Lecture - 10

Energy Resources, Economics and Environment

Preferences and Utility

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Preference Relations

- Ranking of preferences between bundles of goods (and services)
- Consumer choices/ preferences
- For simplicity choose two goods x, y

    Wine, Cheese

    Pizza , Movies

    Resource, Environment

Preference Relations - Properties

- Completeness
- Transitivity (Rational preferences)
- Non –Satiation (or Monotonicity - more is better)

Preference relations

- X $\succ$ Y strict preference
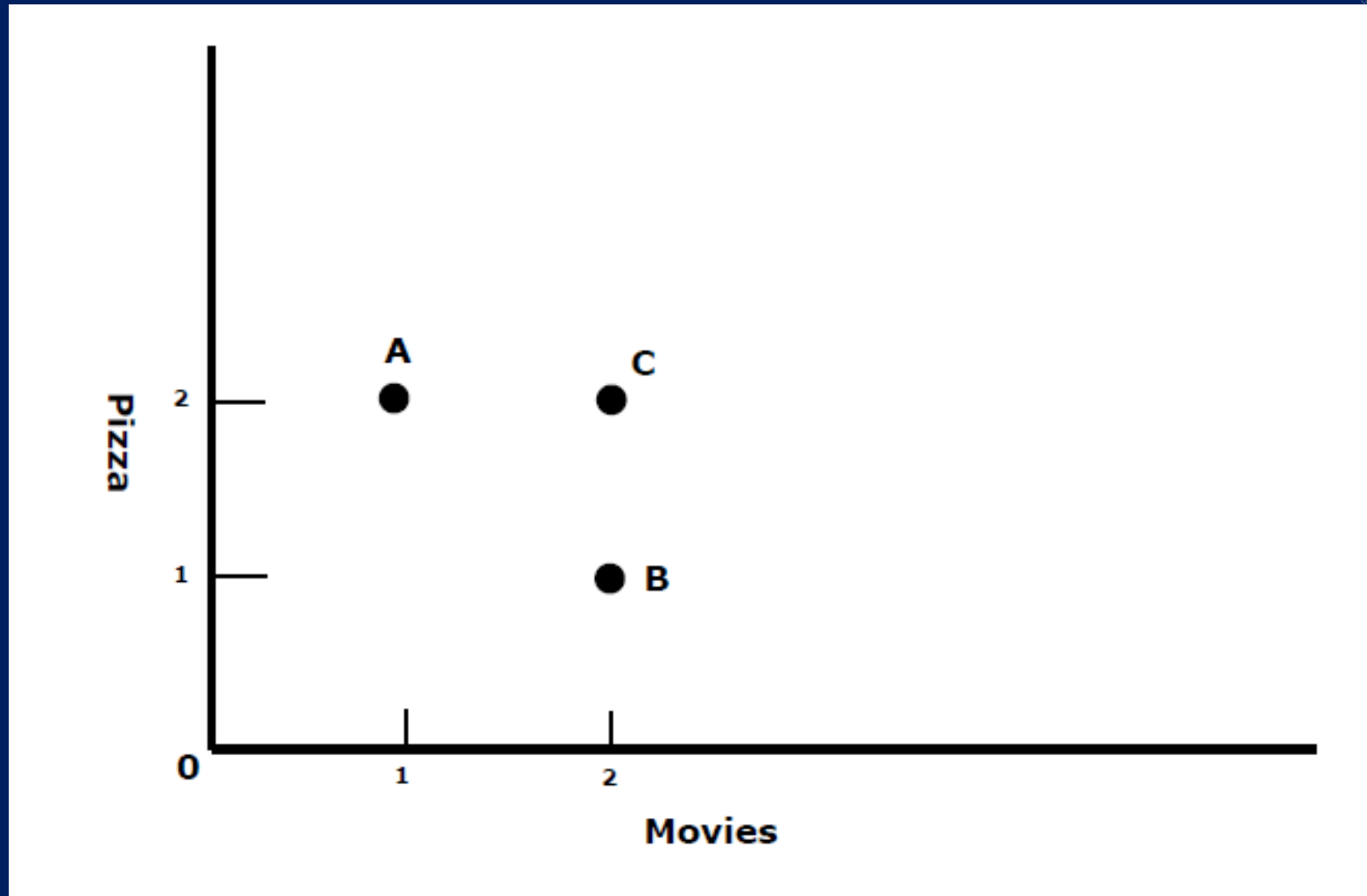- X $\succeq$ Y weak preference relationship
- X $\sim$ Y indifference relation

Transitivity

- Apple ≻ Orange
- Orange ≻ Banana

Implies

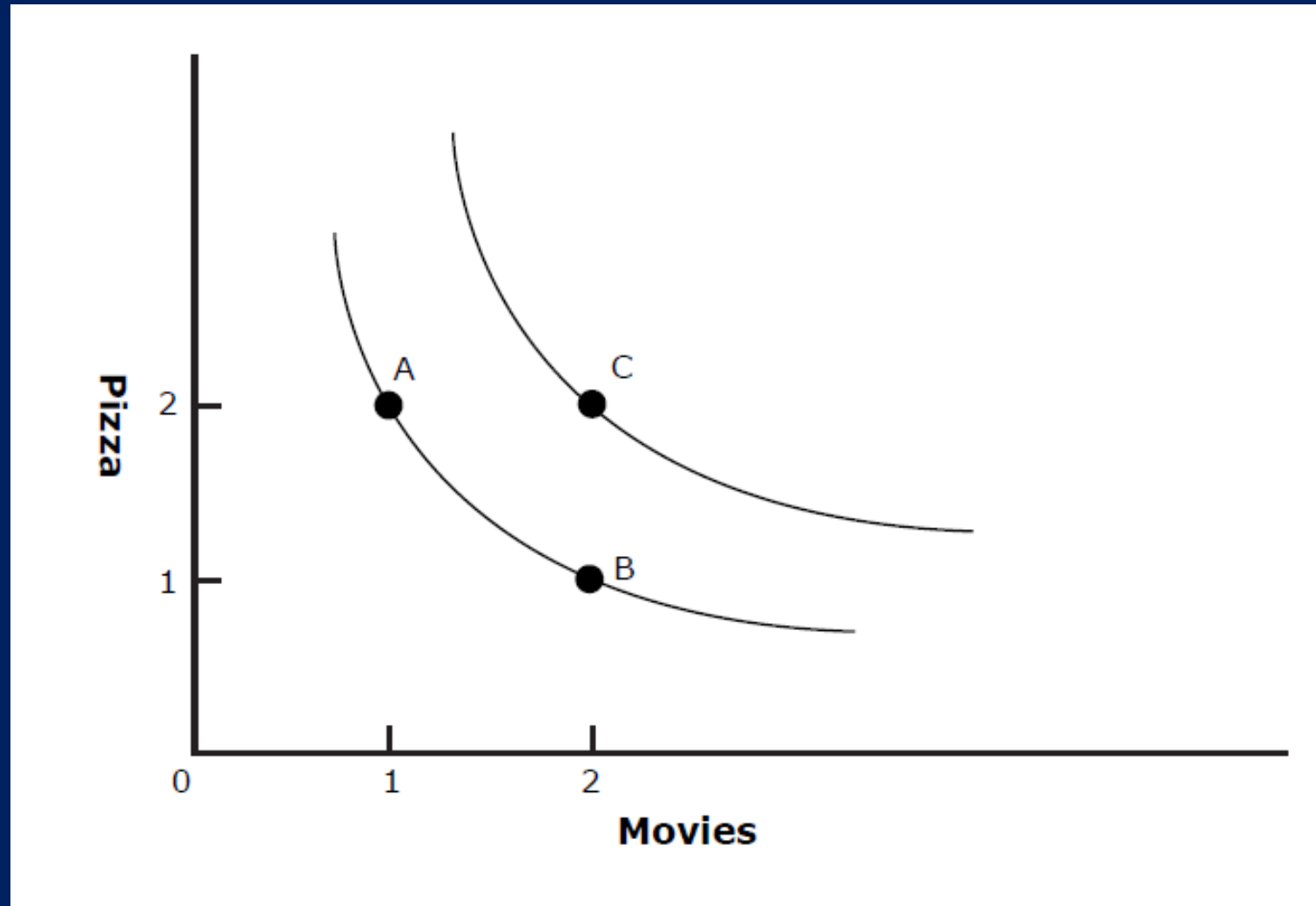Apple ≻ Banana

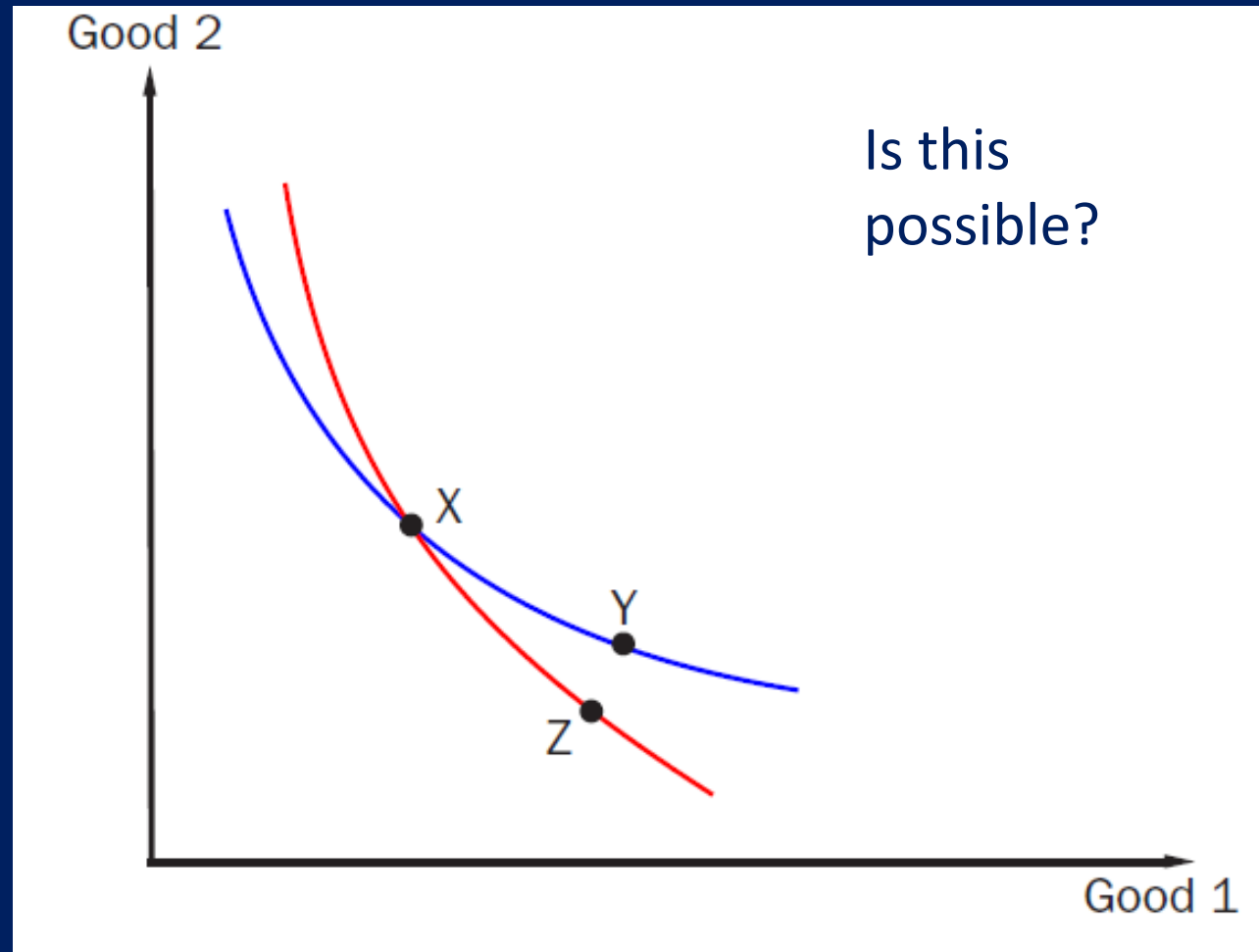# Preference

Indifference curves

Set of consumption bundles that consumer think are equally good she/he are indifferent to the consumption bundles
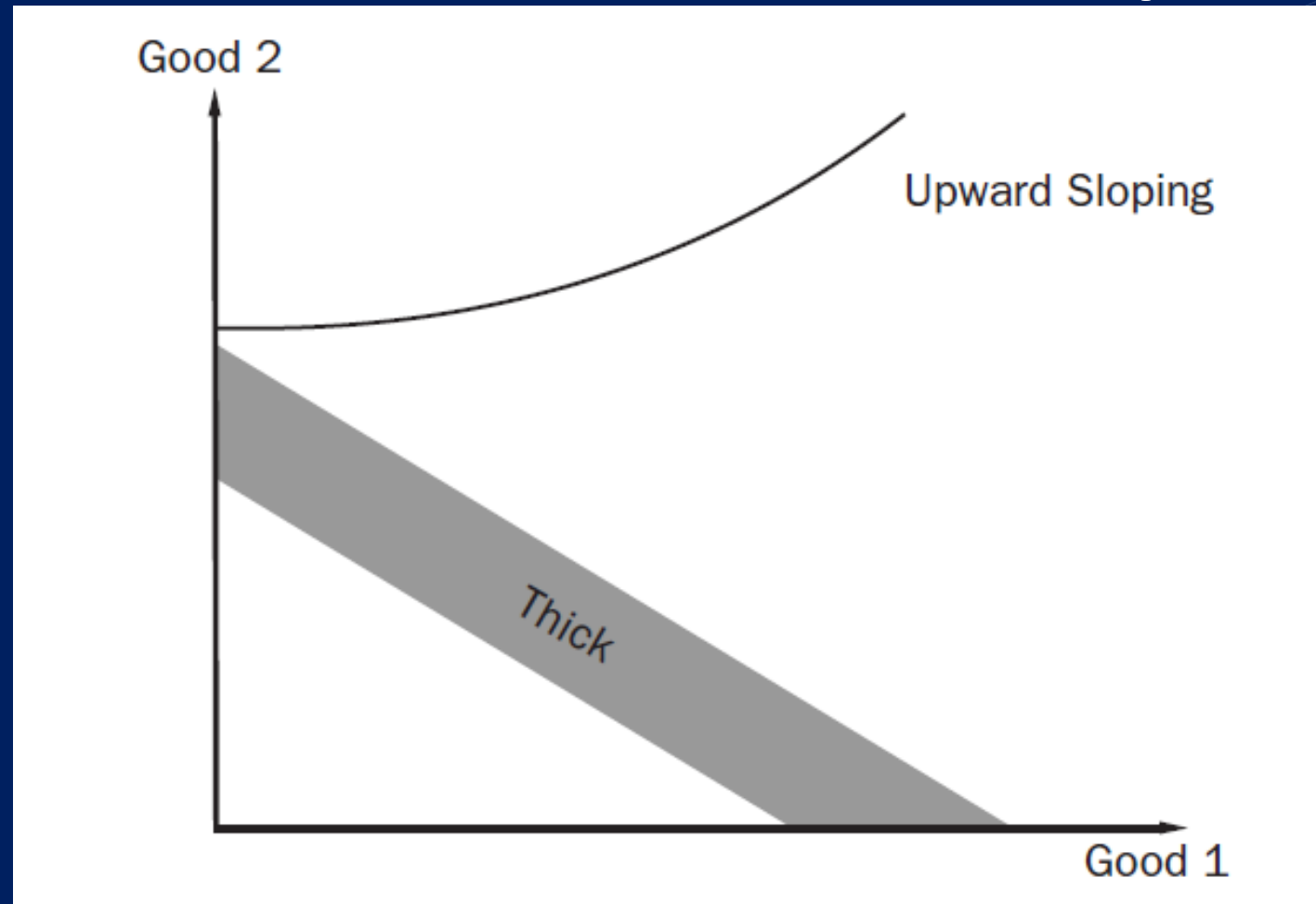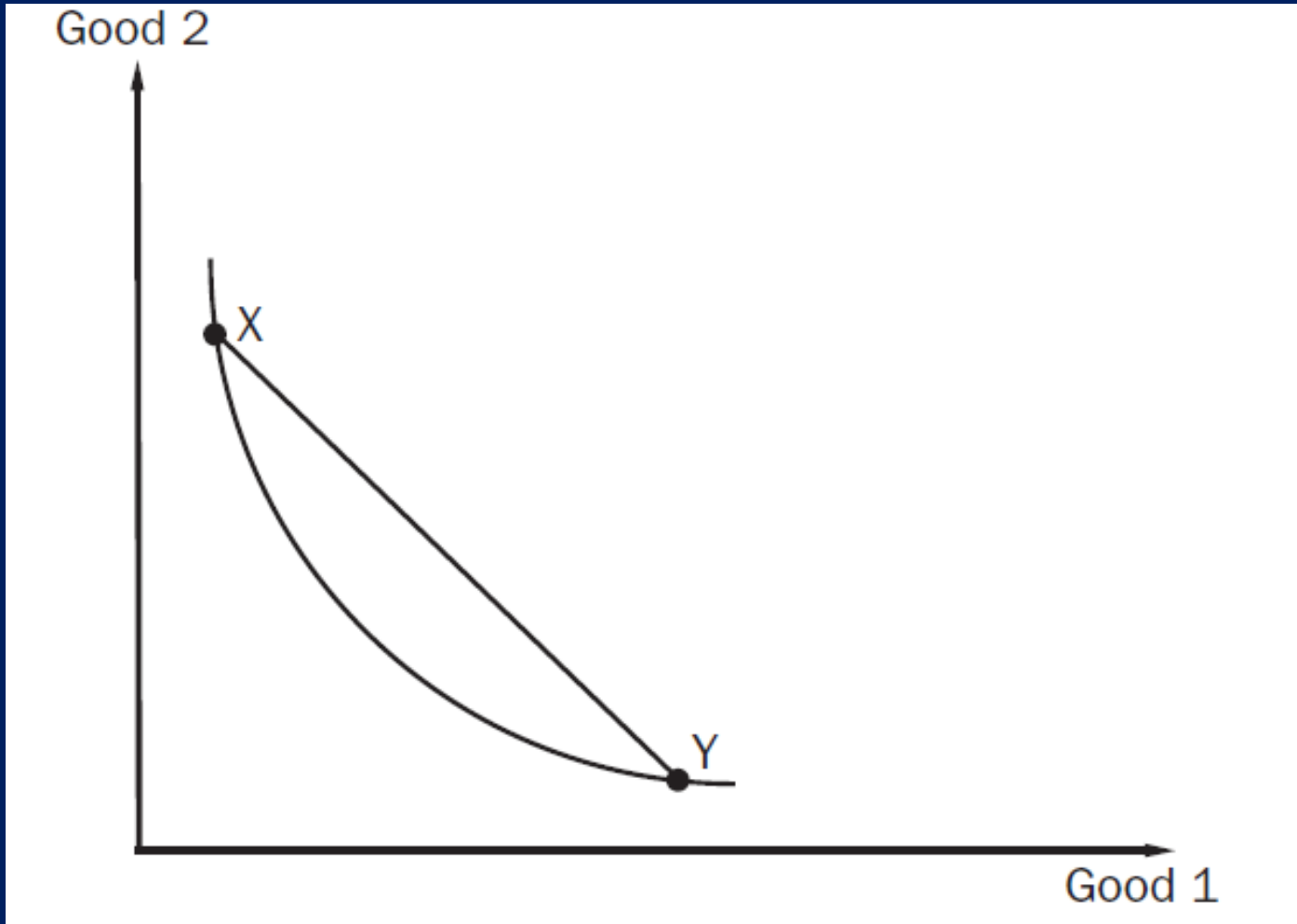
$$X \sim Y$$

Indifference Curves

Indifference curve

Is this possible?

Indifference curves

Is this possible?

Convexity

Source: Serrano and Feldman, 2011

Utility

- Utility - An economic term referring to the total satisfaction received from consuming a good or service
- $U_i = U_i(C_i)$
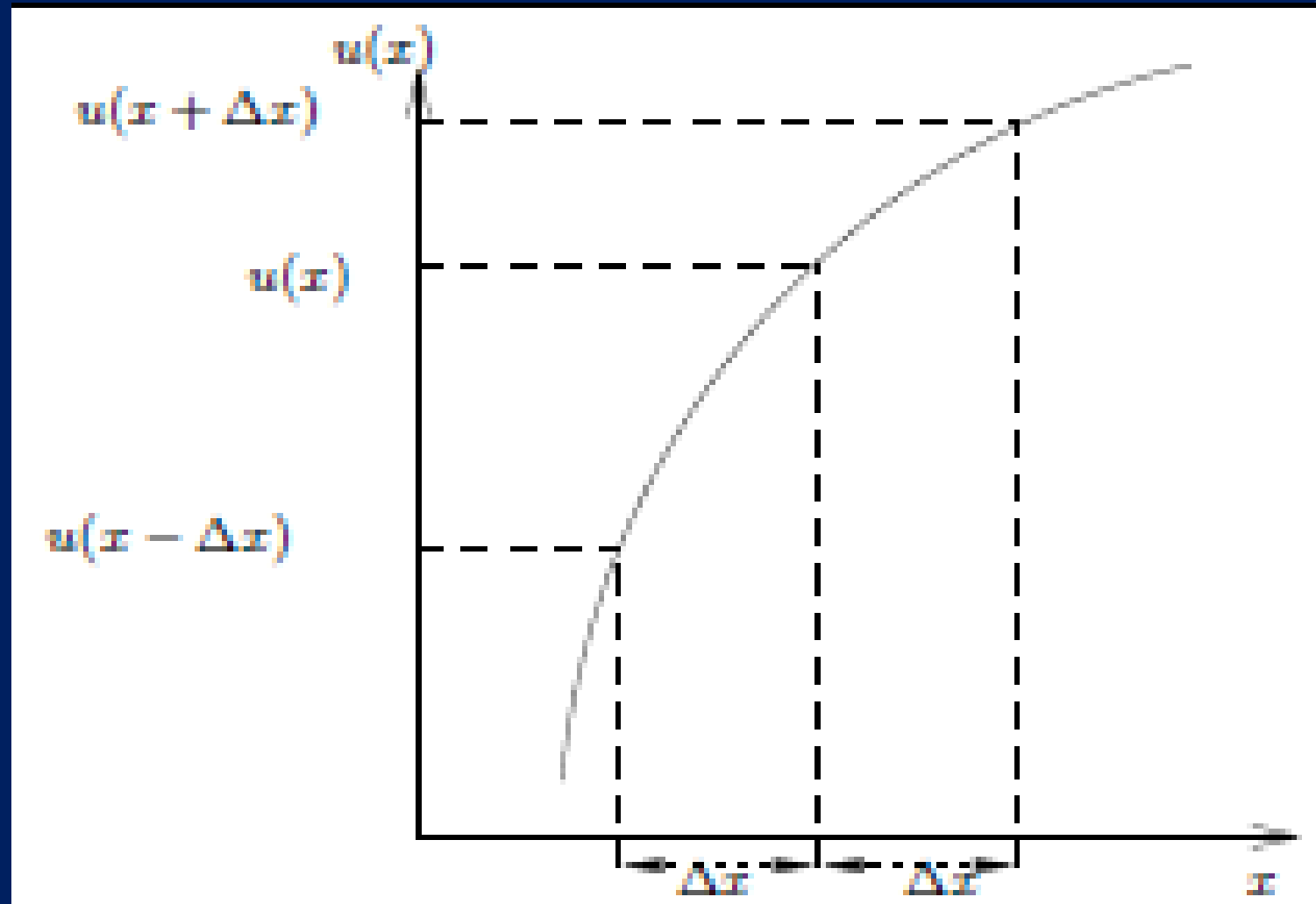- Utility function – mathematical representation of preference relations

Utility functions

- $U(x,y) = \sqrt{xy}$
- $U(x) = 1 - e^{-ax} \quad a > 0$
- $U(x) = \log x$
- $U(x,y) = x^a y^b$ (Cobb- Douglas utility function)
- $U(x,y) = \min\{x,y\}$
- $U(x,y) = ax + by$

Properties of Utility Functions

- Independence
- Completeness
- Transitivity
- Continuity
- Increasing function u' (x) >0
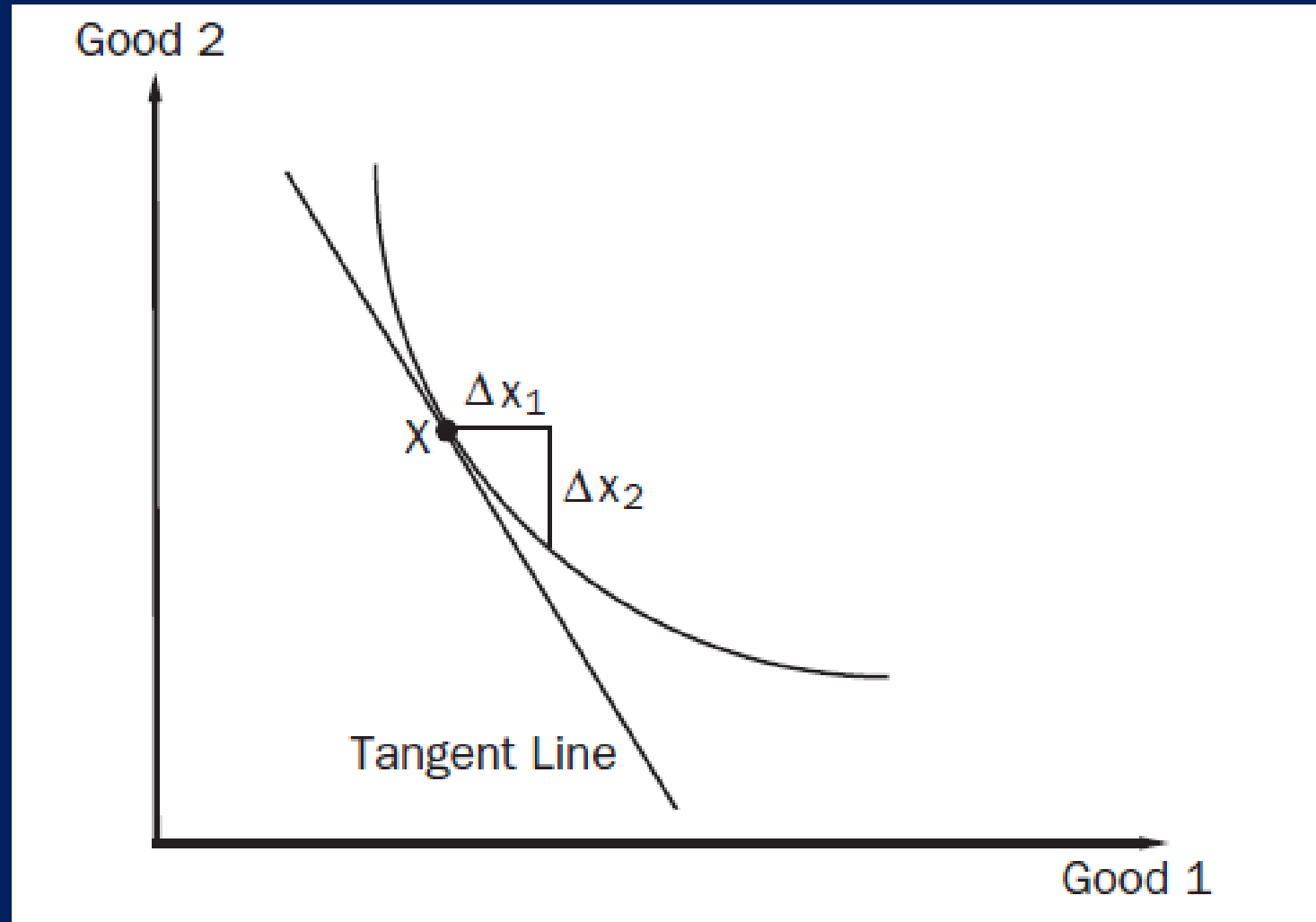- Ordinal not cardinal

Utility Function

Marginal Utility

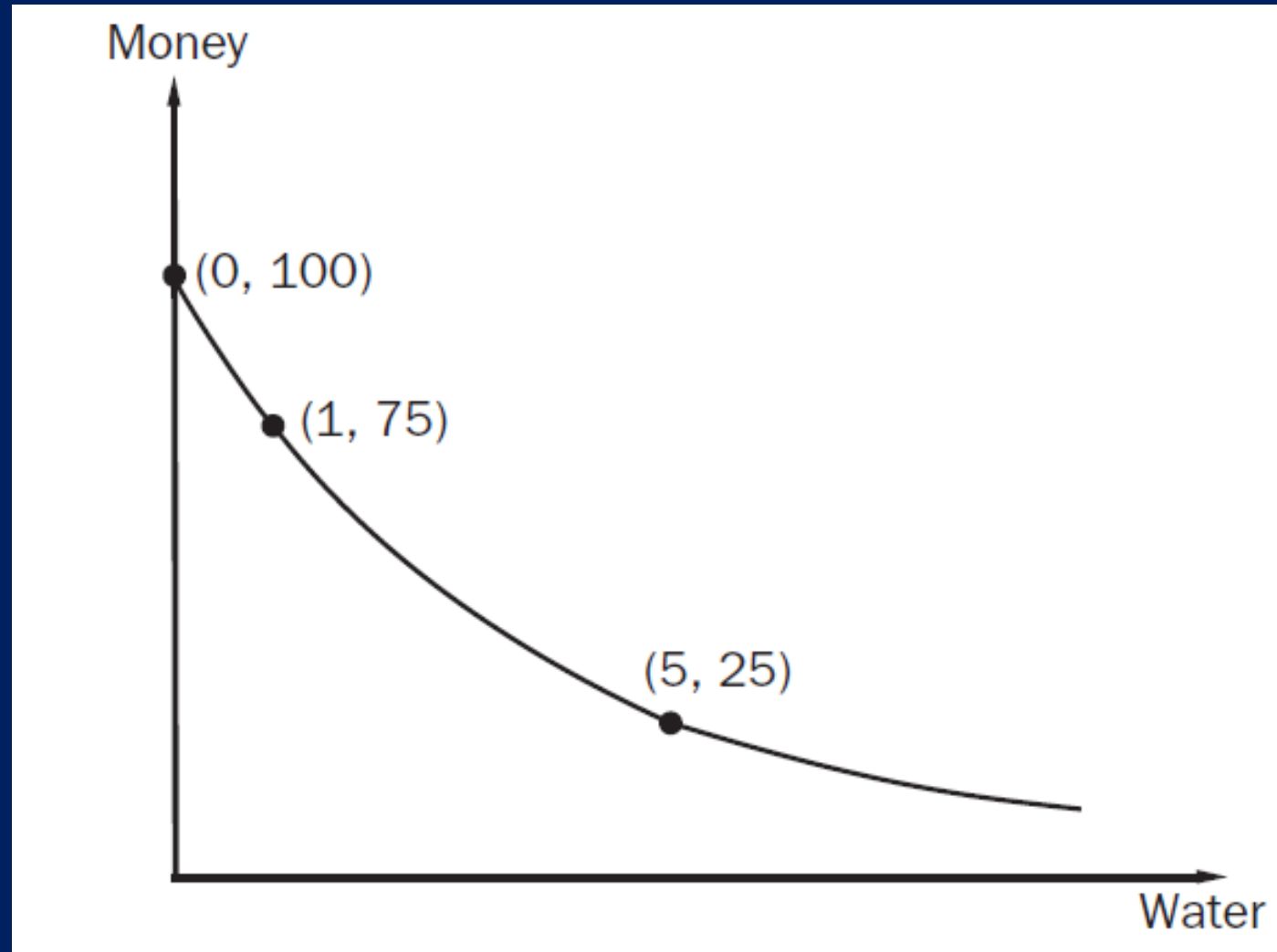- Change in Utility per unit of additional good

$$\partial U / \partial x$$

- Should this increase, decrease or remain constant? Why?
- Law of Diminishing Marginal utility

Marginal Rate of Substitution

Marginal rate of substitution

Source: Serrano and Feldman, 2011

Marginal Rate of Substitution

- MRS = $-\Delta x_2 / \Delta x_1$
- MRS = MU1/ MU2

$$= (\partial U/\partial x_1) / (\partial U/\partial x_2)$$

Budget constraint

- Prices P_x and P_y, total budget B
- $P_x \, x + P_y \, y \leq B$
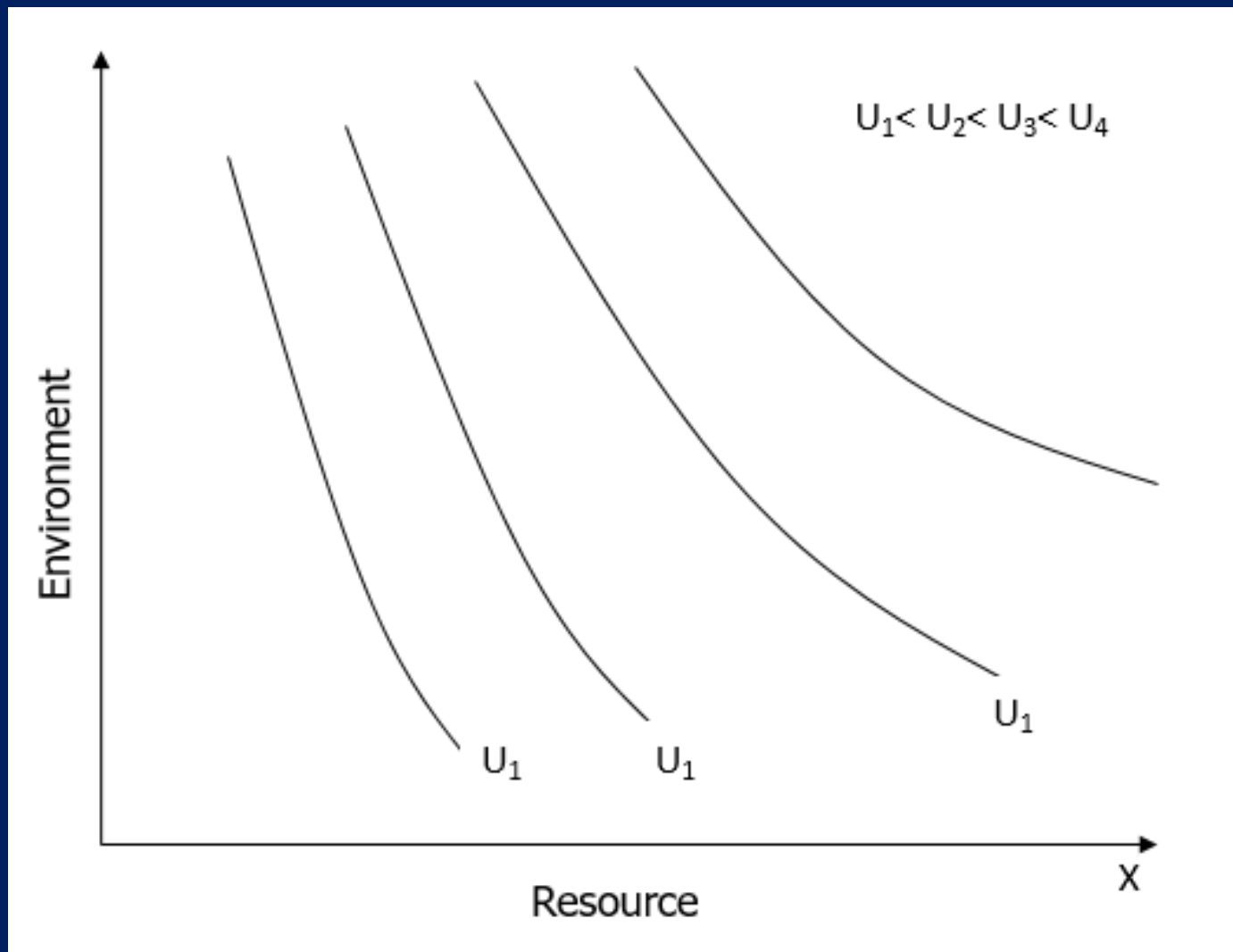- Maximise $U(x,y)$ subject to budget constraint

Solution

- Maximise

$$L = U(x,y) + \lambda (B - P_x x - P_y y)$$

$$\partial L/\partial x = \partial U/\partial x - \lambda P_x = 0$$

$$\partial L/\partial y = \partial U/\partial y - \lambda P_y = 0$$

$$\lambda = \frac{\partial U / \partial x}{P_x} = \frac{\partial U / \partial y}{P_y}$$

Utility: Indifference Curves

Source: Kolstad, 1999

References

- Serrano and Feldman, Lesson 2, Preferences and Utility

  http://www.econ.brown.edu/faculty/serrano/textbook/Lesson2.pdf

- http://ocw.mit.edu

- Charles Kolstad, Environmental Economics, Vol. 1, Oxford University Press (1999).