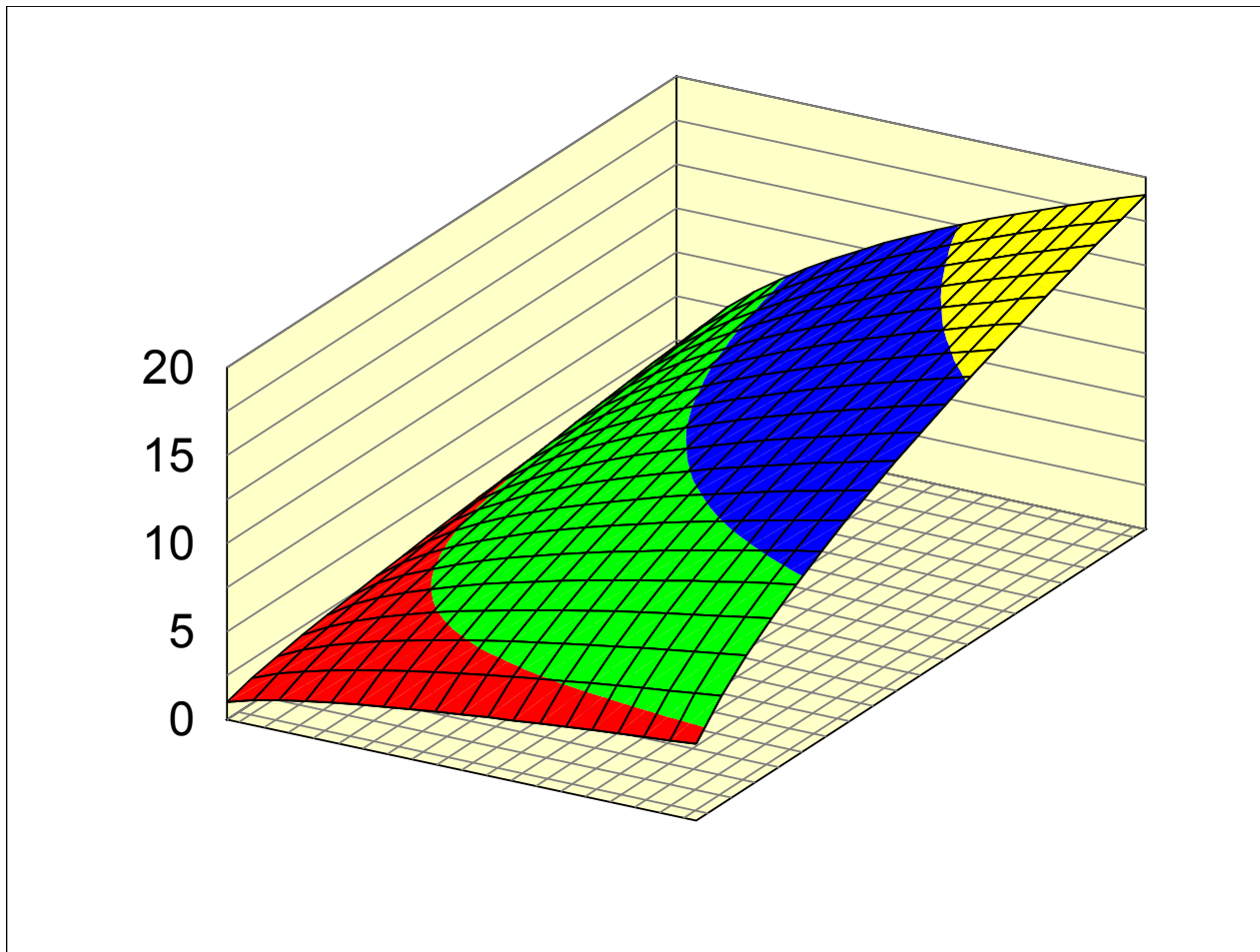
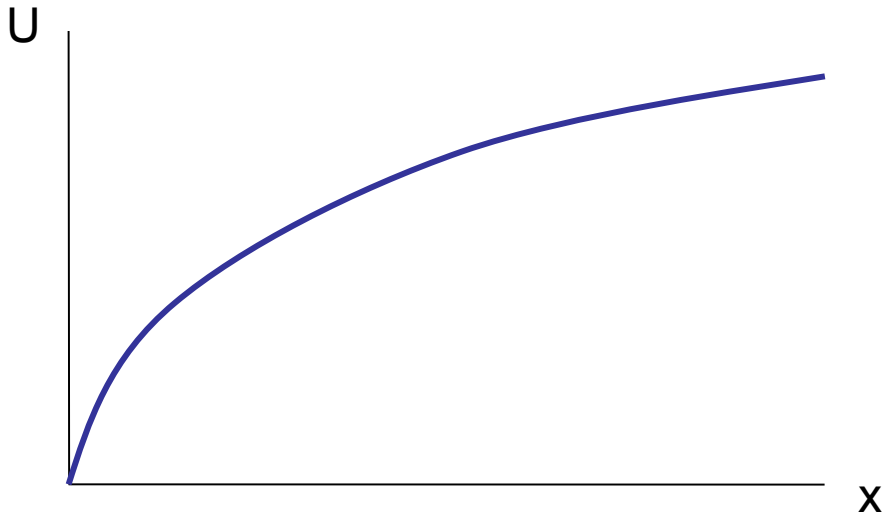


$$U = \sqrt{x \cdot y}$$



Source: [http://www.wiwi.uni-frankfurt.de/professoren/spahn/lehre/ppt/micro%2F01.ppt&rct=j&q=Nutzengebirge&ei=AzmXTuLMAoTdsGbWg6iHBA&usg=AFQjCNG5enQaM7pTUD-7Ohg98\\_g7d23Y1Q&cad=rja](http://www.wiwi.uni-frankfurt.de/professoren/spahn/lehre/ppt/micro%2F01.ppt&rct=j&q=Nutzengebirge&ei=AzmXTuLMAoTdsGbWg6iHBA&usg=AFQjCNG5enQaM7pTUD-7Ohg98_g7d23Y1Q&cad=rja)

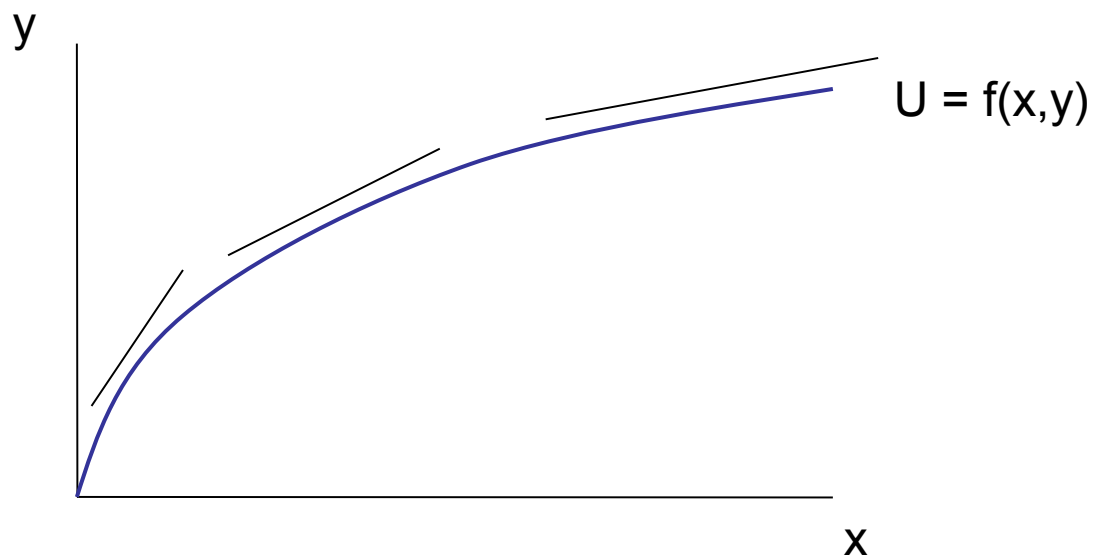
# Vertical cut



$$U = (x, y \text{ fixed})$$

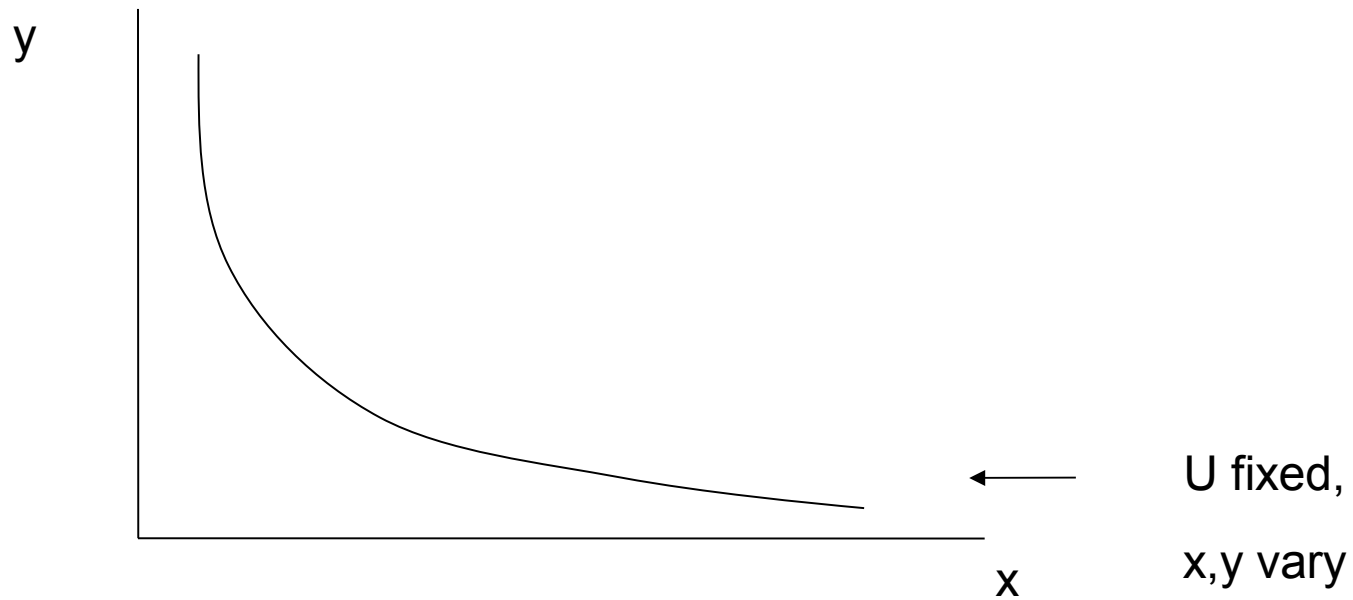
$$dU/dx > 0; d^2U/dx^2 < 0$$

marginal utility is positive, but declines



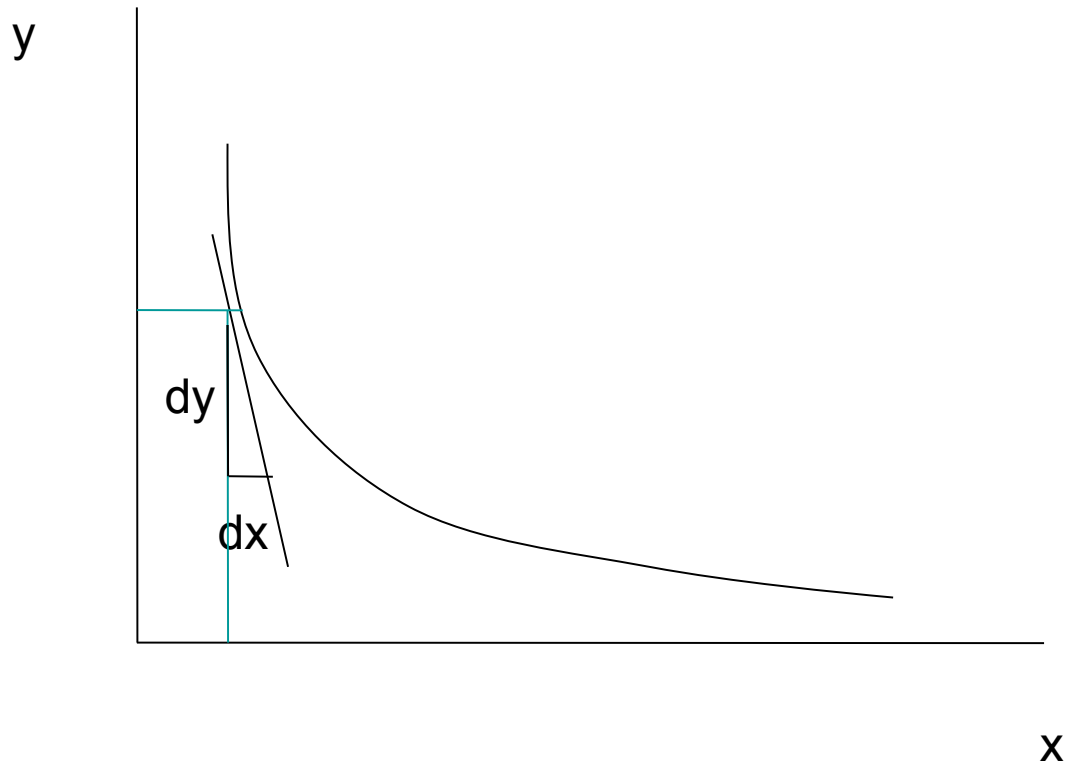
marginal utility is positive, but declines

# Horizontal cut



Indifference curve

# Marginal rate of substitution



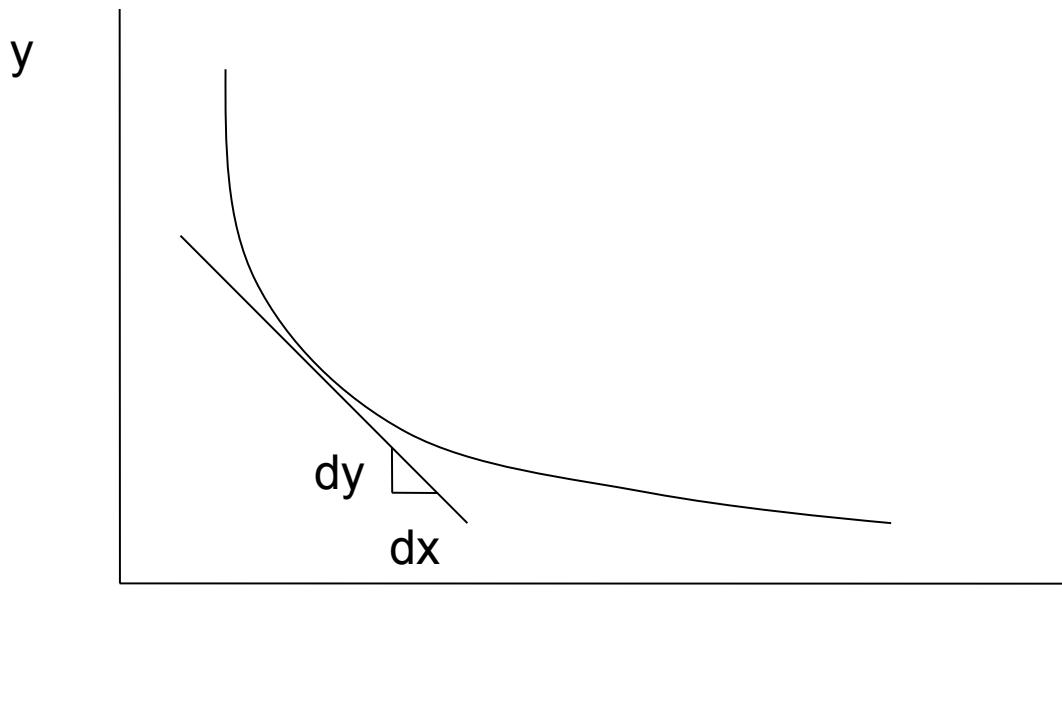
Exchange relation  
between y and x

That keeps me on  
the same utility  
level

-dy traded for dx

# MRS

- Marginal rate of substitution

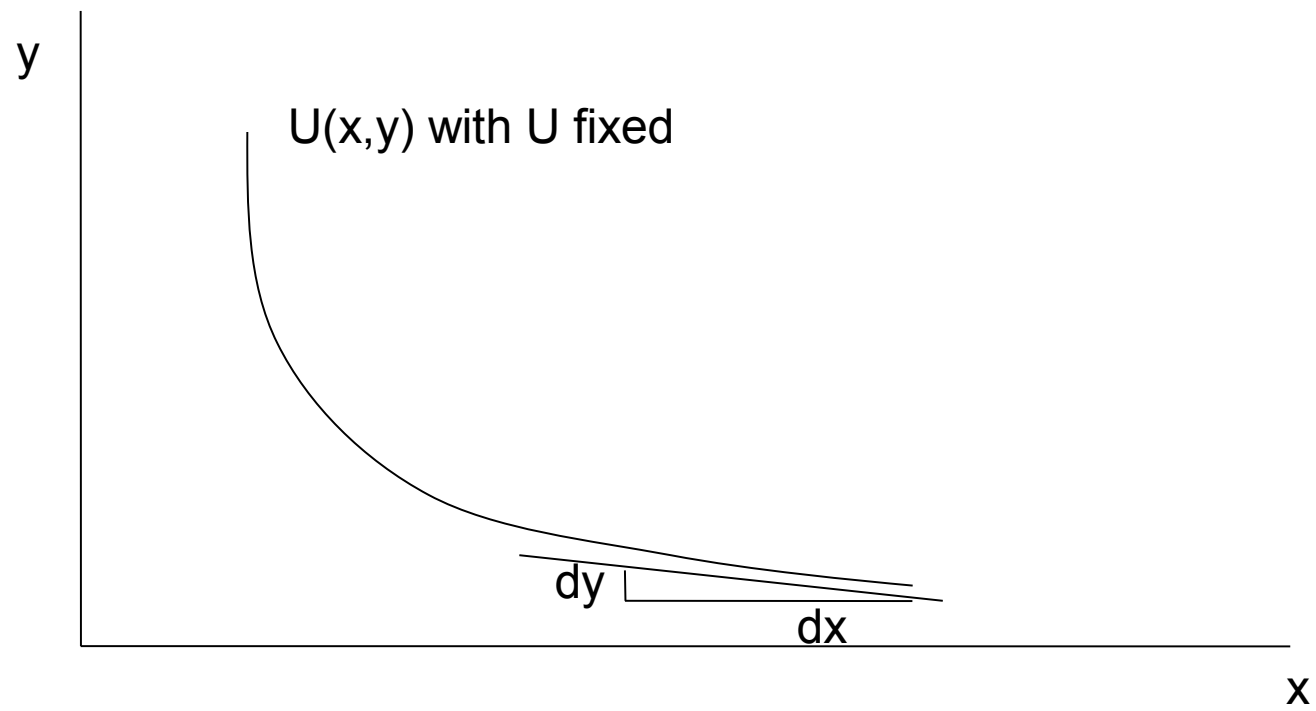


$$\text{MRS} = -dy/dx$$

MRS not constant

MRS negative

x



# Critique

- Utility not empirically observable
- Observable: choice (revealed preferences)
- Joan Robinson: "Utility is the quality in commodities that makes individuals want to buy them, and the fact that individuals want to buy commodities shows that they have utility" (Robinson 1962)



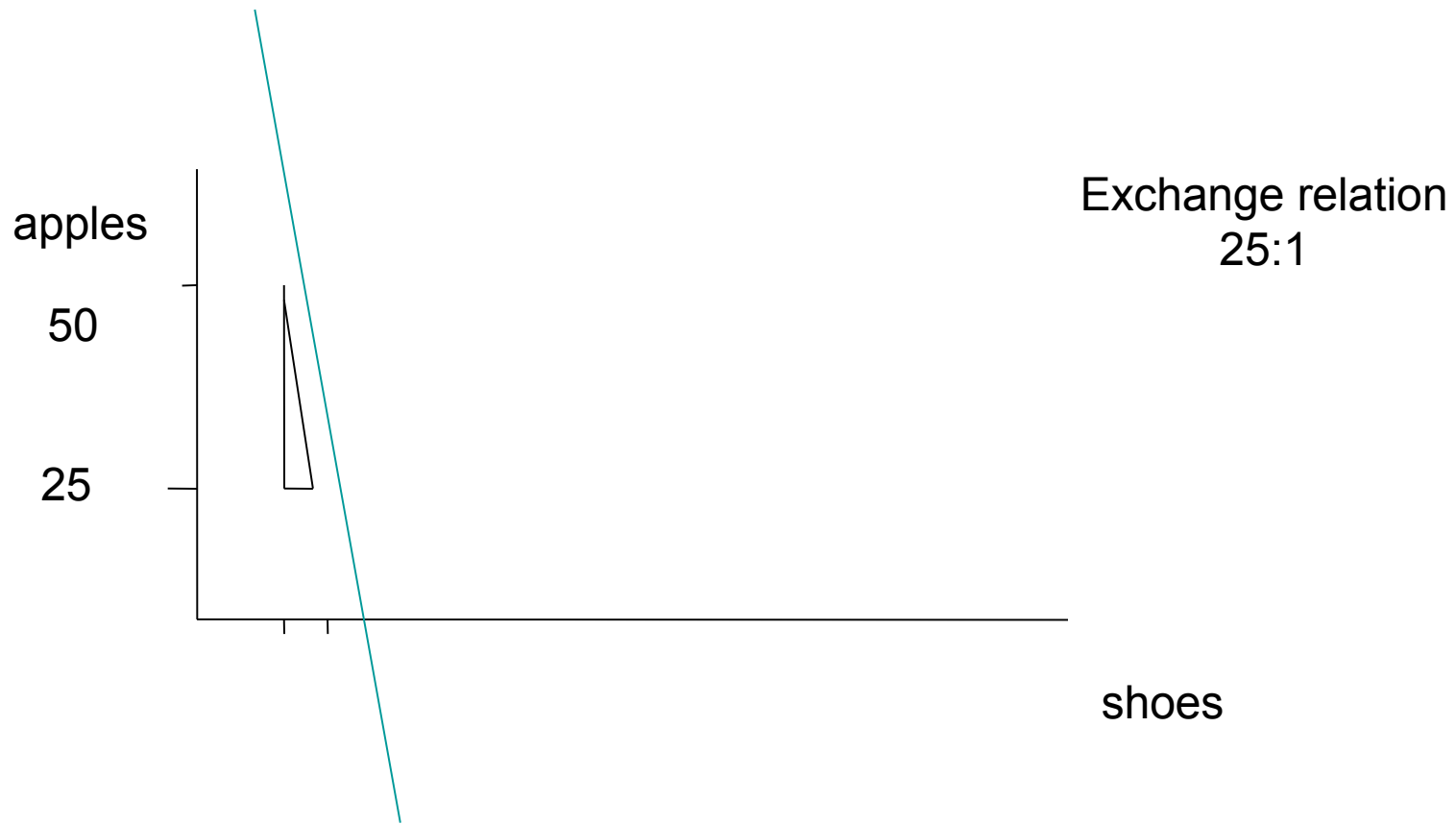
# The budget I

- Fixed income ( $I$ )
- Goods consumption  $(x, y)$  ( $A, B$ )
- Market prices of goods given  $(p_A, p_B)$
- Traditionally: prices  $\Rightarrow$  exchange relation of goods in markets
- Assumption: households cannot save money

# The budget II

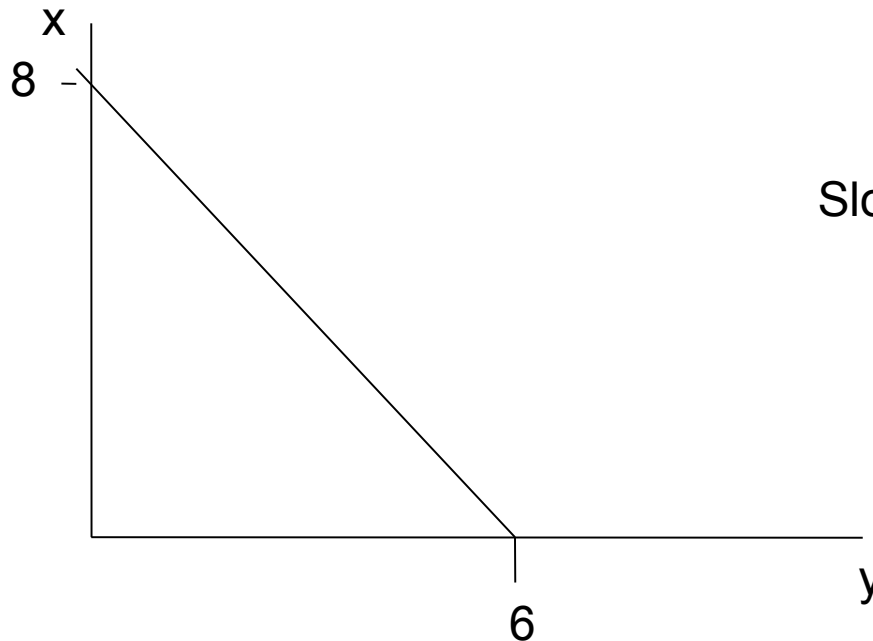
- Apple: 1 Euro
- Shoe: 25 Euro
- Exchange relation shoe/apple = 1/25
- 25 apples: => 1 shoe
- Mathematically:  $-\delta_{\text{shoe}}/\delta_{\text{apple}} = 1/25$

# The budget III



# The budget line

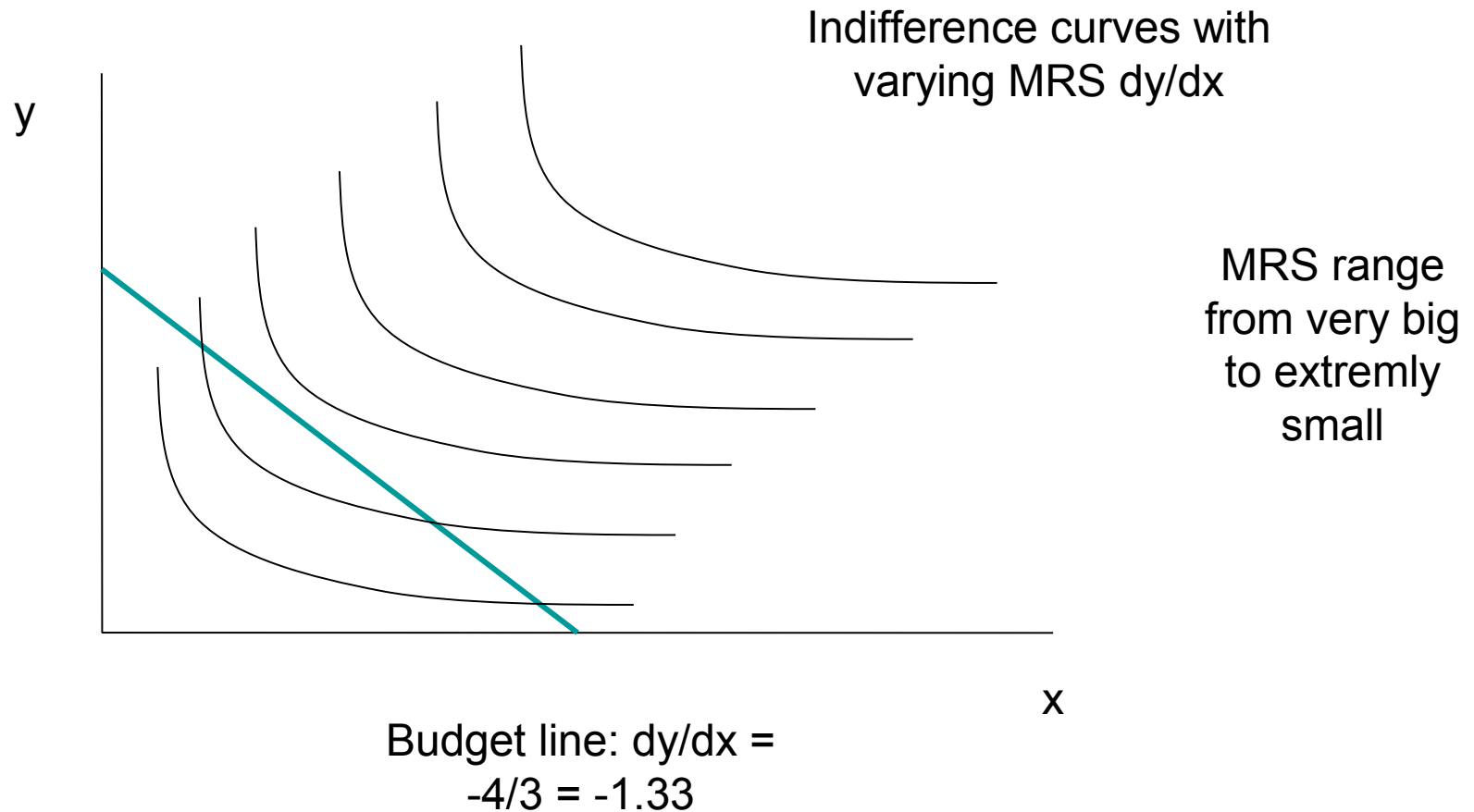
- Good x: 3 Euro, good y: 4 Euro
- Income = 24 Euro  $\Rightarrow$  x max = 8; y max = 6



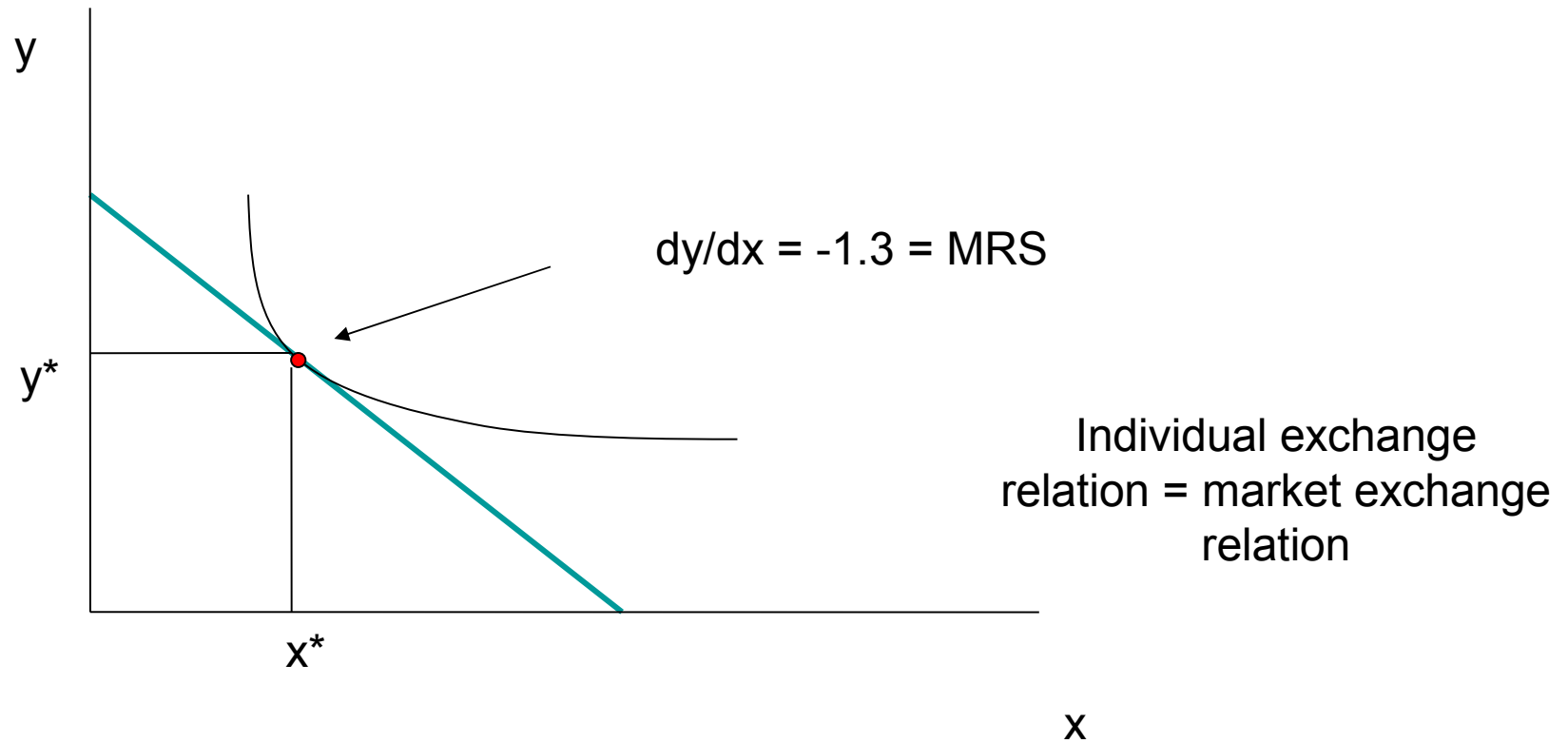
$$\text{Slope} = -8/6 = -1.33$$

Feasible: good bundles on and below budget line

# Utility maximization I



# Utility maximization II



optimal consumption bundle  $x^*, y^*$

# Utility maximization III

- Mathematical:
- $\text{Max } U(x,y) \text{ s.t. } I = p_x x + p_y y$
- Income: constraint, limit to maximum consumption
- Convexity of indifference curves: well-weighted mixture of  $(x,y)$  preferred over large amounts of either  $x$  or  $y$

# Utility maximization IV

