ERASMUS PROGRAM: PUBLIC FINANCE I

LECTURE II

THE TOOLS OF PUBLIC FINANCE

- Theoretical Analysis (Models)
- Empirical Analysis (Interviews, Experiments, Econometric Studies)

DEMAND AND CONSTRAINED UTILITY MAXIMIZATION

- Preferences in economics are typically characterized by utility functions and indifference curves

- An indifference curve is the locus of points representing all consumption combinations among which an individual is indifferent. That is, all consumption combinations that give the individual the same level satisfaction, well-being or utility.

Assumed Properties of Indifference Curves

✱ Non-satiation ("more is better") implies that:

- I. Consumer prefer to be in higher indifference curves (further away from the origin in a north east direction)

- II. Indifference curves are downward slopping

✱ *We also assume that preferences are characterized by the following:*

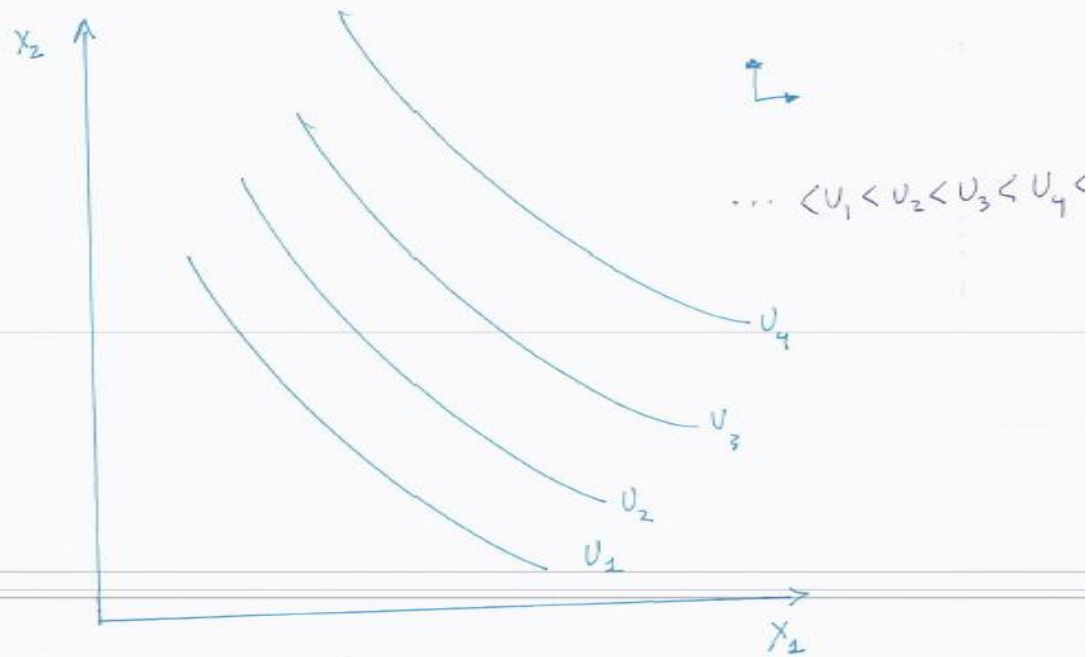- III. Indifference curves are convex to the origin

Indifference Curve: An Example
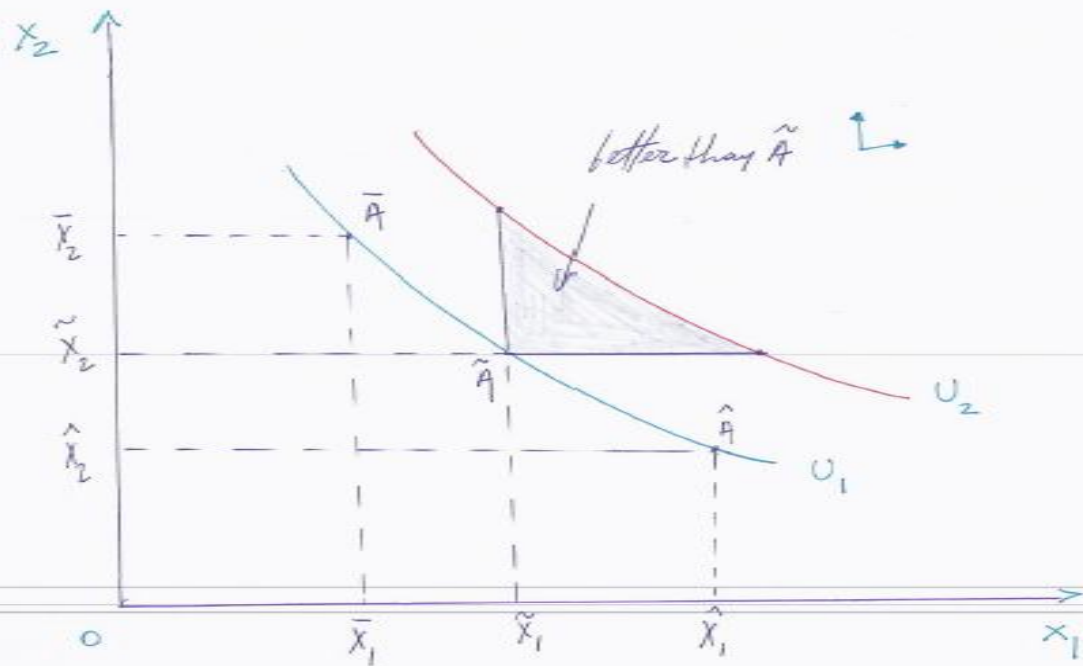
Indifference Map and Utility

- Indifference Map is the collection of an individual's indifference curves with each one of these indifference curves been associated with a level of the individual's utility

Indifference Map: An Example

X_2

$\cdots < U_1 < U_2 < U_3 < U_4 <$

U_4

U_3

U_2

U_1

X_1

- Exercise 2
- 1. Draw the indifference curves of an individual for goods, X and Y, When the individual:

(a) Does not like Y (i.e, does not matter how … ……..Y he/she consumers)

(b) Dislike Y (i.e., prefers leww Y to more Y)

(c) Does not distinguishe X from Y

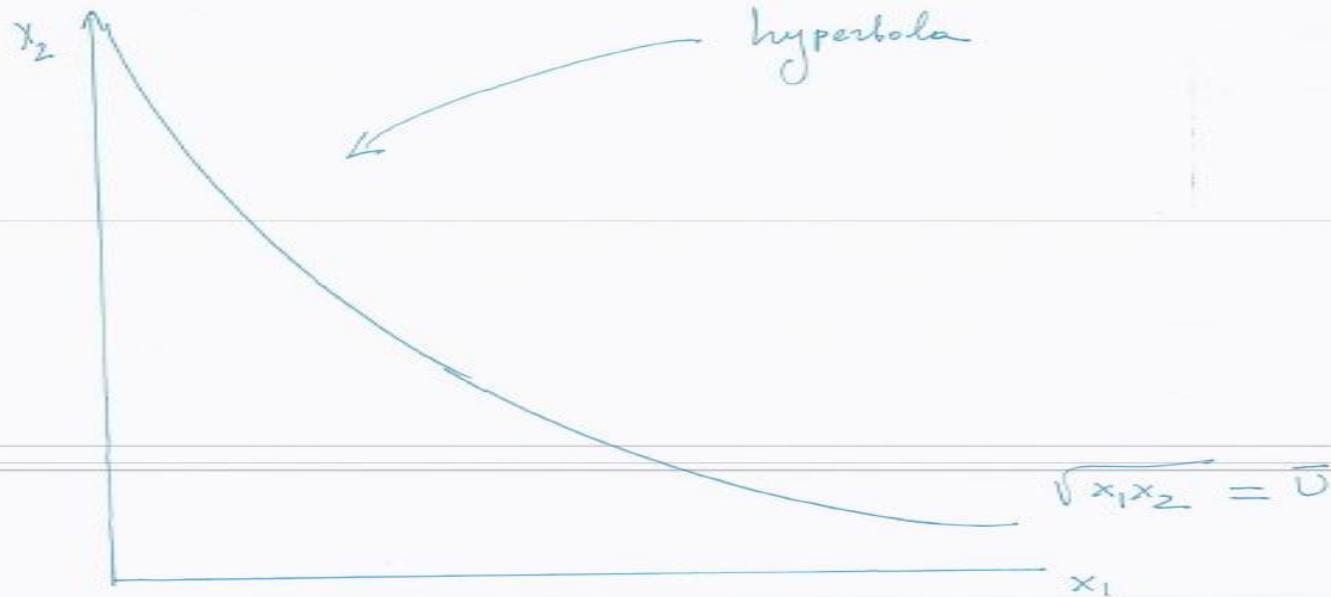(d) Interested only on consuming these goods in a fixed proportion (e.g., 1 to 1)

Utility Function

- A utility function is a mathematical function, u, that gives the level of an individual's utility, U, derived from the consumption of quantities, $x_1, x_2, \ldots$ of goods, $X_1, X_2, \ldots$, respectively, of the form:

$$U = u(x_1, x_2, \ldots)$$

Utility Function: An Example

- $U = u(x_1, x_2) = \sqrt{x_1 x_2}$

hyperbola

$\sqrt{x_1 x_2} = \bar{U}$

Marginal Utility

- It is typically assumed that utility increases with the quantity of a good consumed, holding the quantities of all other goods constant, but that these increments of utility decrease, with the amount of the good consumed. (What is the extra value of a third raincoat?)

- Mathematcally, we express this by:

- $MU_x \equiv \frac{\Delta U}{\Delta x} > 0$ (i.e., utility is increasing in x)

- $MU_{xx} \equiv \frac{\Delta MU_x}{\Delta x} \equiv \frac{\Delta^2 U}{\Delta x^2} < 0$ (i.e, marginal utility in decreasing in x)
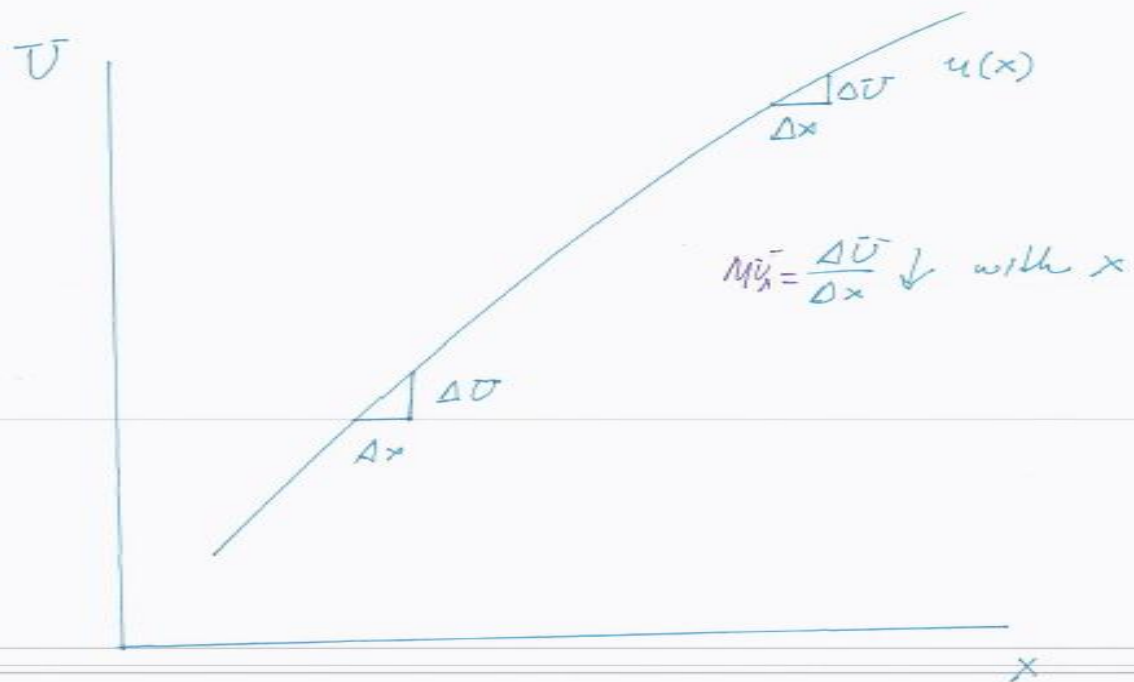
Diminishing Marginal Utility

U

$u(x)$

$\dfrac{\Delta U}{\Delta x}$

ΔU

Δx

ΔU

Δx

$M\bar{u}_x = \dfrac{\Delta \bar{U}}{\Delta x} \downarrow$ with x

x

Marginal Rate of Substitution

- The negative of the slope of an indifference curve is called the marginal rate of substitution and indicates the rate at which an individual is willing to accept a reduction in one good, while keeping utility constant, by increasing the amount of another good by one unit. The last property of isoquants means that this rate is diminishing.

- A diminishing marginal rate of substitution means that an individual prefers balanced consumption combinations to more unbalanced ones. This is what makes the indifference curves be convex to the origin
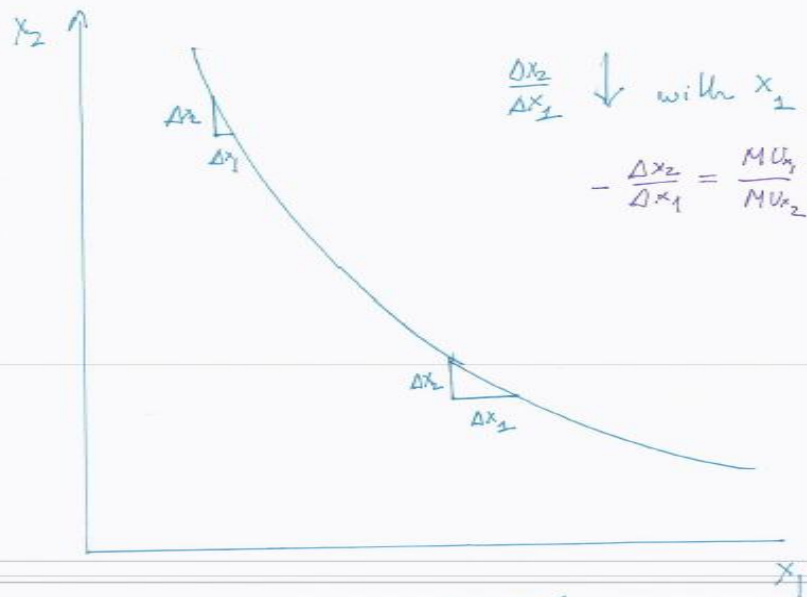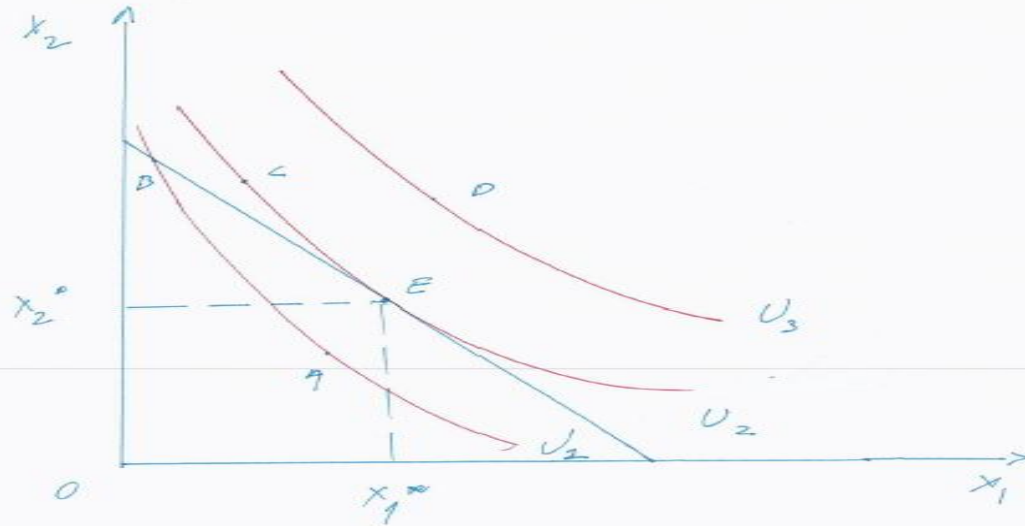
Marginal Rate of Substitution is Diminishing

Budget Constraint

- Given prices $p_1, p_2, \ldots$ of goods consumed $X_1, X_2, \ldots$ and the income of an individual, M, the budget constraint is the combinations of goods that the individual can afford. For example,

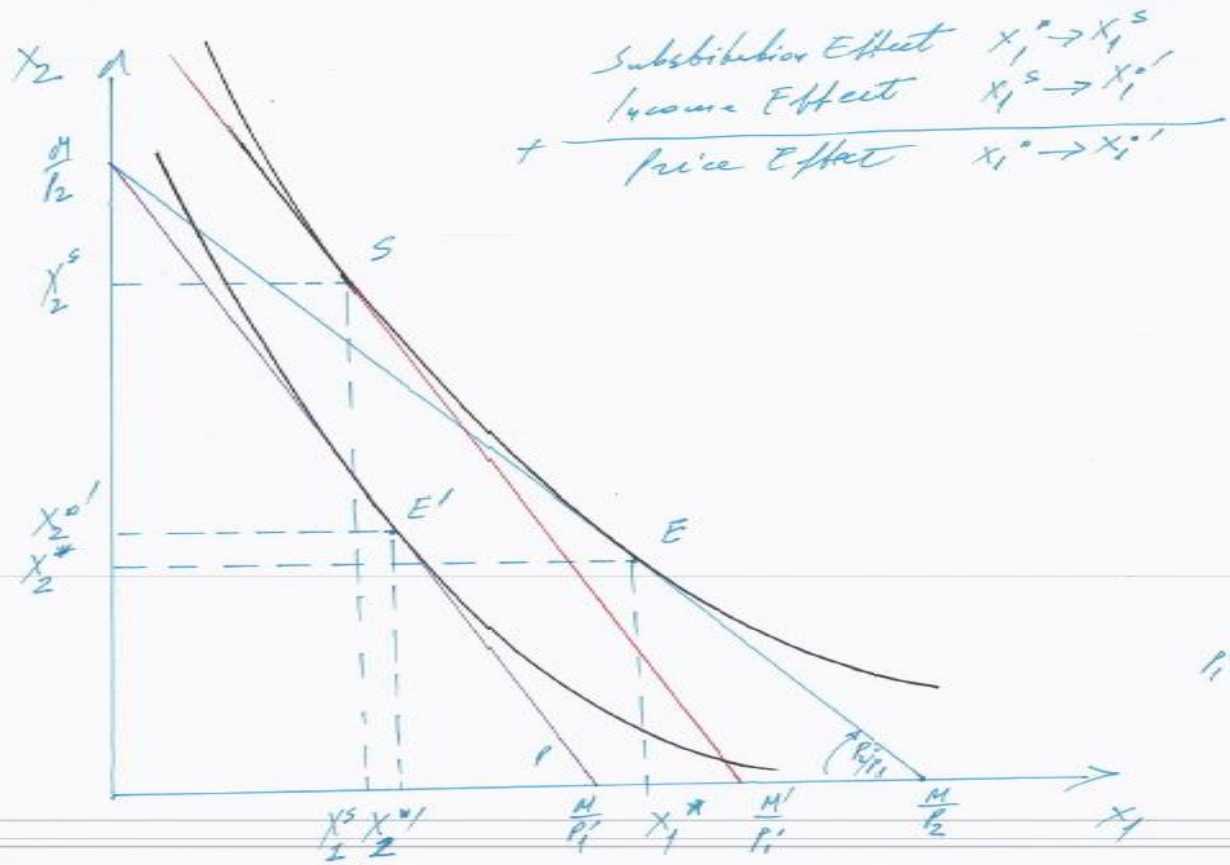- $p_1 x_1 + p_2 x_2 \leq M$
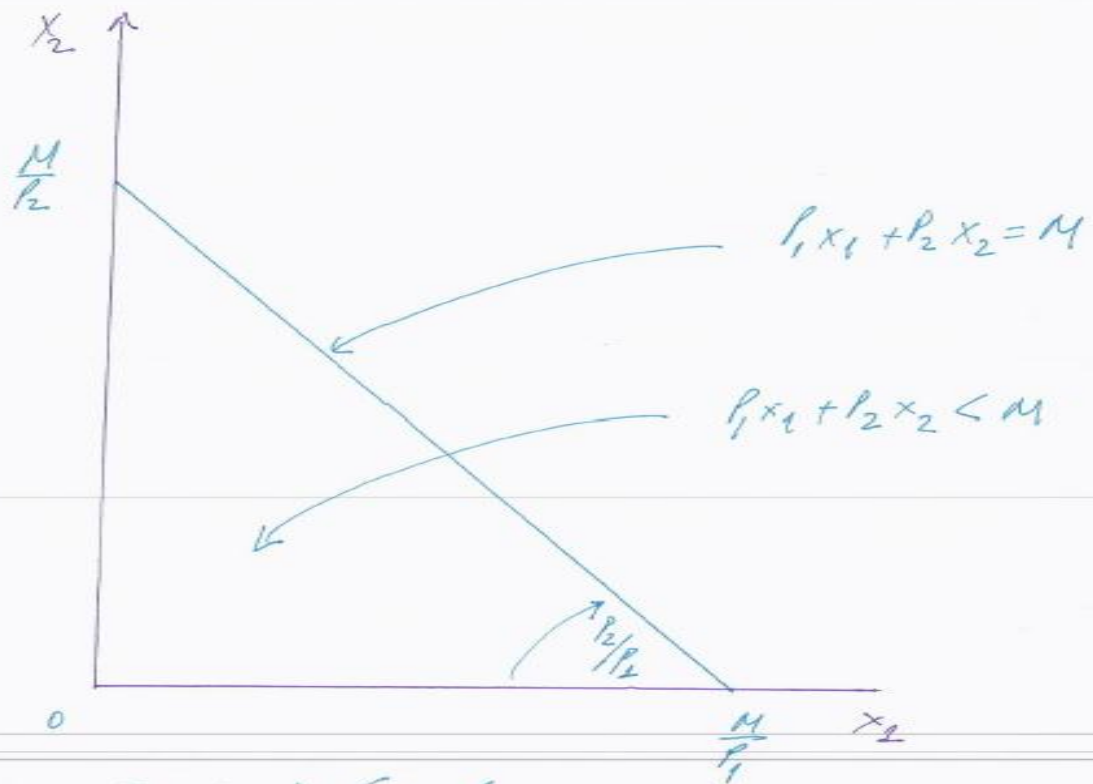
Budget Constraint

Maximization of Utility
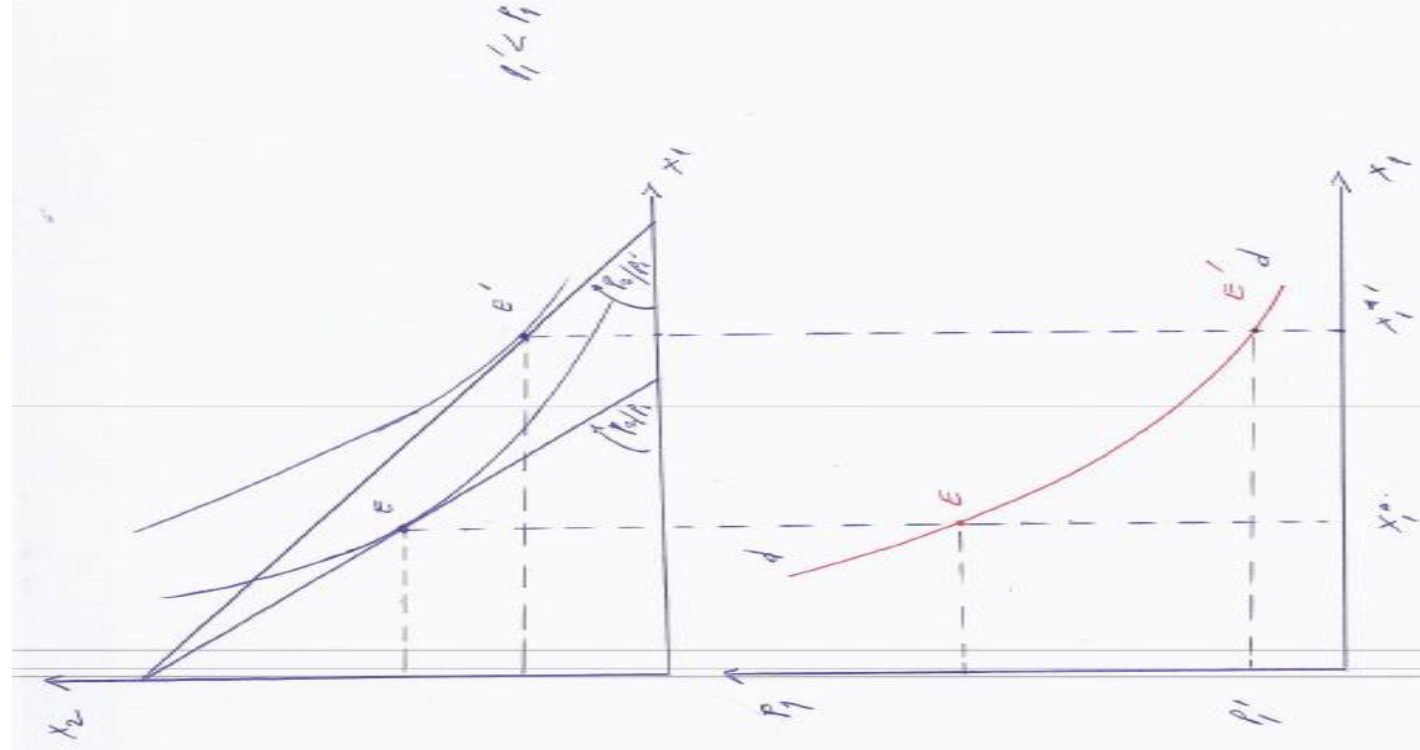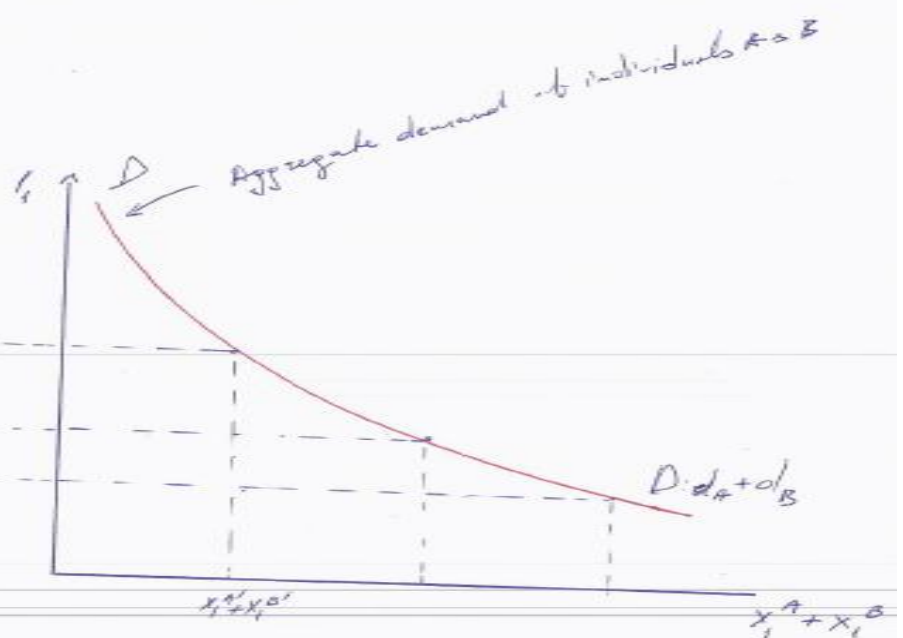# Subject to the Budget Constraint

Demand

- The solution to the constrained utility maximization problem is the key to deriving an individual's demand

Substitution Effect $X_1^o \to X_1^s$
Income Effect $X_1^s \to X_1^{o'}$

$+$ _____

Price Effect $X_1^o \to X_1^{o'}$

Price Effect :

Derivation of an individual's V demand curve

$p_1' < p_1$

(increase)

individual A

d_B d_A

l_1

individual B

P_1'

P_1^A

$P_1^{'A}$

d_B

d_A

$X_1^{B'}$ $X_1^{A'}$

X_1

Aggregate Demand

l_1 D Aggregate demand of individuals A & B

$D \cdot d_A + d_B$

$X_1^{A'} + X_1^{B'}$

$X_1^A + X_1^B$

P

$\tilde{D}$

inelastic
$\varepsilon < 1$

$\hat{D}$

elastic
$\varepsilon > 1$

$\hat{D}$

$\tilde{D}$

X
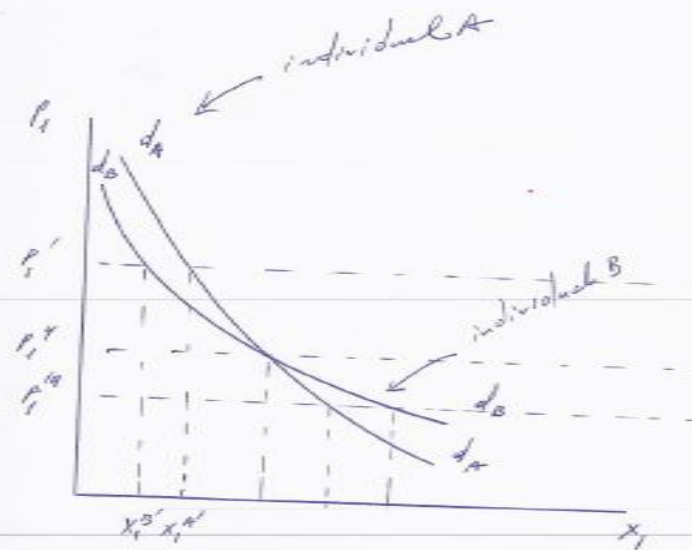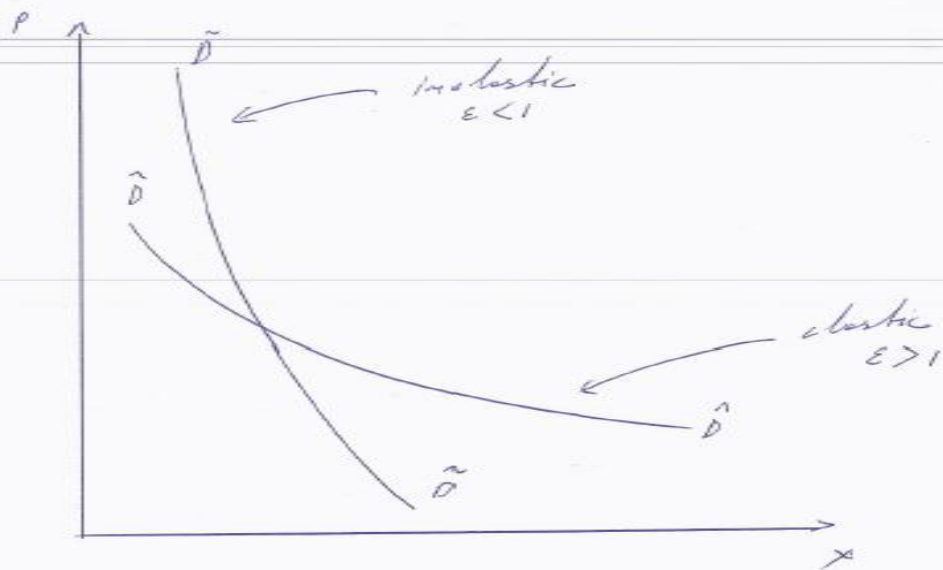
$$\varepsilon = \frac{\Delta X}{\Delta P} \frac{P}{X} \quad : \text{elasticity of demand}$$

(does not involve absolute units)

Demand Slope and Demand Shifts

- When price changes the change in demand reflects its slope, but when something else changes (i.e., income, preferences, prices of other goods) demand shifts up or down.

- Normal Goods, Inferior goods, Giffen goods, complements and substitutes