)$ just indicates the different values consumer attaches to different bundles.

- Marginal utility is the change in utility when any one of the goods, say good X , is increased by ΔX , a very small amount. Good Y is held as fixed.

MU_X = Partial derivative of U w.r.t X (good Y held constant)

MU_Y = Partial derivative of U w.r.t Y (good X held constant)

DMU: MU_X or MU_Y falls as consumption of good X or Y is increased.

Total change in utility associated with total change in any good X

$$dU_X = MU_X dX$$

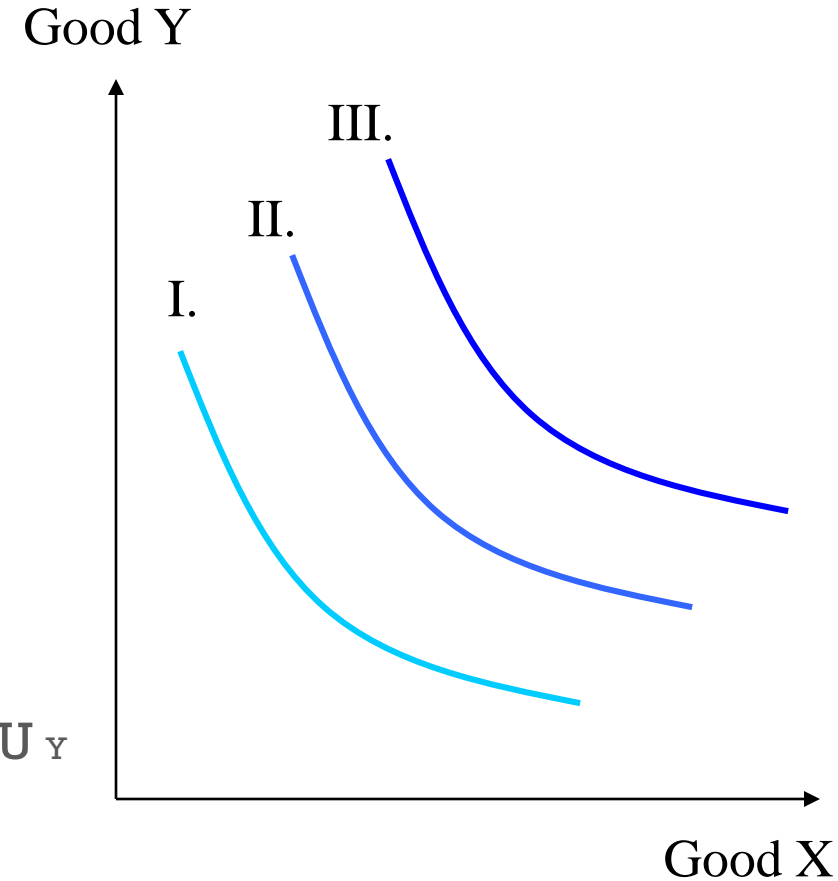
Total change in utility when both goods change can be computed using total differential,

$$dU = MU_X dX + MU_Y dY$$

Indifference Curve (IC) Analysis

4-7

- An IC joins all combinations of two good X and Y that give the consumer the same level of satisfaction, quantitatively measured through utility.
- $U(X, Y) = k$
- Why IC is downward sloping?
- $MRS \Rightarrow$ Absolute Slope of IC
- Differentiate the U fn w.r.t. x to get the MRS value.
- Along an IC, show that $MRS = MU_X / MU_Y$



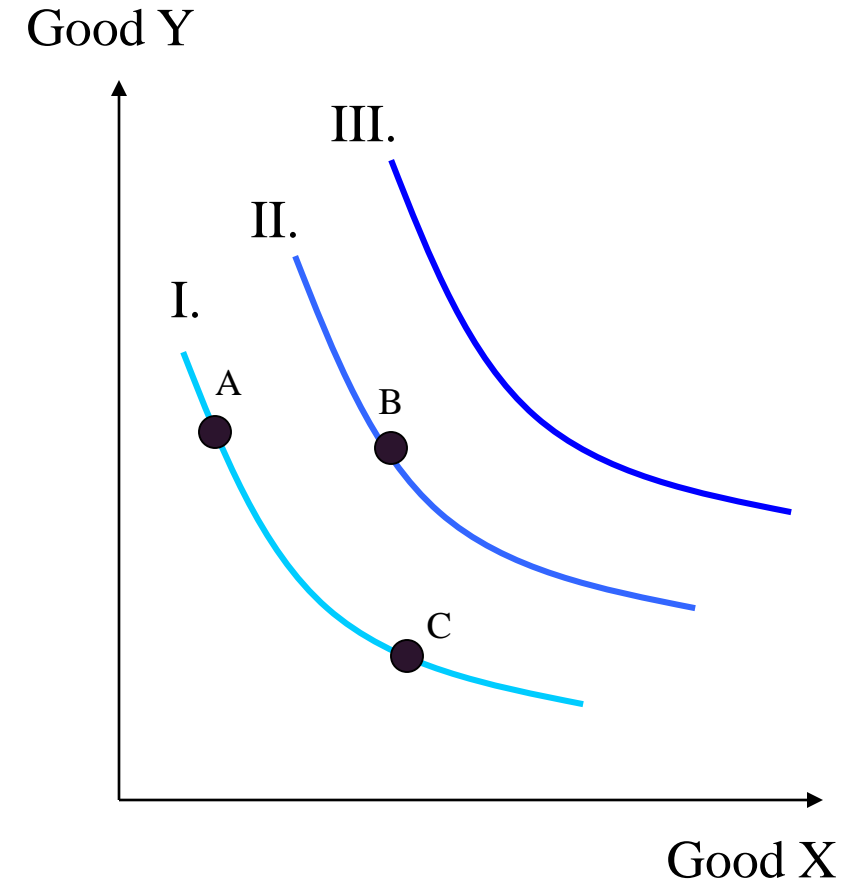


Consumer Preference Ordering Properties

- Completeness
- Reflexivity
- More is Better
- Diminishing Marginal Rate of Substitution
- Transitivity

Complete Preferences

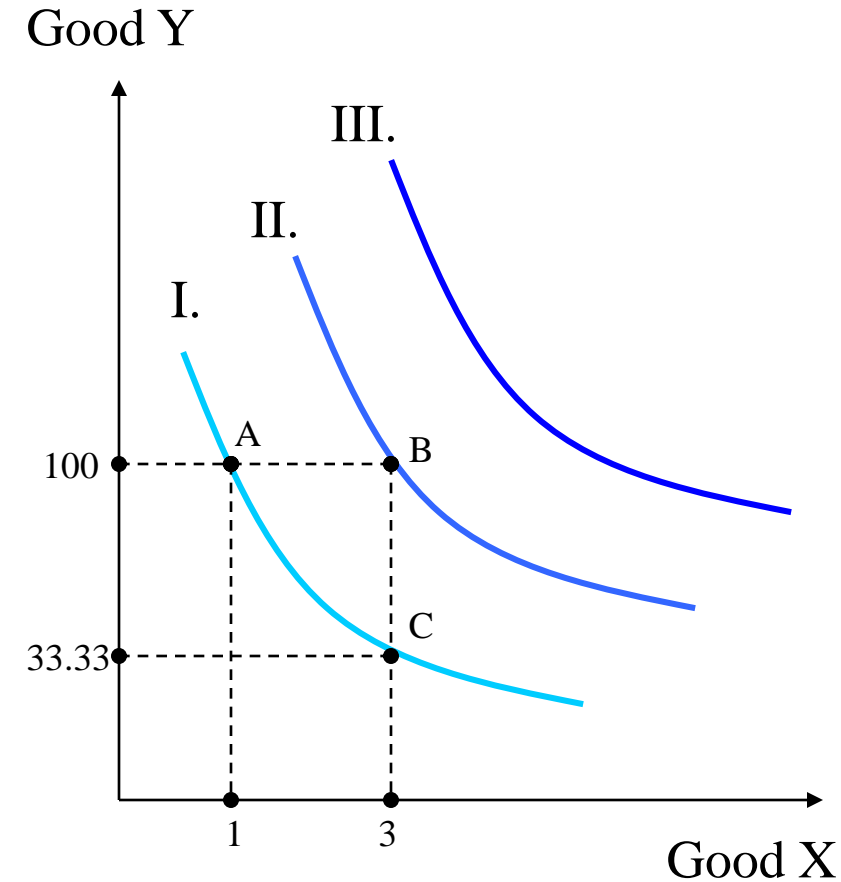
- **Completeness Property:** Any two bundles can always be compared.
- Consumer is capable of expressing preferences (or indifference) between all possible bundles. (“I don’ t know” is NOT an option!)
- If the only bundles available to a consumer are A, B, and C, then the consumer
 - is indifferent between A and C (they are on the same indifference curve).
 - will prefer B to A.
 - will prefer B to C.



More Is Better!

■ More Is Better Property

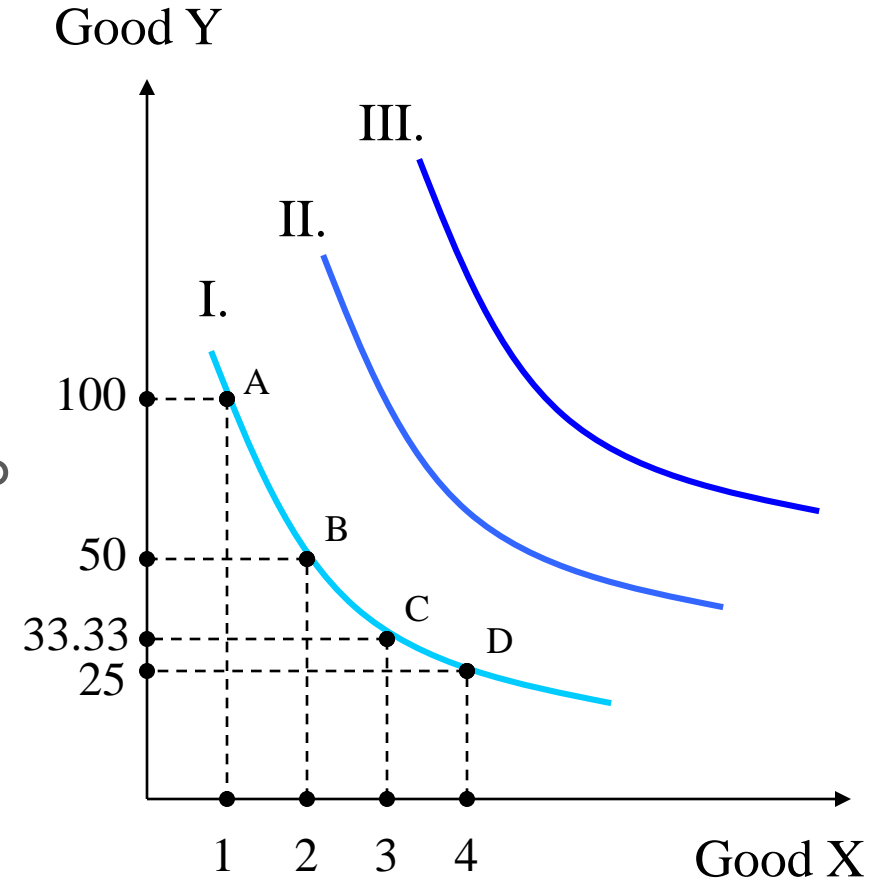
- Bundles that have at least as much of every good and more of some good are preferred to other bundles.
- Bundle B is preferred to A since B contains at least as much of good Y and strictly more of good X.
- Bundle B is also preferred to C since B contains at least as much of good X and strictly more of good Y.
- More generally, all bundles on IC_{III} are preferred to bundles on IC_{II} or IC_I . And all bundles on IC_{II} are preferred to IC_I .



Diminishing Marginal Rate of Substitution

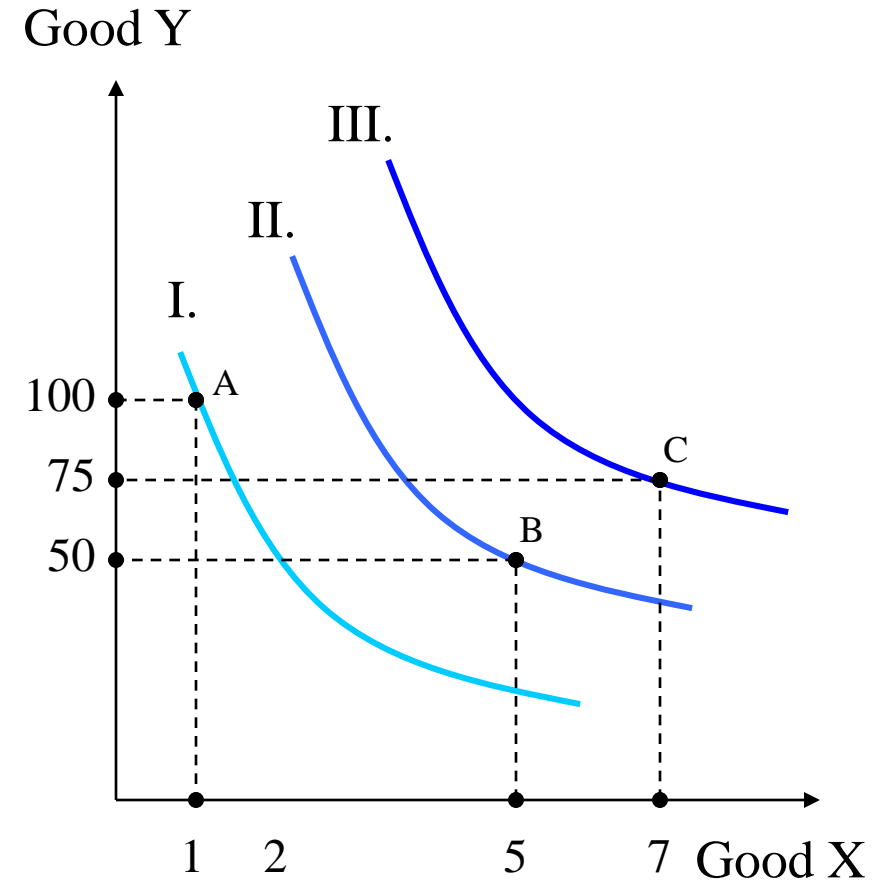
■ Marginal Rate of Substitution

- The amount of good Y the consumer is willing to give up to maintain the same satisfaction level decreases as more of good X is acquired.
 - The rate at which a consumer is willing to substitute one good for another and maintain the same satisfaction level.
- To go from consumption bundle A to B the consumer must give up 50 units of Y to get one additional unit of X.
 - To go from consumption bundle B to C the consumer must give up 16.67 units of Y to get one additional unit of X.
 - To go from consumption bundle C to D the consumer must give up only 8.33 units of Y to get one additional unit of X.



Consistent Bundle Orderings

- Transitivity Property
 - For the three bundles A, B, and C, the transitivity property implies that if $C \succ B$ and $B \succ A$, then $C \succ A$.
 - Transitive preferences along with the more-is-better property imply that
 - indifference curves will not intersect.
 - the consumer will not get caught in a perpetual cycle of indecision.





Different preferences

- If you are given an utility function, you can easily draw the related set of indifference curves.
- **Cobb-Douglas Function**: $U = X^\alpha Y^\beta$
- **Perfect Substitutes** : Two goods are perfect substitutes when consumer is willing to substitute one for the other at a constant rate. Linear preferences
- **Perfect complements**: Goods that are always consumed together. L-shaped IC.
- **Bads**: A good consumer doesn't like. Pollution, risk, tenacious work, and illness are some examples of bads.
- Depending on the level of consumption, a good can become a bad after certain levels of both commodities. Satiation point.

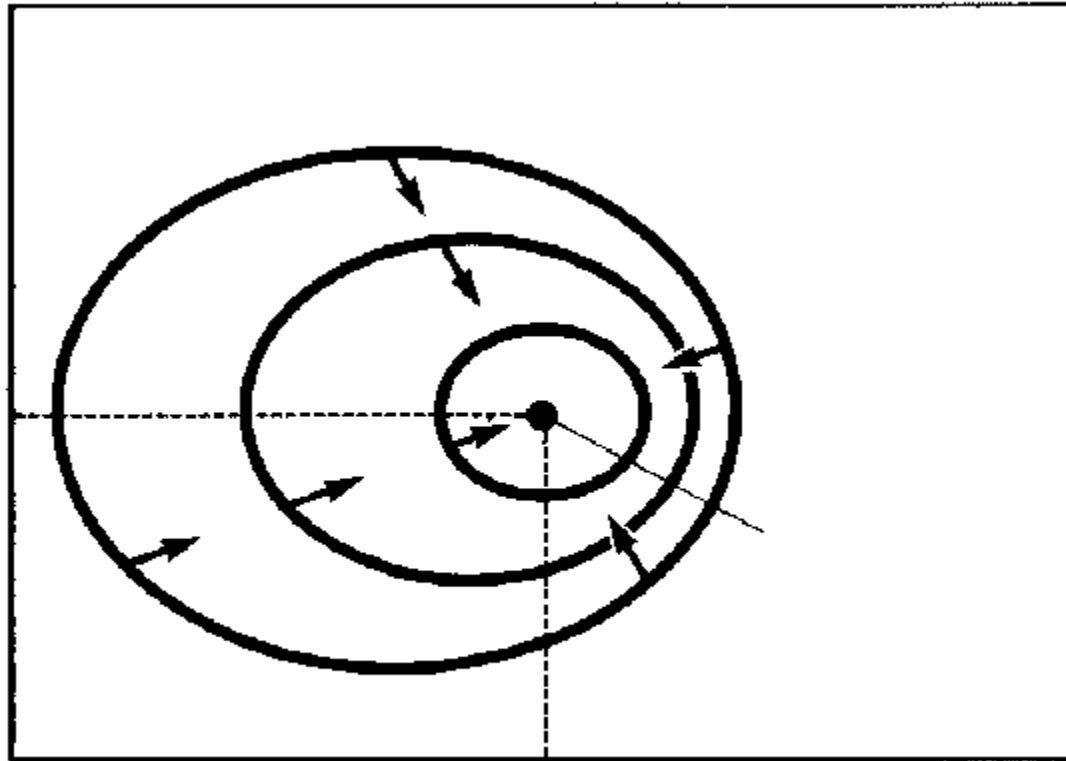




TOO MUCH OF A GOOD THING? SATIATION AND SATISFACTION



- once you pass the **satiation point**, consuming more — even of something you love — means enjoying it less





HW

- Suppose the return and safety of a financial instrument are two commodities and you are told to determine the preferences of a risk averse and risk lover investor.
- Hint: Take return (Y) and risk(X) on the two dimensional plane. Starting from any point on any IC, plot the IC for either of them.
- Assumptions: For the risk-lover, risk is a 'good' that is it gives positive utility. For the risk-averse investor, risk is a 'bad' that is it gives him negative utility.
- Risk-averse: the indifference curve between riskiness (i.e., bad) and rate of return (i.e., a good) slopes upward. This is because as we move rightward satisfaction declines due to greater risk and to compensate for the decline in satisfaction due to greater risk and to keep the level of satisfaction constant, rate of return (i.e., good') has to be increased. It may be noted that direction of preference in this case also will be northward and westward as indicated in the diagram.

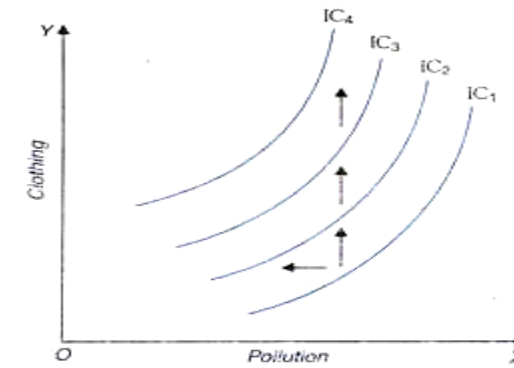
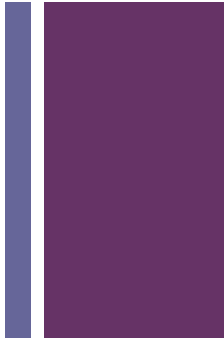


Fig. 8.9. Indifference Curves between 'Bad' and 'Good'





U(x,y)	MU_x	MU_y	MRS _{x.y}
2x+3y			
ln x +y			
(x+a)(y+b)			
X^a + Y^a			

+

Anupama has **quasilinear** utility. Her preferences can be represented by the utility function $U(x_1, x_2) = U(\text{nut}, \text{berry}) = f(x_1) + x_2 = 4\sqrt{x_1} + x_2$.

- (a) She originally consumed 9 units of nuts and 10 units of berries. Her consumption of nuts is reduced to 4 units, but she is given enough berries so that she is just as well-off as she was before. After the change, how many units of berries does Anupama consume?
- On the graph, indicate Anupama's original consumption and sketch an indifference curve passing through this point. If you doubled the amount of each good in each bundle, what are the consumption bundles. Are these two bundles on the same indifference curve as before?
 - What is her preference between the bundles (9,10) and (25,2)?
 - What is the functional expression of MRS of Anupama? What is her marginal rate of substitution, $MRS(x, y)$, when she is consuming the bundle (9,10)? What is her marginal rate of substitution when she is consuming the bundle (9,20) and (25,2)?





Techniques learnt

- Draw an indifference curve through a specified commodity bundle when you know the form of the utility function.
- Calculate marginal utilities and marginal rates of substitution when you know the utility function.
- Find utility functions that represent preferences when goods are perfect substitutes and when goods are perfect complements.
- Recognize utility functions for commonly studied preferences such as perfect substitutes, perfect complements, quasilinear utility and Cobb-Douglas utility.

