Unit 4: Consumer choice

In accordance with the APT programme the objective of the lecture is to help You to:

- gain an understanding of the basic postulates underlying consumer choice: utility, the law of diminishing marginal utility and utility-maximizing conditions, and their application in consumer decision-making and in explaining the law of demand;
- by examining the demand side of the product market, to learn how incomes, prices and tastes affect consumer purchases;
- understand how to derive an individual's demand curve;
- understand how individual and market demand curves are related;
- understand how the income and substitution effects explain the shape of the demand curve.

Required reading

Mankiw, N.G. Principles of Microeconomics. 6th edition. South-Western. 2009.

Chapter 21. The theory of Consumer Choice

Questions to be revised

- ✓Opportunity cost;
- ✓Marginal analysis;
- ✓Demand schedule, own and cross-price elasticities of demand;
- ✓Law of demand and Giffen good;
- ✓Factors of demand: tastes and incomes;
- ✓Normal and inferior goods.

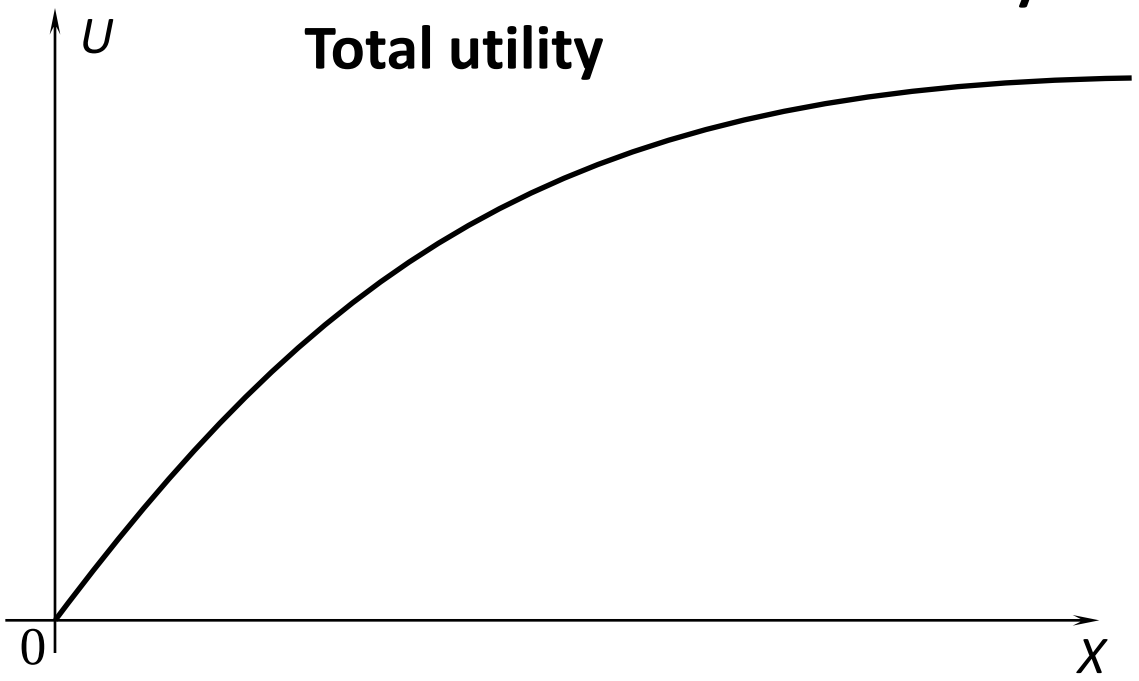
Consumer choice

Consumers choose the *best bundle* (combination) of goods they *can afford*.

The “best bundle” is selected in accordance with preferences and utility functions to represent them, indifference curves;

An “affordable” bundle is given by the budget constraint.

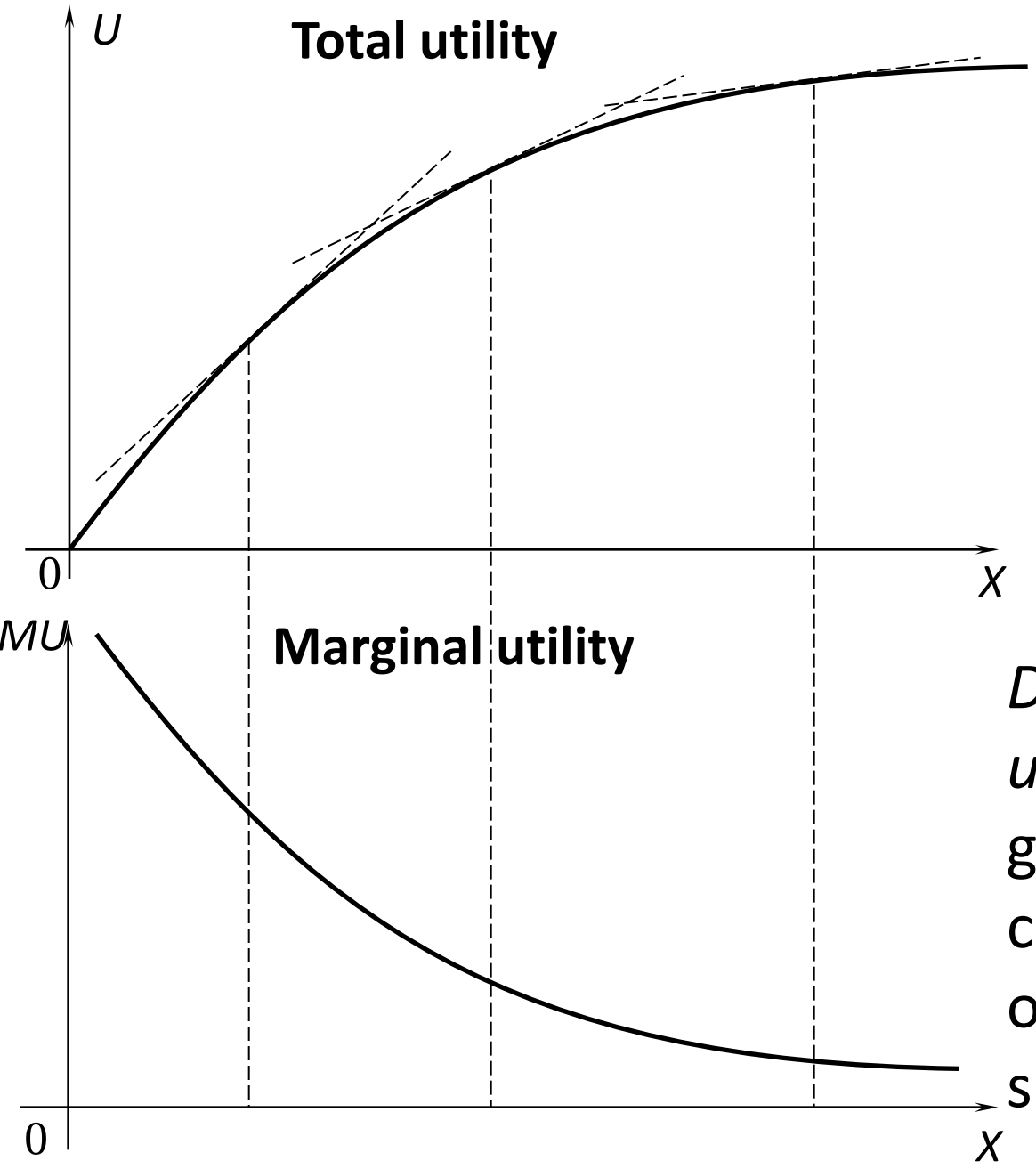
Utility



Utility is a measure of personal satisfaction with consumption of goods: $U(X)$.

Nonsatiation of consumption: More is preferred to less

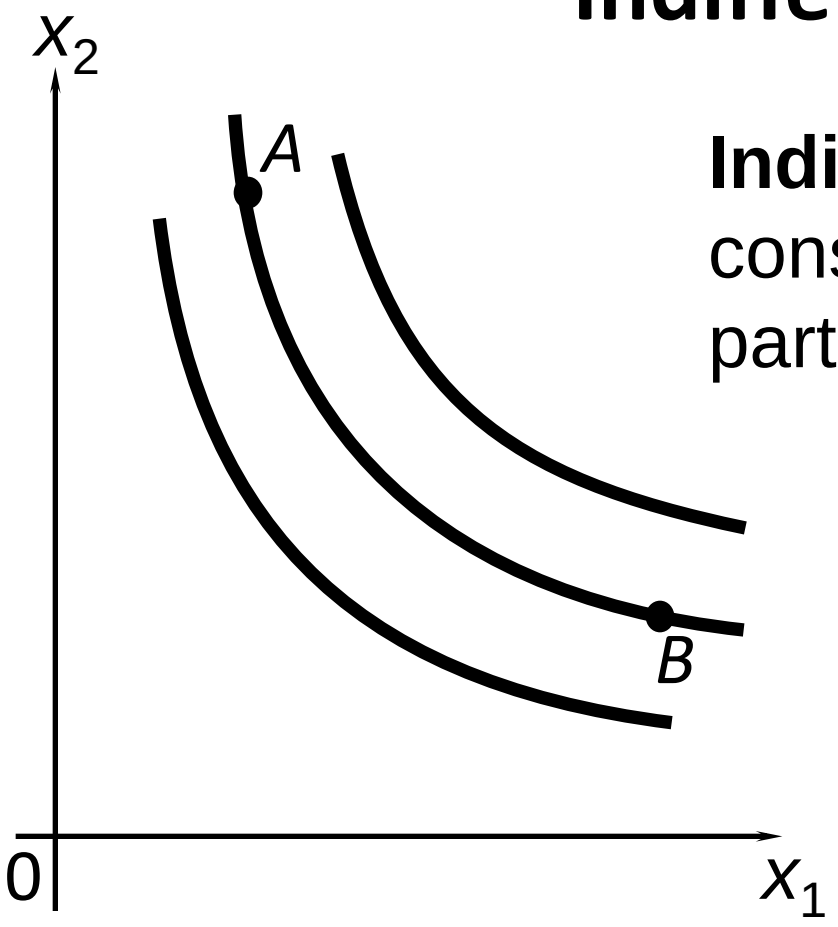
Total Utility and Marginal Utility



Marginal utility of a good shows an increase in total utility due to infinitesimal increase in consumption of the good, provided that consumption of other goods is kept unchanged: $MU = \frac{\Delta U}{\Delta X}$

Diminishing marginal utility: each extra unit of a good consumed, holding constant consumption of other goods, adds successively less to utility

Indifference curves

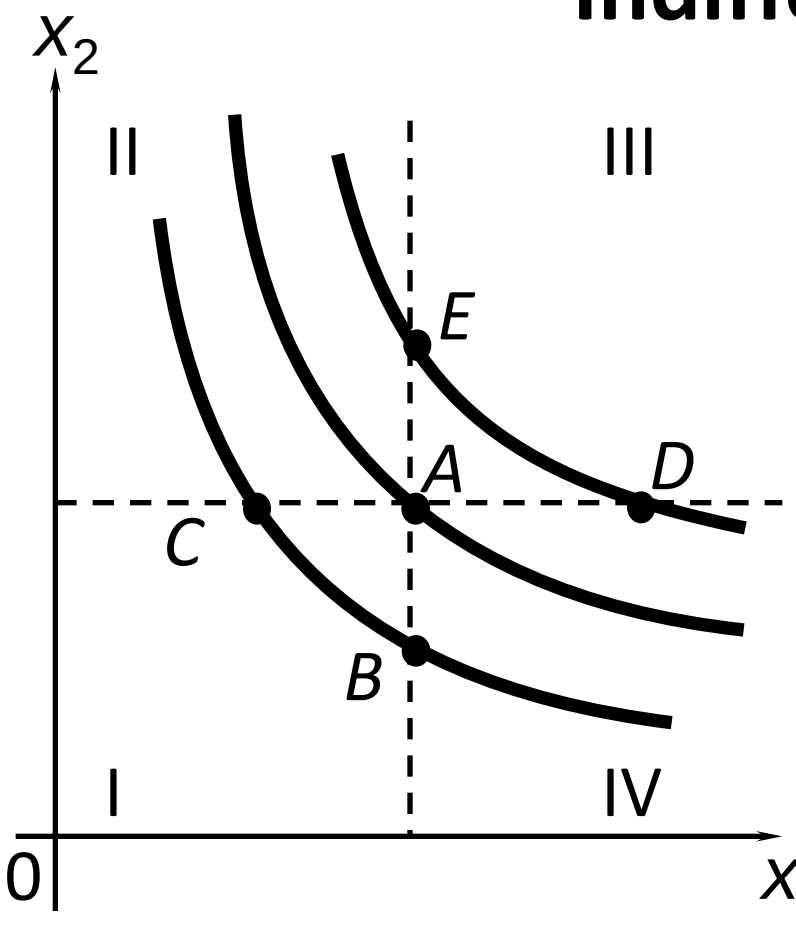


Indifference curve shows all the consumption bundles that yield a particular level of utility.

A set of indifference curves

Indifference curves do not intersect

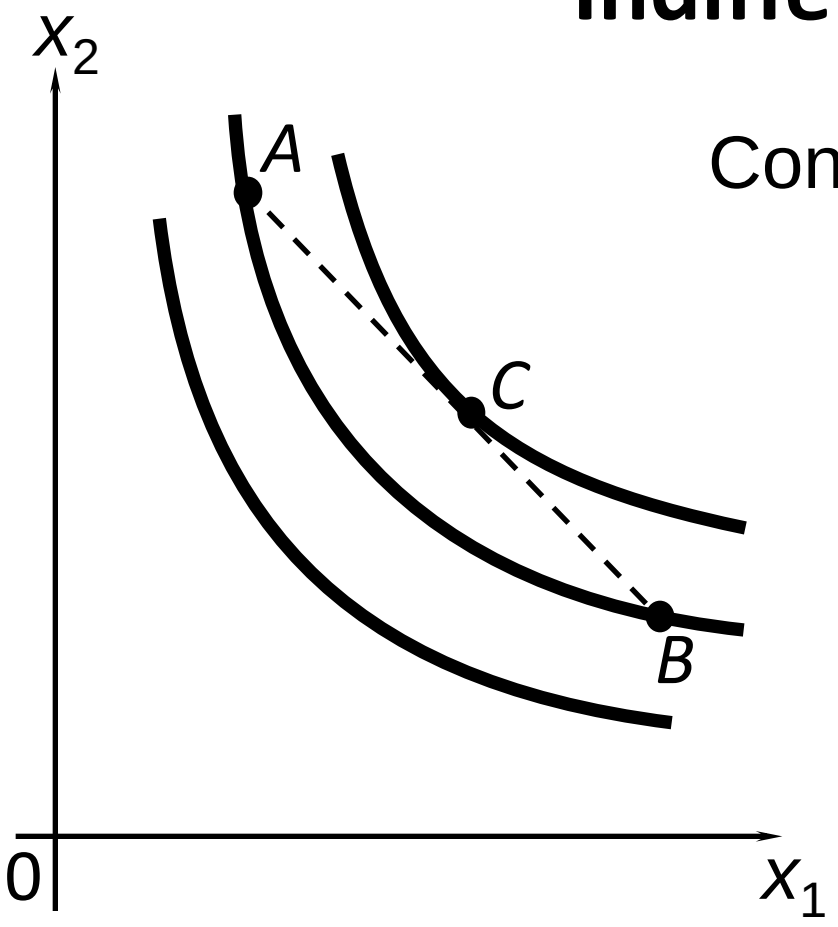
Indifference curves



According to nonsatiation condition the bundles that lie above a given indifference curve are preferred to bundles on or below it. In other words, an indifference curve which is more distant from the origin corresponds to more preferable consumption bundles.

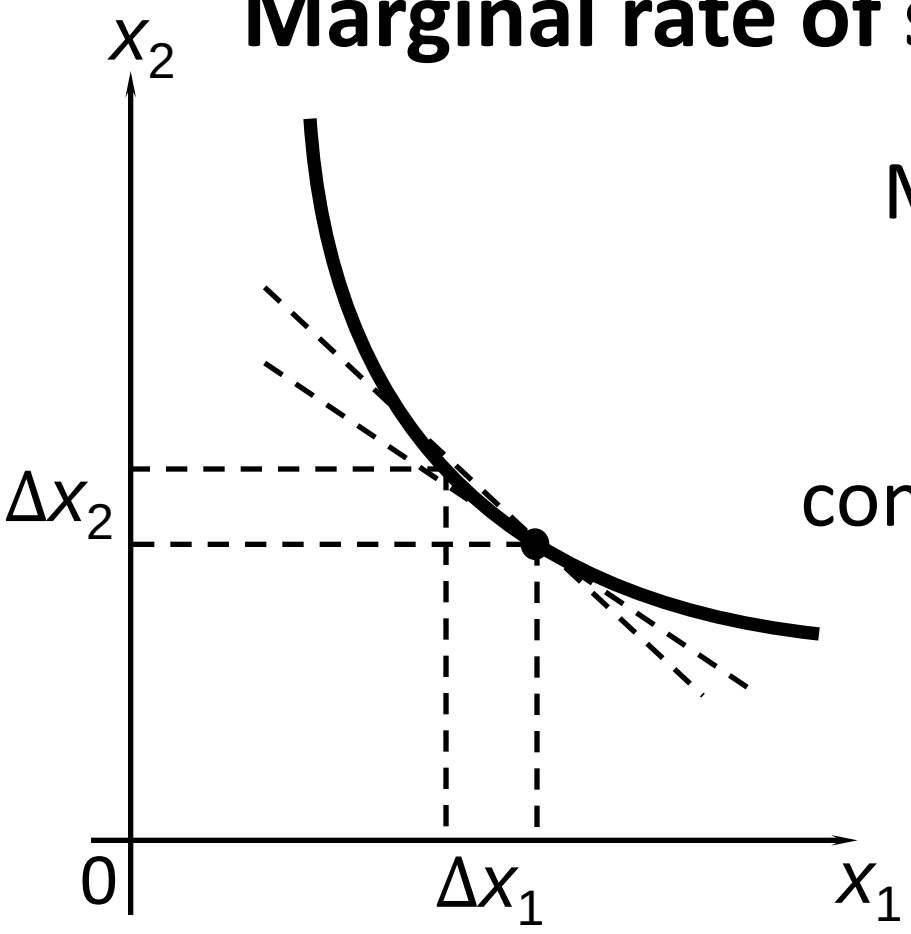
The bundles which give the consumer the same level of utility as *A*, are situated either in the II or in the IV sections. An indifference curve is a decreasing correspondence between quantity of a good x_1 and quantity of the other good (x_2).

Indifference curves



Convexity: consumers prefer variety

Marginal rate of substitution (MRS)

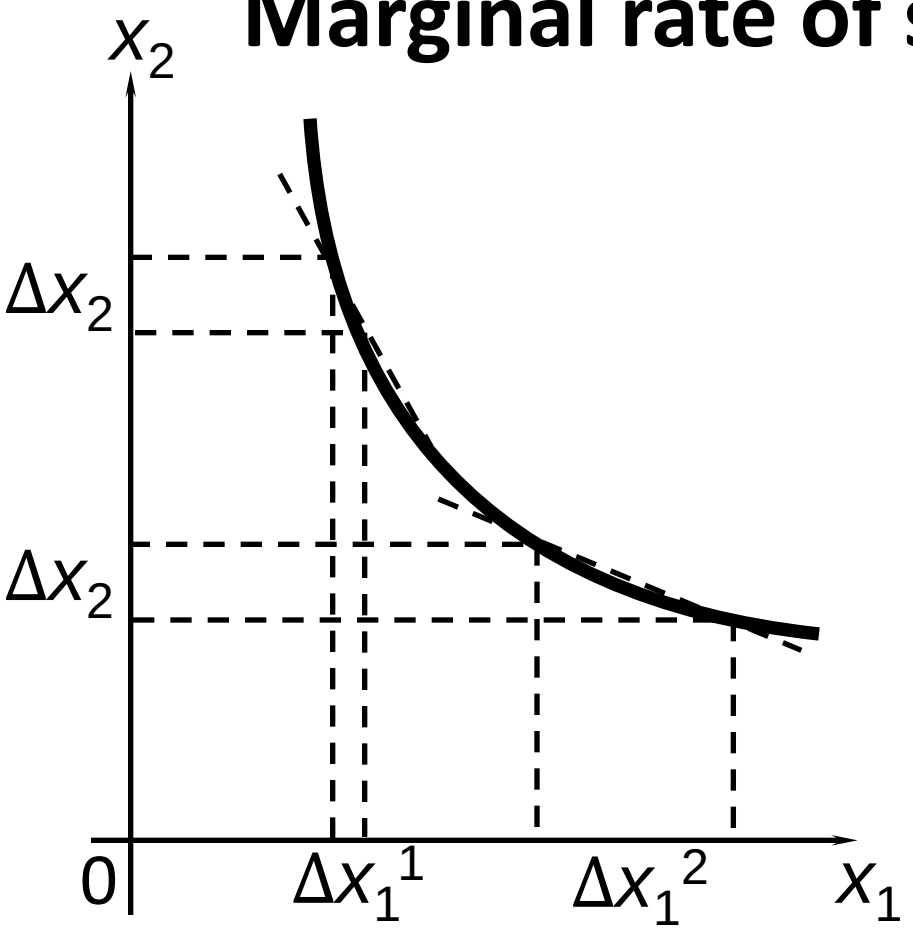


MRS shows the quantity of good 2 consumer must sacrifice to increase the consumption of good 1 without changing her (his) utility:

$$MRS_{12} = -\frac{\Delta x_2}{\Delta x_1}\Big|_{U=const}$$

Slope of indifference curve at a given bundle is given by the marginal rate of substitution at that bundle

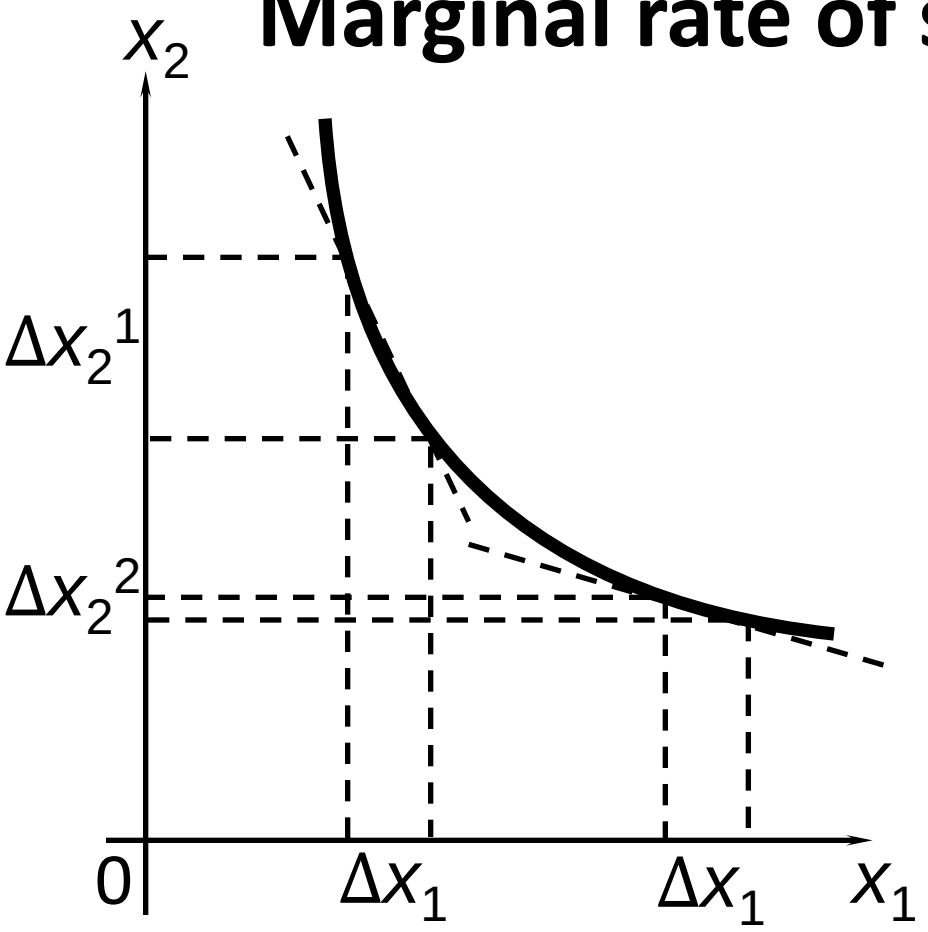
Marginal rate of substitution (MRS)



Convex to the origin indifference curves: Diminishing marginal rate of substitution

When the quantity a good (x_2) consumed becomes smaller and smaller the consumer who gives up with one and the same unit of the good (x_2) has to gain increasingly larger amount of the other good (x_1) so as the level of utility to be kept unchanged.

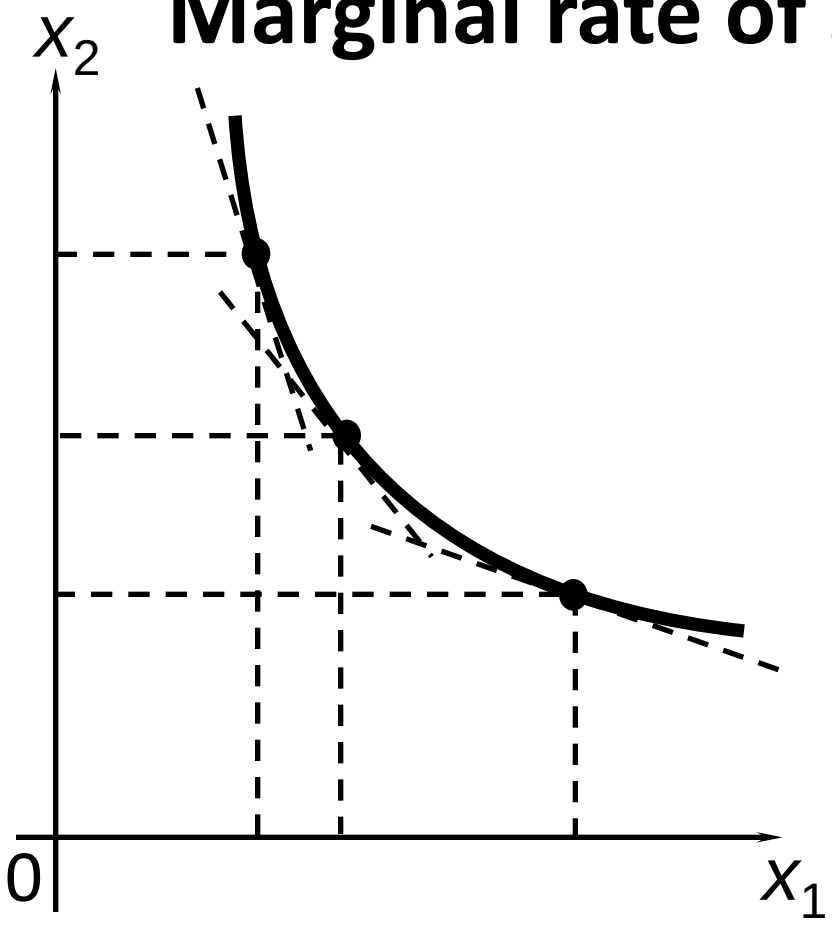
Marginal rate of substitution (MRS)



Convex to the origin indifference curves: Diminishing marginal rate of substitution

When the quantity a good (x_2) consumed becomes smaller and smaller the consumer has to give up with increasingly larger amount of it to gain one and the same unit of the other good (x_1) so as the level of utility to be kept unchanged.

Marginal rate of substitution (MRS)



Convex to the origin indifference curves: Diminishing marginal rate of substitution

MRS and Marginal Utility

Utility of the consumer is fixed on an indifference curve. For the change in total utility with a movement along an indifference curve to be zero, the utility gain (ΔU) due to the increase in consumption of the first good (Δx_1) should be equal in absolute value to the drop in utility ($-\Delta U$) caused by the decrease in consumption of the other one (Δx_2):

$$\frac{\Delta U}{\Delta x_1}\Delta x_1 = MU_1 \Delta x_1 = -\frac{\Delta U}{\Delta x_2}\Delta x_2 = -MU_2 \Delta x_2$$

Rearrange to get:

$$MRS_{12} \equiv -\left.\frac{\Delta x_2}{\Delta x_1}\right|_{U=const} = \frac{MU_1}{MU_2}$$

Budget Constraint

Denote by $p_1>0$ the price of good 1,

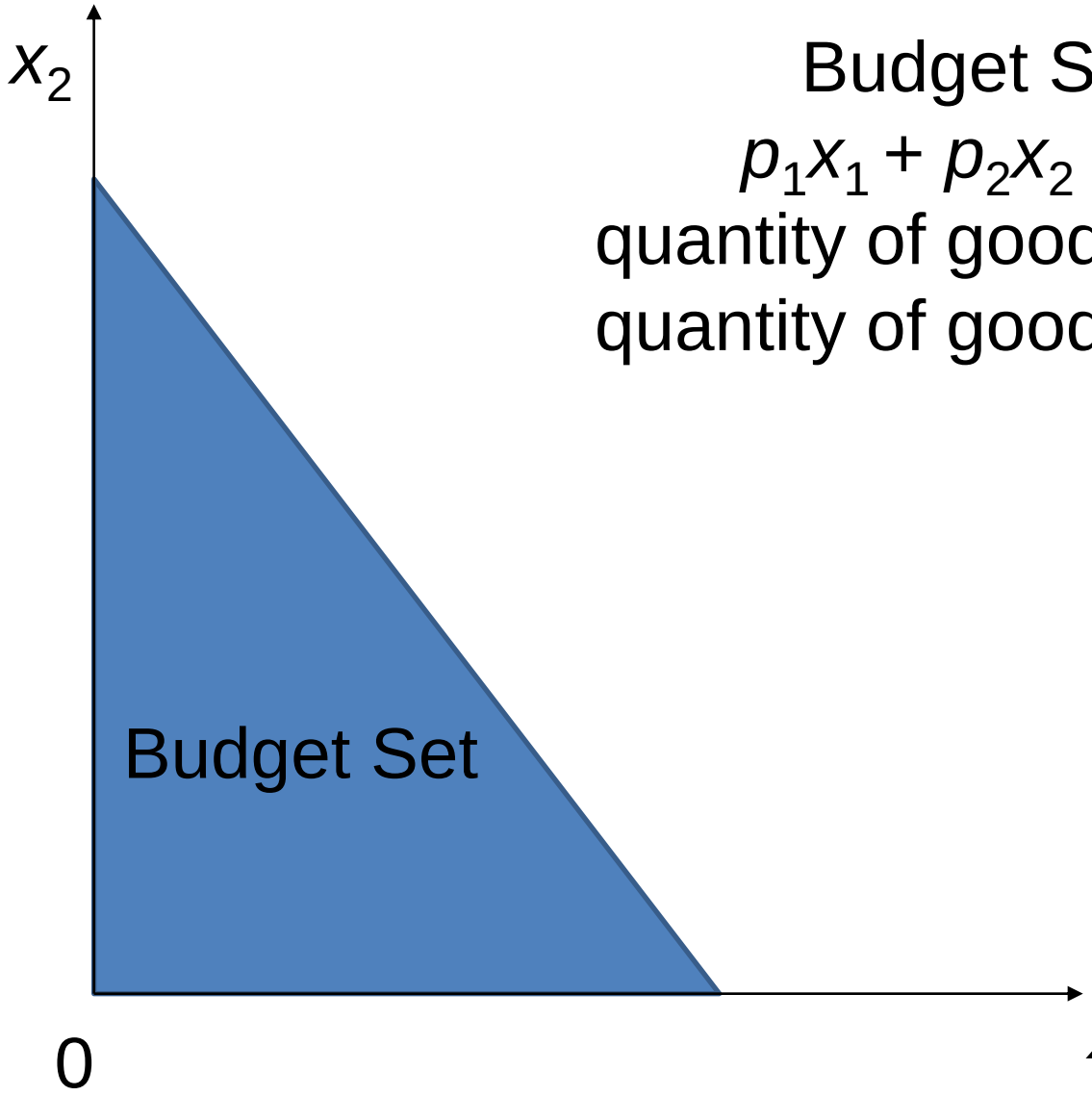
and $p_2>0$ - the price of the 2nd good.

Denote by $M \geqslant 0$ the amount of money a consumer has got.

Budget constraint (line) is a combination of quantities of goods 1 and 2 the consumer can just afford:

$$p_1 x_1 + p_2 x_2 = M.$$

Budget Constraint



Budget Set:

$p_1x_1 + p_2x_2 \leqslant M$;

quantity of good 1: $x_1 \geqslant 0$;

quantity of good 2: $x_2 \geqslant 0$.

Budget Constraint

Budget constraint (line) is a combination of quantities of goods 1 and 2, that the consumer can just afford:

$$p_1 x_1 + p_2 x_2 = M,$$

or

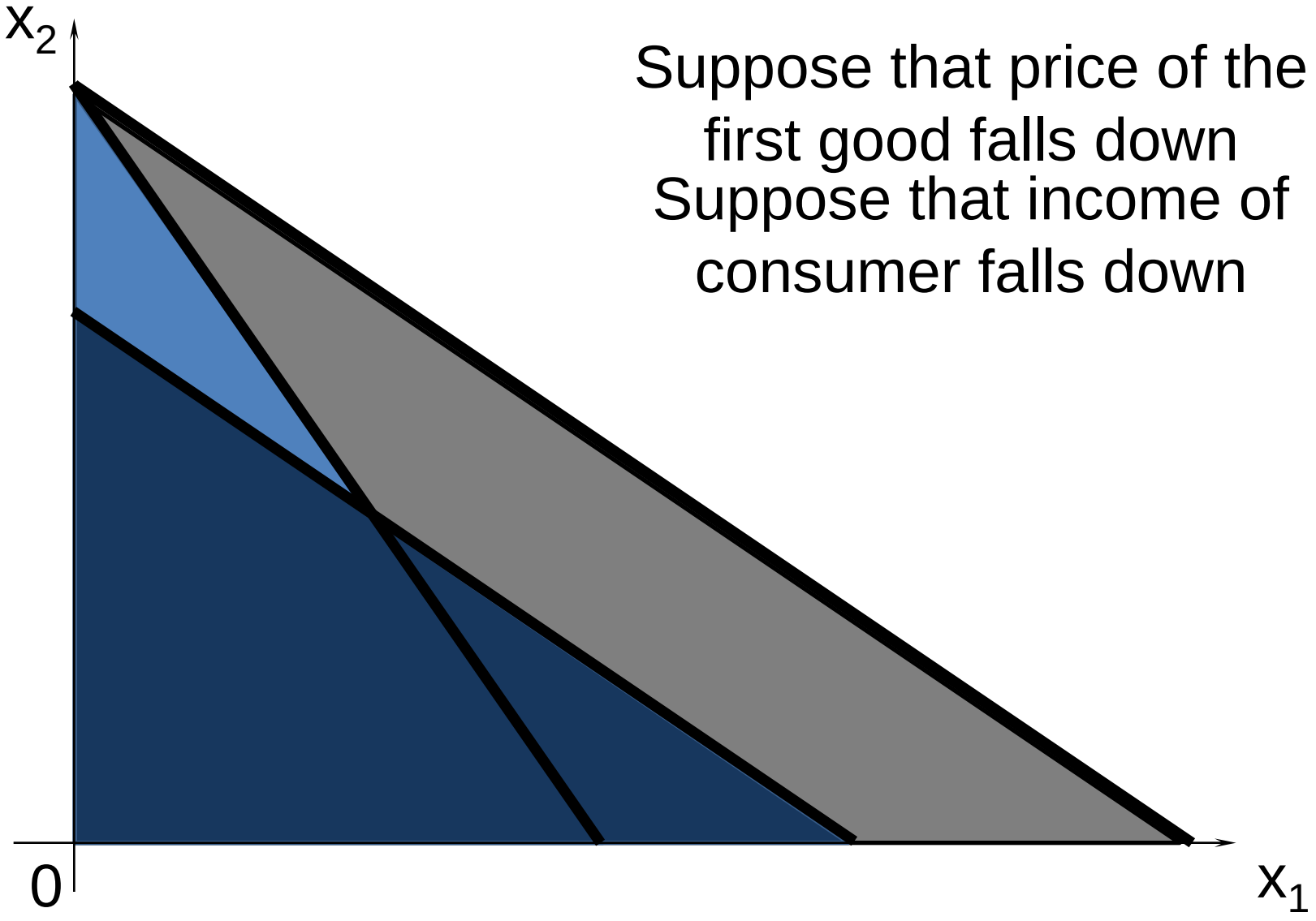
$$x_2 = \frac{M}{p_2} - \frac{p_1}{p_2} x_1$$

Absolute value of the slope of budget constraint equals the relative price of the first good (with respect to the price of the second one): p_1/p_2.

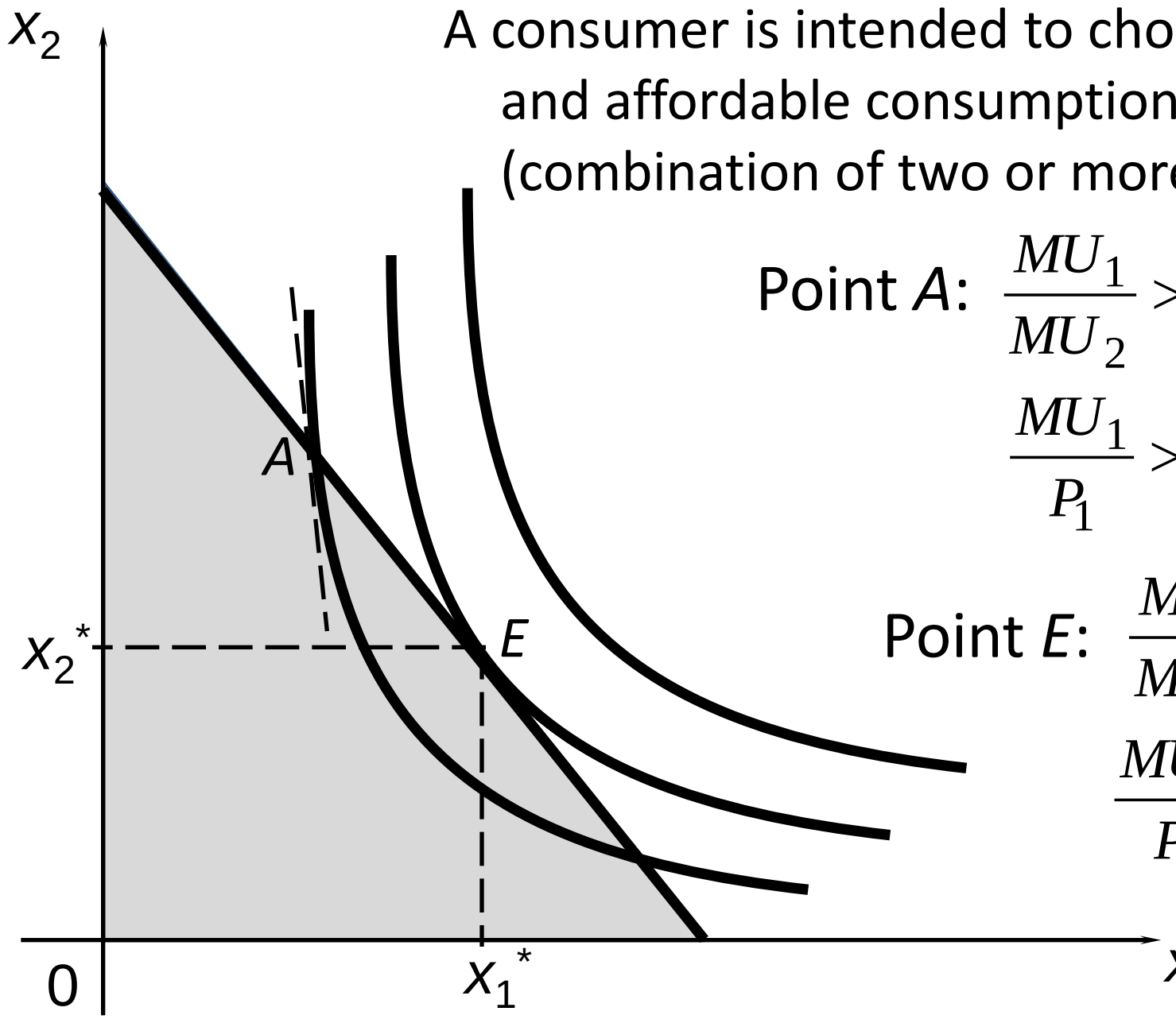
Slope of the budget line measures the rate at which the market is willing to substitute good 1 for good 2.

The real (with respect to the price of the second good) income of the consumer gives an intercept of the budget constraint at the vertical axes: M/p_2.

Budget Constraint: changing prices and wealth



Consumer choice: Optimality



A consumer is intended to choose the best and affordable consumption bundle (combination of two or more goods).

Point *A*: $\frac{MU_1}{MU_2} > \frac{P_1}{P_2}$

$\frac{MU_1}{P_1} > \frac{MU_2}{P_2}$

Point *E*: $\frac{MU_1}{MU_2} = \frac{P_1}{P_2}$

$\frac{MU_1}{P_1} = \frac{MU_2}{P_2}$

Consumer choice: Optimality

Consumer's optimal choice is the bundle X=(x_1,x_2) where MRS is equal to the slope of the budget constraint:

$$MRS_{12} = -\left.\frac{\Delta x_2}{\Delta x_1}\right|_{U=const} = \frac{MU_1}{MU_2} = \frac{p_1}{p_2}$$

Market trade-off $MRSE_{12} = \frac{p_1}{p_2}$

is equal to

the utility trade-off required to maintain constant utility $MRSC_{12} = \frac{MU_1}{MU_2}$

Optimal consumer's bundle: example

Quantity of a good	Good 1		Good 2	
	MU_1	MU_1/P_1	MU_2	MU_2/P_2
1	60	12	70	7
2	50	10	60	6
3	40	8	50	**5**
4	30	6	40	4
5	25	**5**	30	3
6	20	4	20	2

Assume that income of a consumer is M=55,
price of the first good is P_1=5,
price of the second good is P_2=10.

Optimal consumption bundle: example

Quantity of a good	Good 1		Good 2	
	MU_1	MU_1/P_1	MU_2	MU_2/P_2
1	60	12	70	7
2	50	10	60	6
3	40	8	50	**5**
4	30	6	40	4
5	25	**5**	30	3
6	20	4	20	2

$\frac{MU_1}{P_1} = \frac{MU_2}{P_2}$, the whole income is spent for the two goods

Consumer choice: example (APT 2008)

The table below shows the quantities, prices, and marginal utilities of two goods, fudge and coffee, which Mandy purchases.

	Fudge	Coffee
Quantity of purchase	10 pounds	7 pounds
Price per pound	$2	$4
Marginal utility of last pound	12	20

Mandy spends all her money and buys only these goods. In order to maximize her utility, should Mandy purchase more fudge and less coffee, purchase more coffee and less fudge, or maintain her current consumption? Explain.

Consumer choice: example (APT 2002)

The table below shows total utility in utils that a utility-maximizing consumer receives from consuming two goods: apples and oranges.

Apples		Oranges	
Quantity	Total utility	Quantity	Total utility
0	0	0	0
1	20	1	30
2	35	2	50
3	45	3	65
4	50	4	75
5	52	5	80

Assume that apples cost $1 each, oranges cost $2 each, and the consumer spends the entire income of $7 on apples and oranges.

A. Using the concept of marginal utility per dollar spent, identify the combination of apples and oranges the consumer will purchase. Explain your reasoning.

Consumer choice: example (APT 2002)

Apples		Oranges	
Quantity	Total utility	Quantity	Total utility
0	0	0	0
1	20	1	30
2	35	2	50
3	45	3	65
4	50	4	75
5	52	5	80

Assume that apples cost $1 each, oranges cost $2 each, and the consumer spends the entire income of $7 on apples and oranges.

B. With the prices of apples and oranges remaining constant, assume that the consumer's income increases to $12. Identify each of the following.

(i). The combination of apples and oranges the consumer will now purchase.

Consumer choice: example (APT 2002)

Apples		Oranges	
Quantity	Total utility	Quantity	Total utility
0	0	0	0
1	20	1	30
2	35	2	50
3	45	3	65
4	50	4	75
5	52	5	80

Assume that apples cost $1 each, oranges cost $2 each, and the consumer spends the entire income of $7 on apples and oranges.

B. With the prices of apples and oranges remaining constant, assume that the consumer's income increases to $12. Identify each of the following.

(ii). The total utility the consumer will receive from consuming the combination in (i).

Consumer choice: example (APT 2002)

Apples		Oranges	
Quantity	Total utility	Quantity	Total utility
0	0	0	0
1	20	1	30
2	35	2	50
3	45	3	65
4	50	4	75
5	52	5	80

Assume that apples still cost $1 each.

C. With income remaining at $12, assume the price of oranges increases to $4 each. Identify each of the following.

i. The combination of apples and oranges the consumer will now purchase.

ii. The total utility the consumer will receive from consuming the combination in (i).

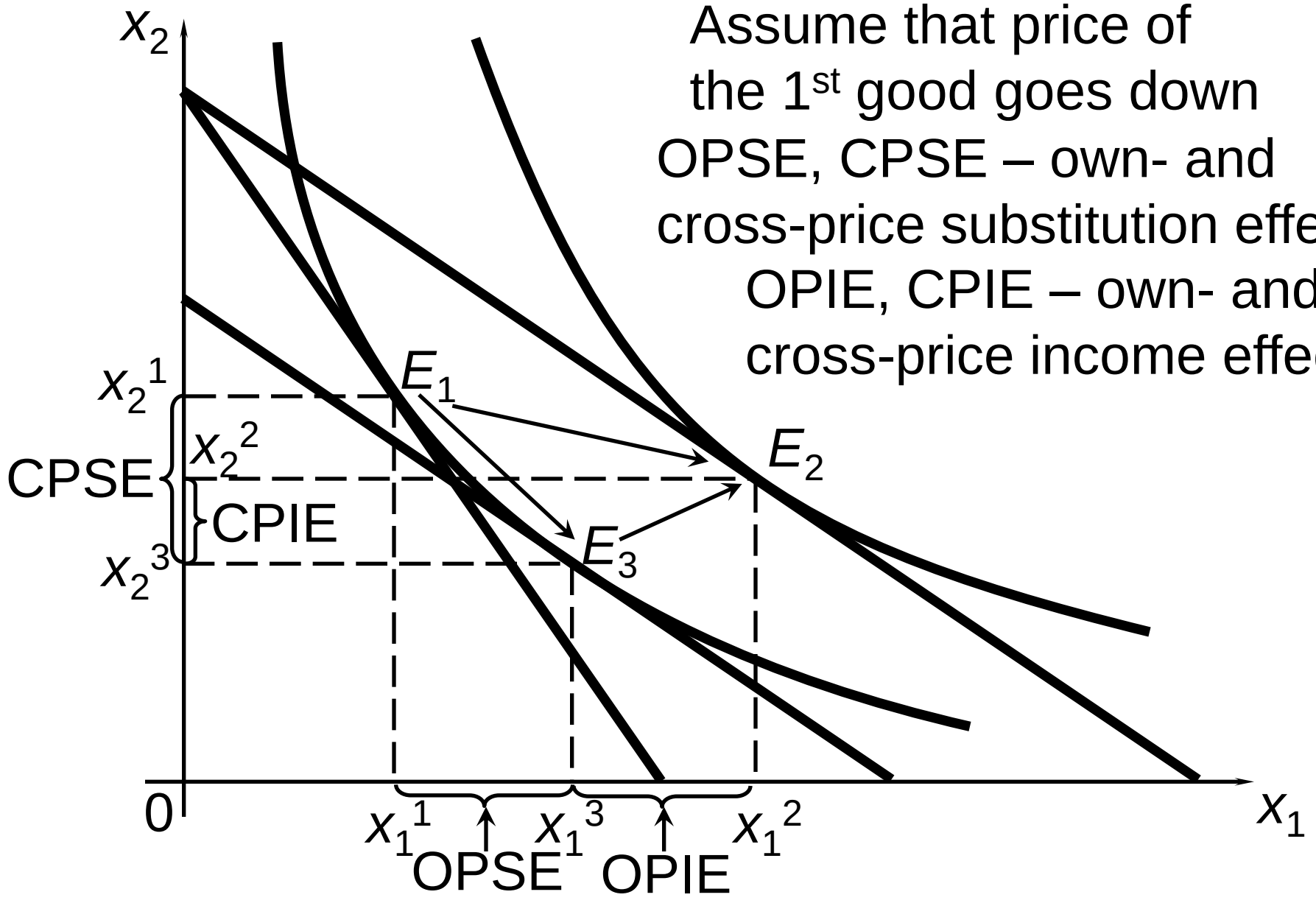
Adjustment to price changes: Slutsky price effect decomposition

Adjustment to price changes can be decomposed into two effects: income effect and substitution effect: $\Delta x_p = \Delta x_{SE} + \Delta x_{IE}$

Due to substitution effect provided fixed personal welfare an individual increases consumption of the goods that become relatively cheaper and reduces consumption of the goods that become relatively more expensive.

Income effect is a variation of purchasing power of a consumer's income caused by a fall or a rise in commodity prices.

Adjustment to price changes: income effect and substitution effect (normal goods)

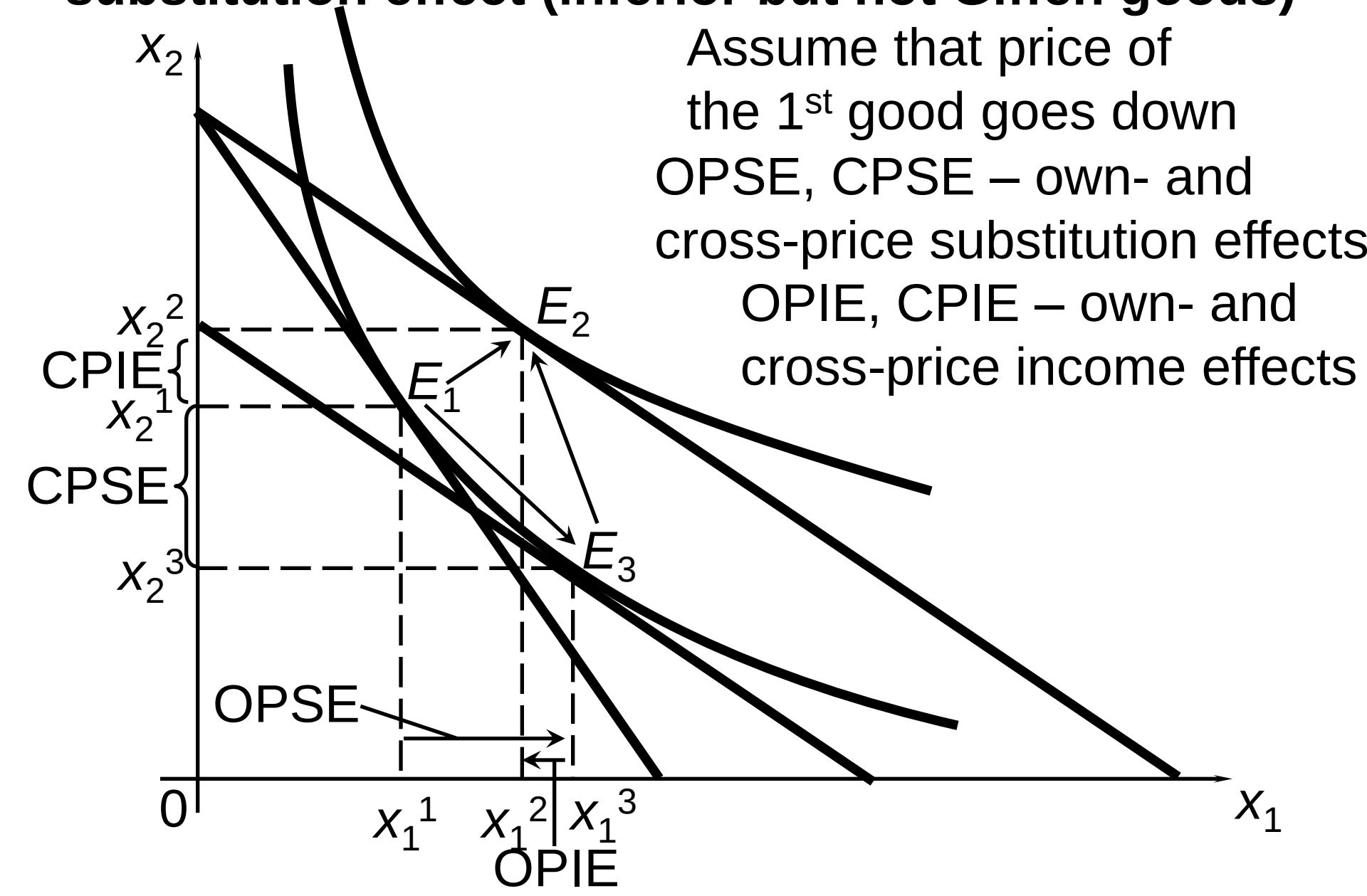


Assume that price of the 1st good goes down

OPSE, CPSE – own- and cross-price substitution effects

OPIE, CPIE – own- and cross-price income effects

Adjustment to price changes: income effect and substitution effect (inferior but not Giffen goods)

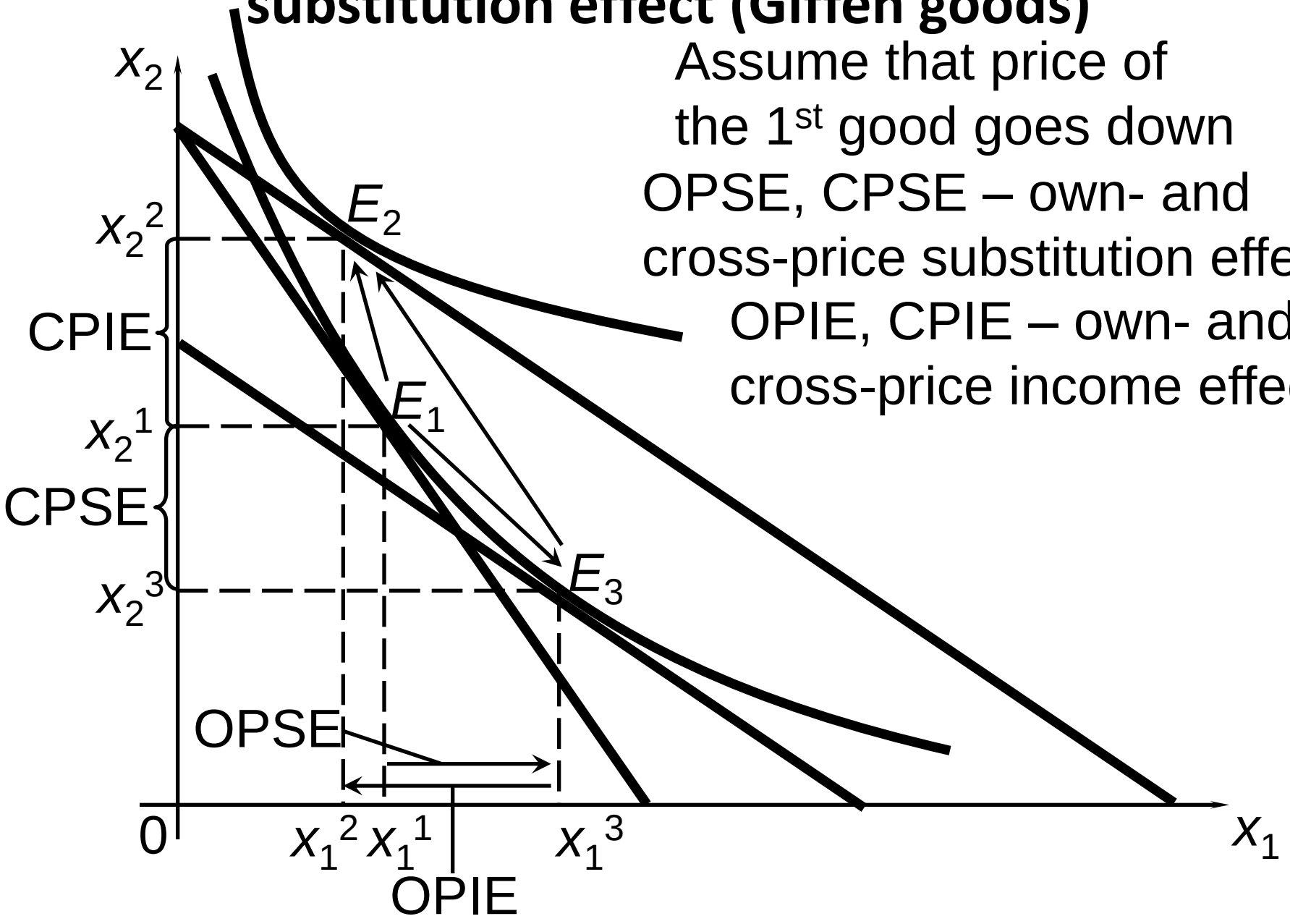


Assume that price of the 1st good goes down

OPSE, CPSE – own- and cross-price substitution effects

OPIE, CPIE – own- and cross-price income effects

Adjustment to price changes: income effect and substitution effect (Giffen goods)



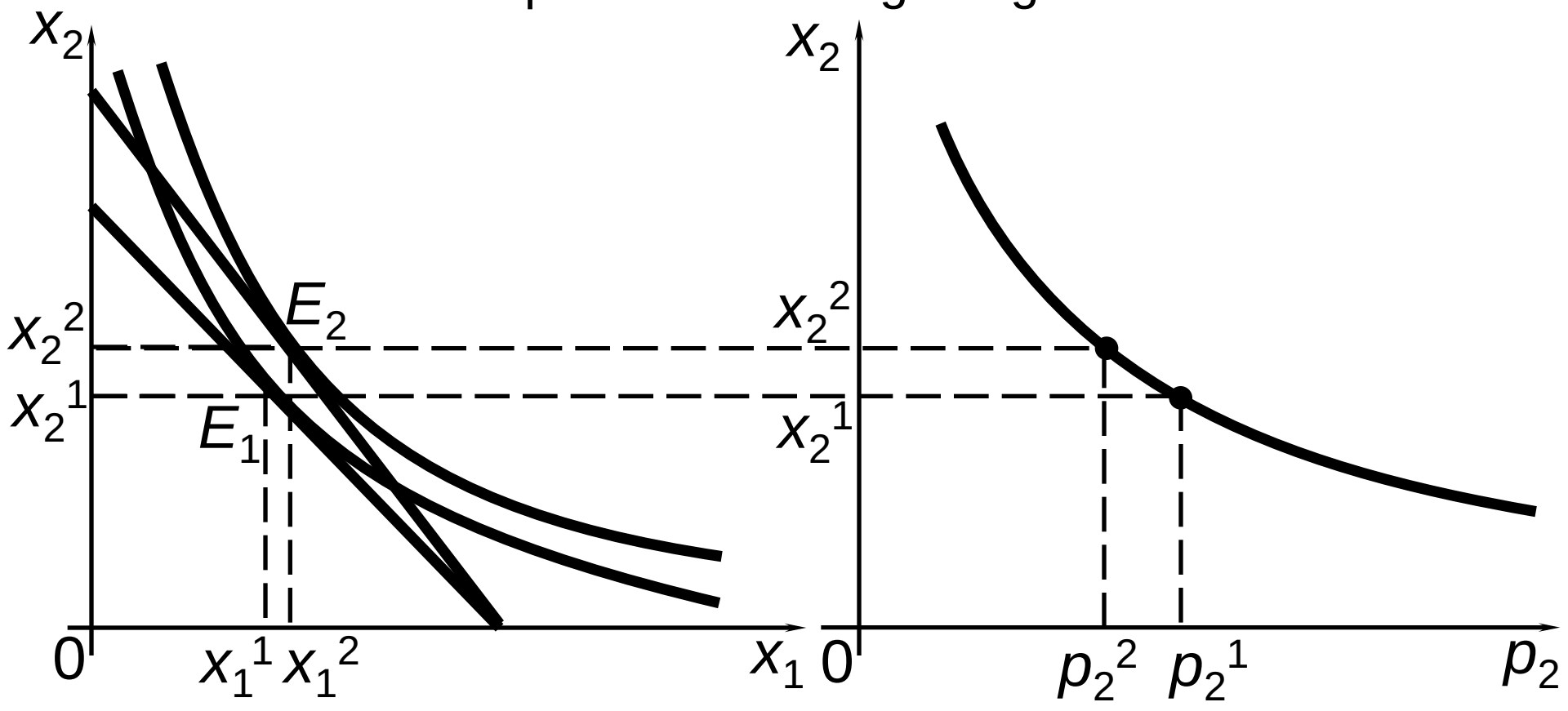
Assume that price of the 1st good goes down

OPSE, CPSE – own- and cross-price substitution effects

OPIE, CPIE – own- and cross-price income effects

Adjustment to price changes: individual demand curve

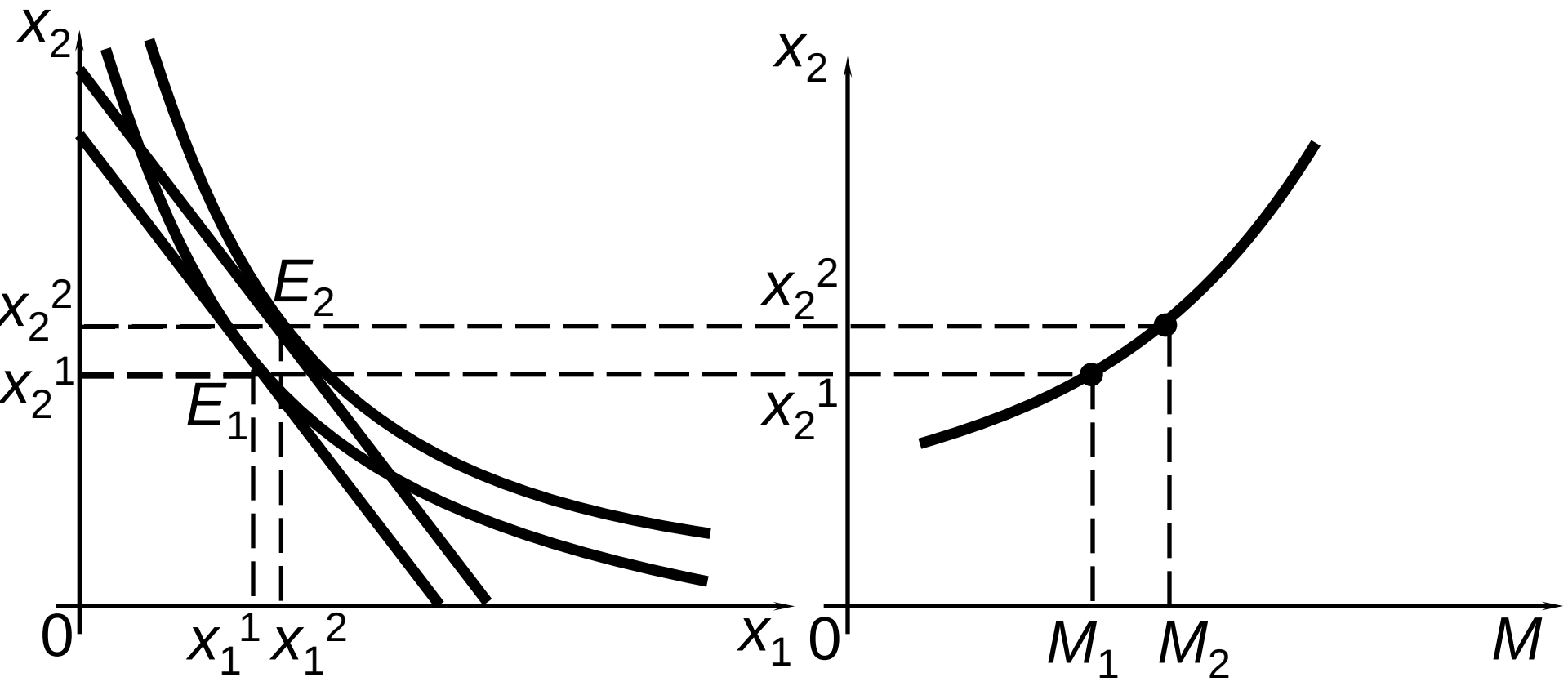
Assume that price of the 2nd good goes down



Individual demand curve – quantity demanded of a good at every possible price of this good, keeping everything else (prices of other goods and income of consumer) fixed.

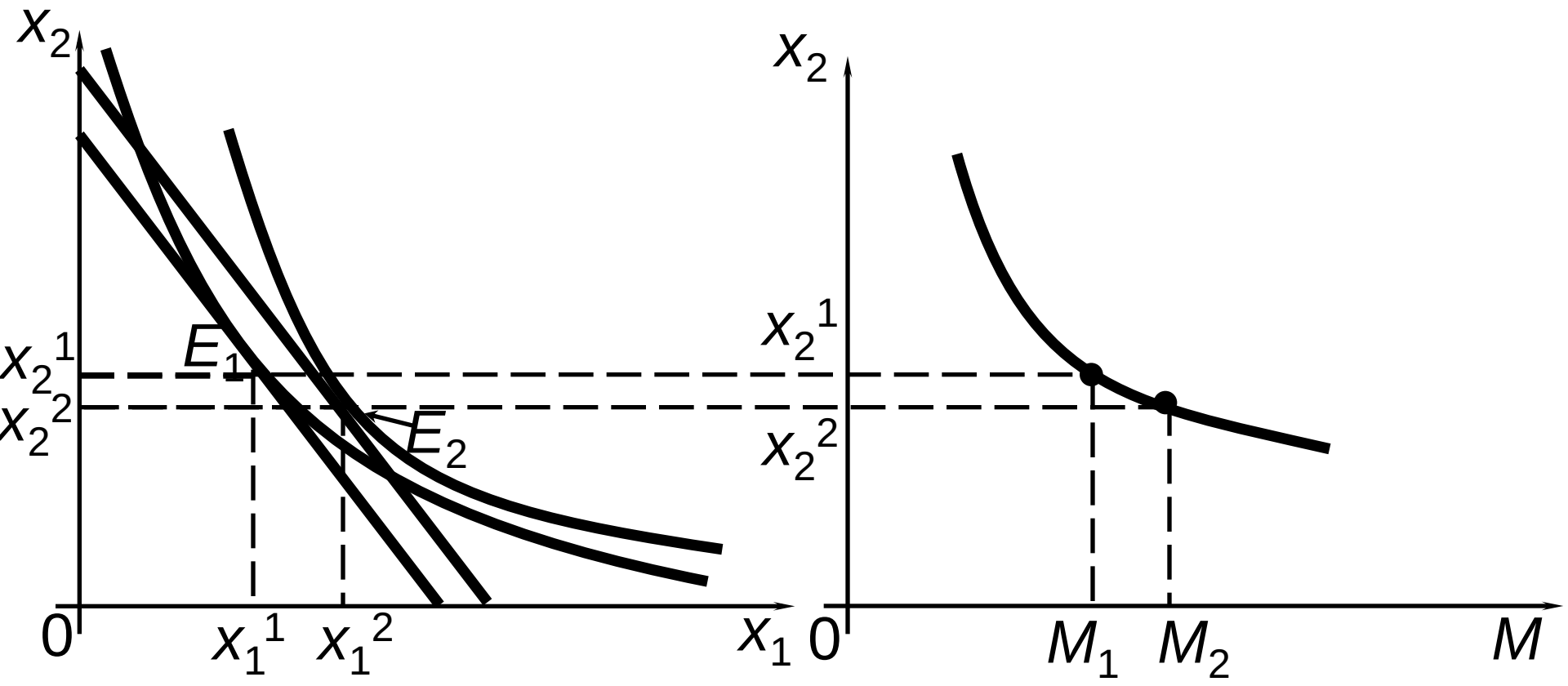
Adjustment to income changes: Engel curve (normal good)

Assume that the consumer's income goes up



Adjustment to income changes: Engel curve (inferior good)

Assume that the consumer's income goes up



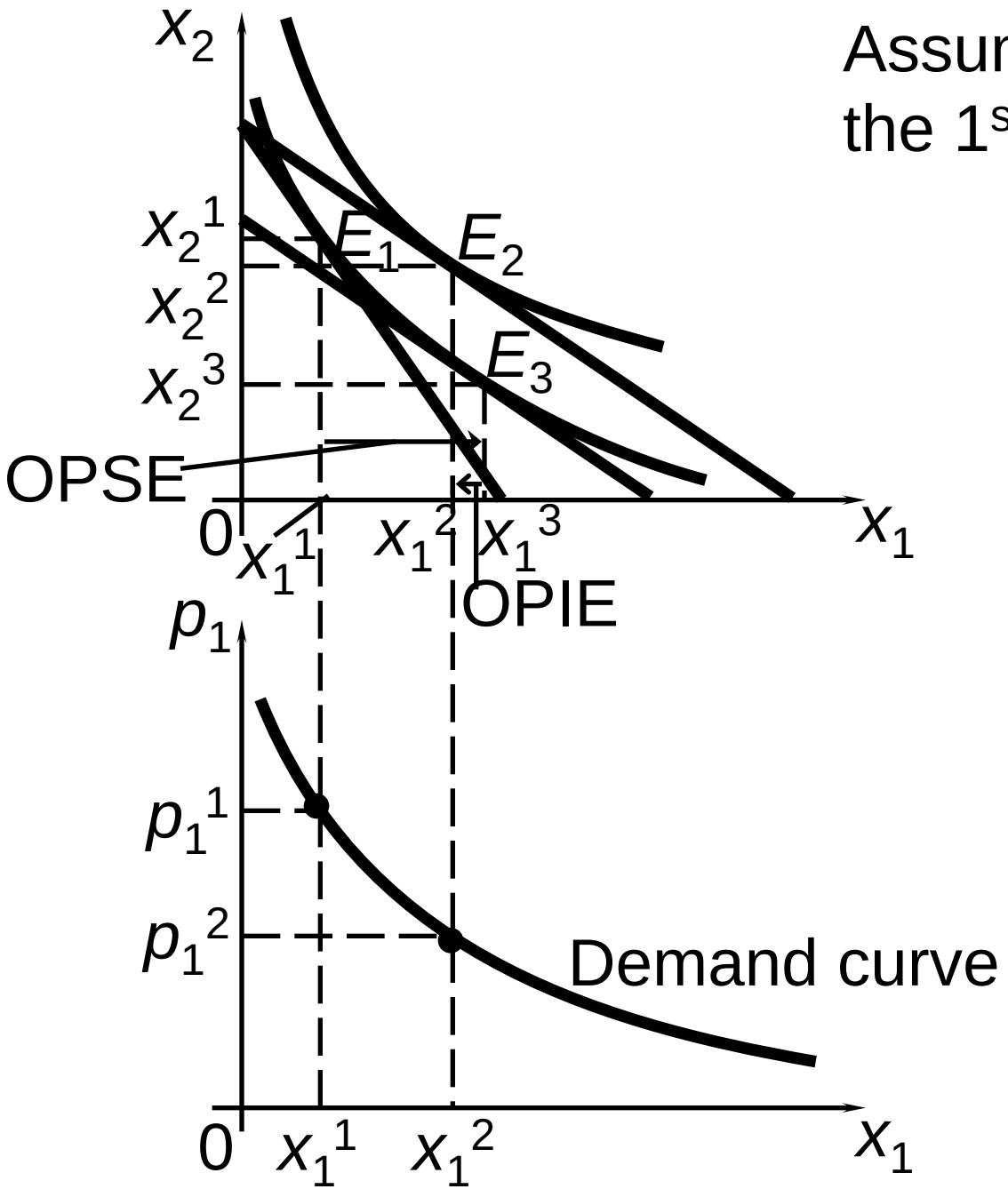
Adjustment to price changes

For any good (normal or inferior) substitution effect leads to reduction in quantity demanded in response to increase in own price.

For *inferior good* income effect leads to increase in quantity demanded in response to increase in own price.

Giffen good – an inferior good, for which income effect dominates substitution effect. Quantity demanded increases in response to increase in own price!

Adjustment to price changes: inferior but not Giffen good

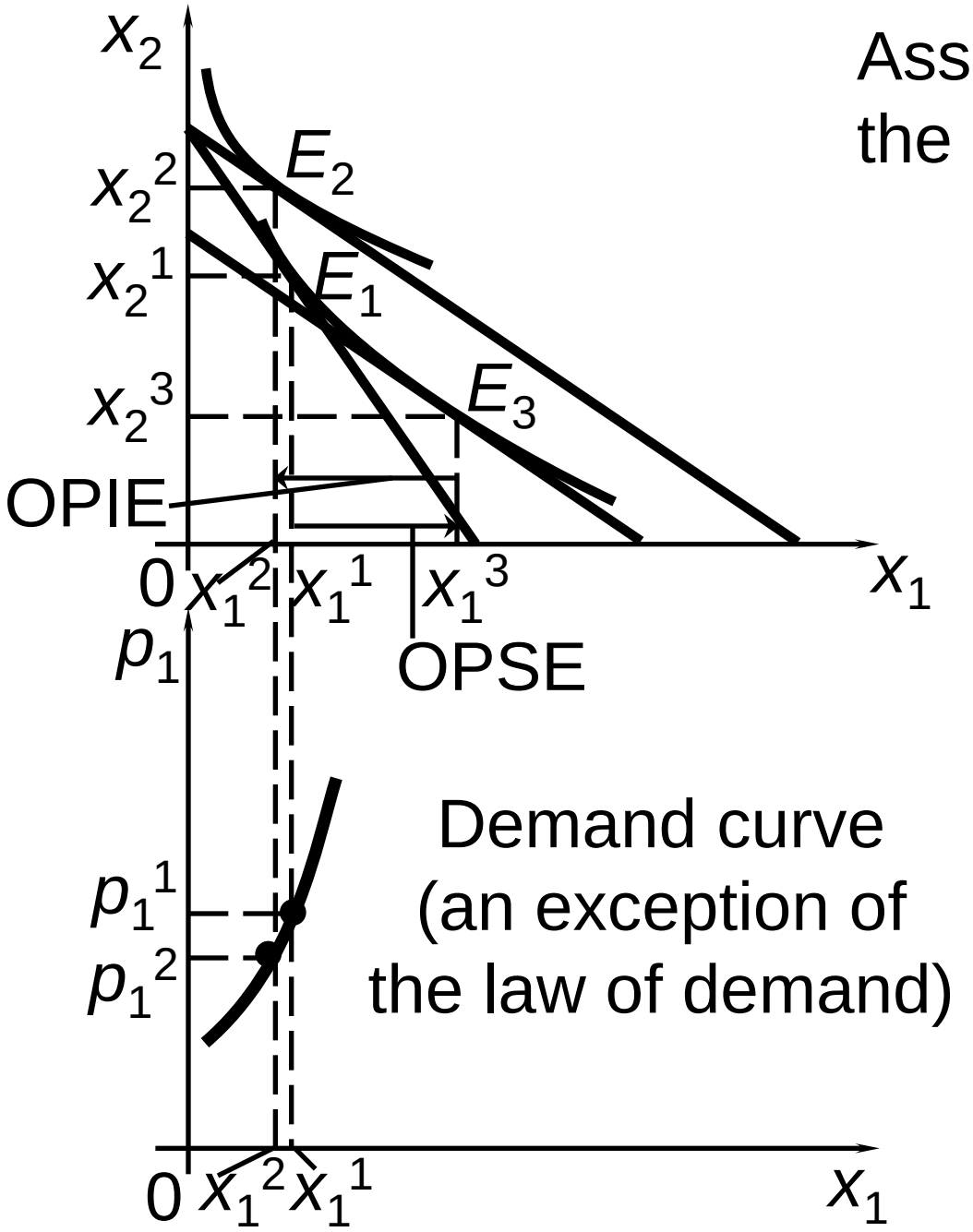


Assume that price of the 1st good goes down

OPSE – own-price substitution effect

OPIE – own-price income effect

Adjustment to price changes: Giffen good



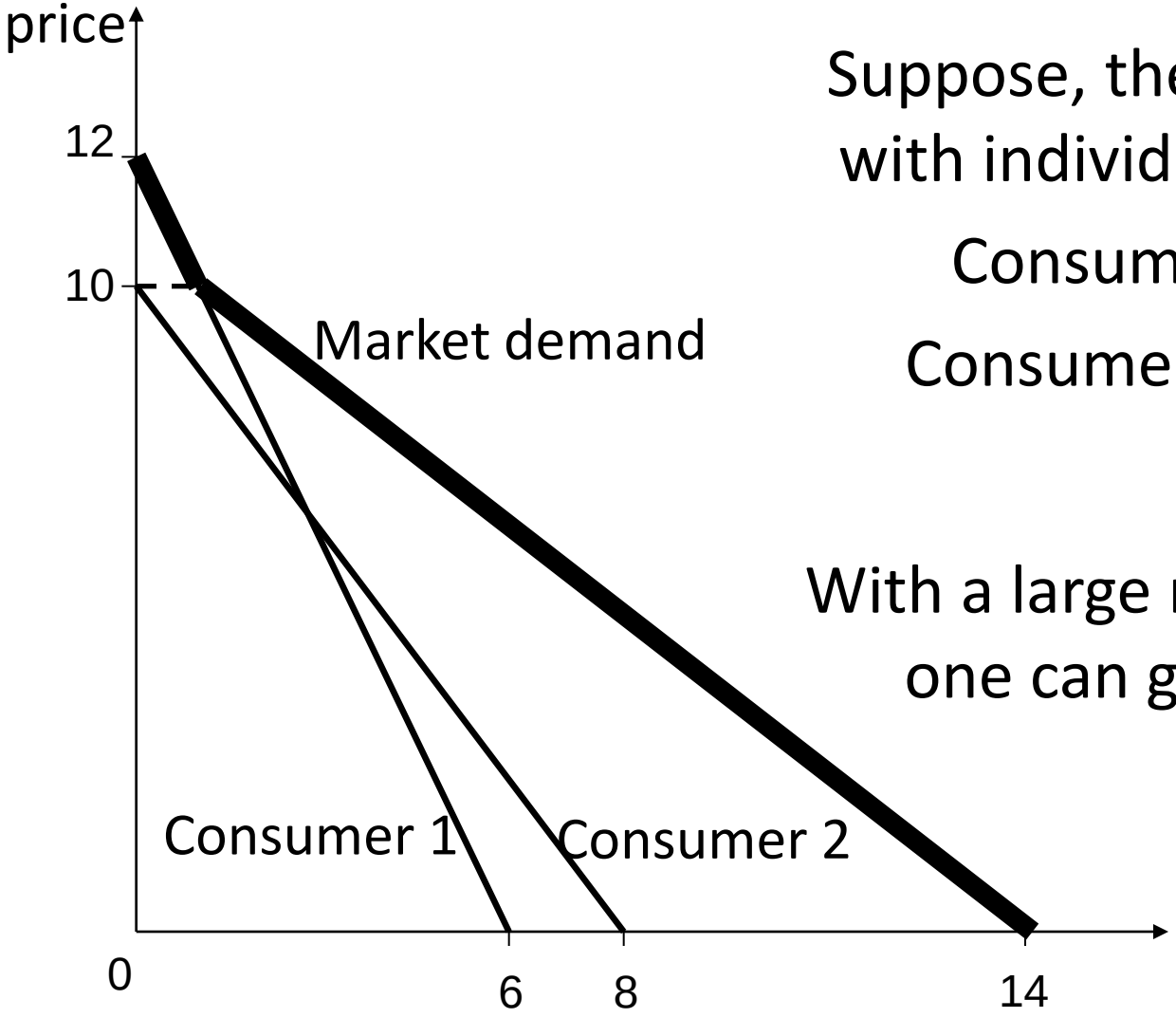
Assume that price of the 1st good goes down

OPSE – own-price substitution effect

OPIE – own-price income effect

Market demand curve

A sum of quantities demanded by all consumers at each price (a "horizontal" sum of individual demand curves for a particular good)



Suppose, there are 2 consumers with individual demand curves:

Consumer 1: $P=12-2Q_1$;

Consumer 2: $P=10-1.25Q_2$.

With a large number of consumers one can get a smooth curve

Adjustment to price changes: example (APT 2009)

Sasha is a utility-maximizing consumer who spends all of her income on peanuts and bananas, both of which are normal goods.

(a) Assume that the last unit of peanuts consumed increased Sasha's total utility from 40 utils to 48 utils and that the last unit of bananas consumed increased her total utility from 52 utils to 56 utils.

(i) If the price of a unit of peanuts is $1 and Sasha is maximizing utility, calculate the price of a unit of bananas.

(ii) If the price of a unit of peanuts increases and the price of a unit of bananas remains unchanged from the price you determined in part (a)(i), how will Sasha's purchase of peanuts change?

Adjustment to price changes: example (APT 2009)

Sasha is a utility-maximizing consumer who spends all of her income on peanuts and bananas, both of which are normal goods.

(b) Assume that the cross-price elasticity of demand between peanuts and bananas is positive. A widespread decease has destroyed the banana crop. What will happen to the equilibrium price and quantity of peanuts in the short run? Explain.

(c) Assume that the price of bananas increases.

(i) Will the substitution effect increase, decrease, or have no effect on the quantity of bananas demanded?

(ii) What will happen to Sasha's real income?