

## Quick Review Utility Maximization

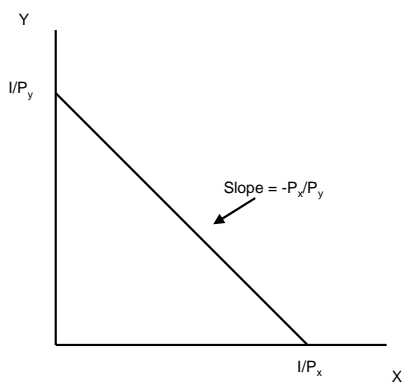
Econ 40565  
Fall 2007

1

### Quick review – Consumer maximization

- Max  $U(x,y)$  subject to  $I = P_x X + P_y Y$
- Slope of the budget constraint is  $-P_x/P_y$
- What does the slope of the budget constraint represent?
- How much Y do you need to give up to get one more unit of X
  - Suppose  $P_x = \$6$  and  $P_y = \$2$ , slope = -3
  - You need to sacrifice 3 units of y to get one more x

2



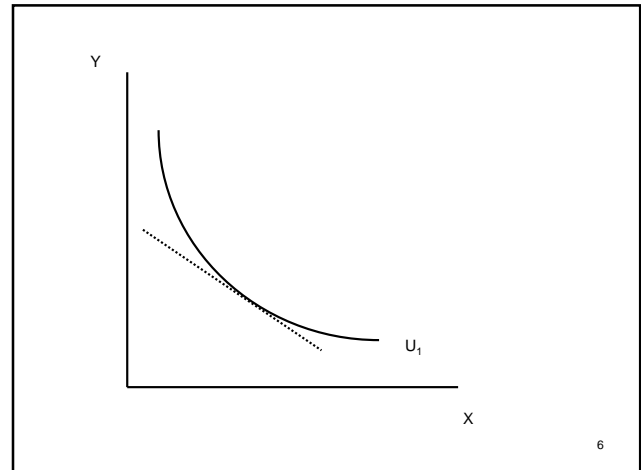
3

- Indifference curve, collection of points that represent equal utility
- Slope of the Indifference curve
  - Line just tangent to the curve
  - Slope equals Marginal rate of substitution
  - $MRS = -MU_x/MU_y$

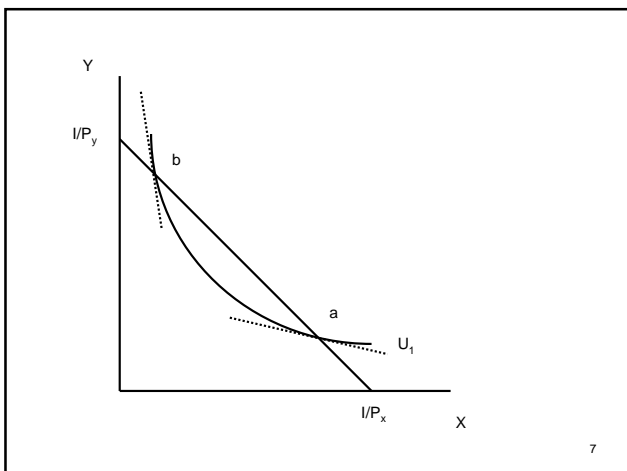
4

- Represents the amount of y you need to give up to consume one more unit of X and keep utility the same
- $MU_x = 0.5$  and  $MU_y = 2$ ,  $MRS = -1/4$
- To get one more 1 x, you need to give up 1 quarter y – holding utility constant

5



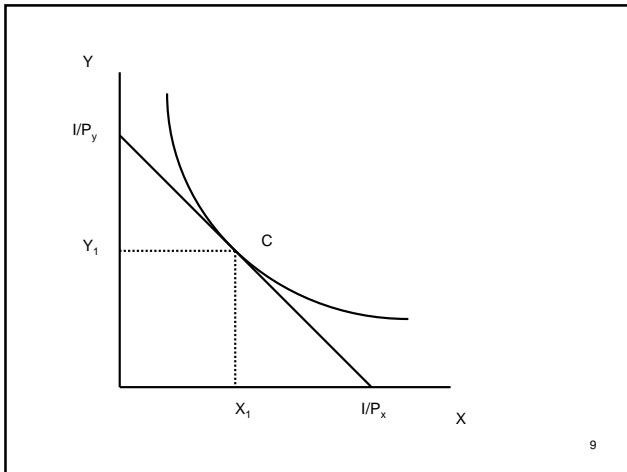
6



7

- Notice at point B
  - $MU_y/MU_x > P_x/P_y$
  - $MU_y/P_x > MU_x/P_y$
  - Extra utility from spending \$1 on X is greater than the utility from taking \$1 from Y
  - Therefore, should increase spending on X
- Notice at point A
  - $MU_y/MU_x < P_x/P_y$
  - $MU_y/P_x < MU_x/P_y$
  - Extra utility from spending \$1 on Y is greater than the utility from taking \$1 from X
  - Therefore, should increase spending on Y

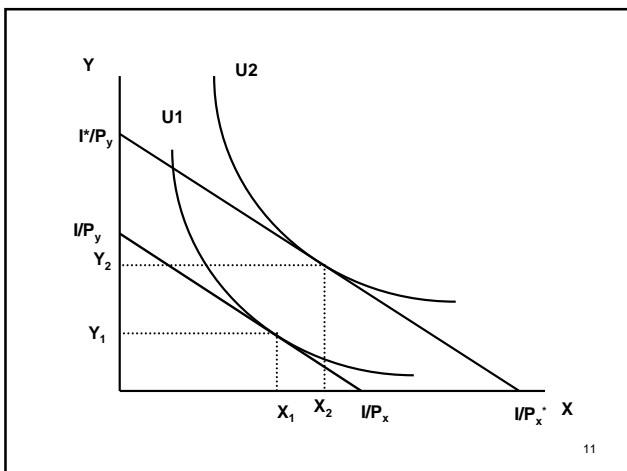
8



9

- Notice at point C
  - $MU_y/MU_x = P_x/P_y$
  - $MU_y/P_x = MU_x/P_y$
  - Extra utility from spending \$1 on X is equal to the extra utility from taking \$1 from Y
  - Therefore, you cannot re-arrange spending and make yourself better off

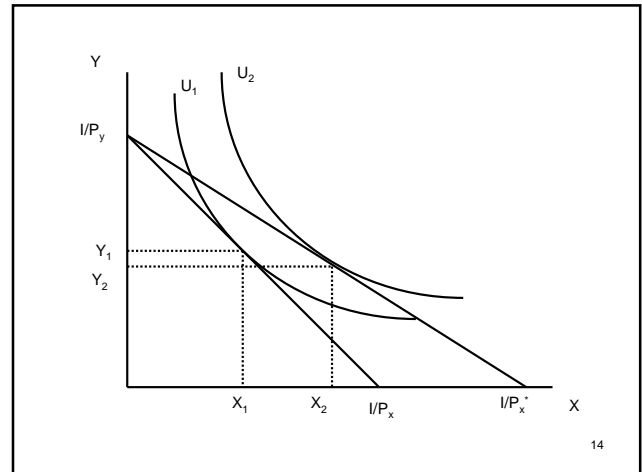
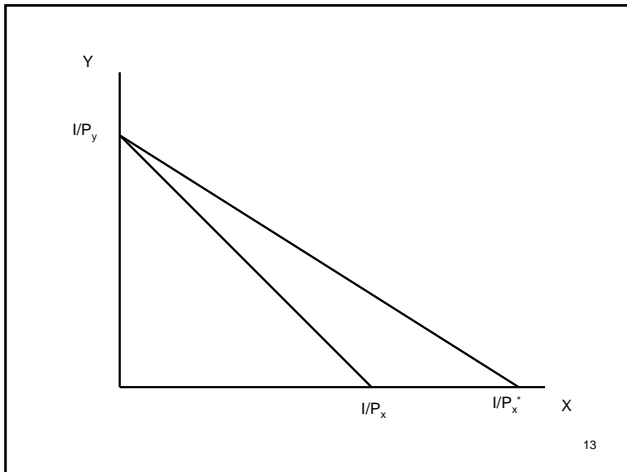
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11

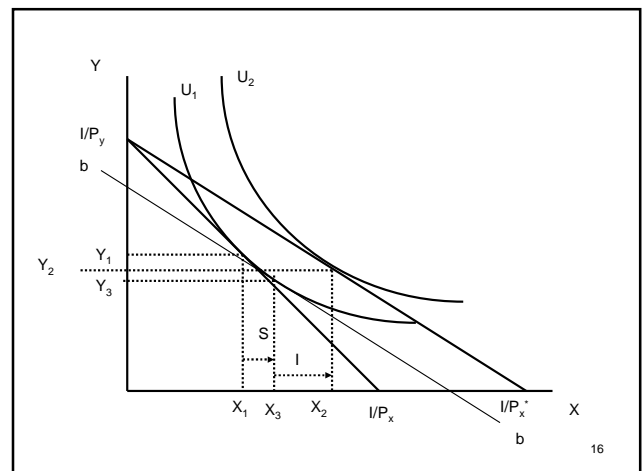
- Suppose price of X falls to  $P_x^*$
- Maximum amount of Y you can purchase is still  $I/P_y$
- Maximum amount of X you can purchase is not  $I/P_x^*$
- Budget constraint rotates about point C
- Slope of budget constraint is now  $-P_x^*/P_y$
- Amount of y you need to give up to get X has now increased

12



- Price of X has fallen relative to Y
  - Substitution effect, encourage more consumption of X, less of Y
  - Every dollar now goes farther, real income has increase, X is normal good, so income effect says you should increase X and Y
- Net effect
  - Unambiguous increase in X
  - Uncertain impact on Y

15



- To isolate income effect, draw line parallel to new budget constrain until just tangent to old indifference curve (thin line bb)
- Movement along old indifference curve is only attributable to change in prices
  - Substitution effect
  - Utility is the same, therefore, movement is due only to price changes

17

- Compare demands between the two parallel budget constraints
  - Only difference is income (price ratios the same)

18

- Along X axis
  - $X_1$  to  $X_3$  same utility, different prices, sub effect
    - Notice that sub effect is (+)
  - $X_3$  to  $X_2$  same prices, different income, income eff
    - Notice income effect is (+)

19

- Along Y axis
  - $Y_1$  to  $Y_3$  same utility, different prices, sub effect
    - Notice that sub effect is (-)
  - $Y_3$  to  $Y_2$  same prices, different income, income eff
    - Notice income effect is (+)

20

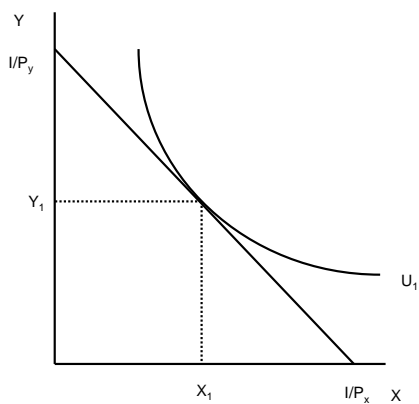
## Example 2

- Price of Y increases to  $P_y^*$ 
  - Substitution effect
    - Increase x, decrease y
  - Income effect
    - Relative income has dropped
    - If Y and X are normal goods, demand for both should drop

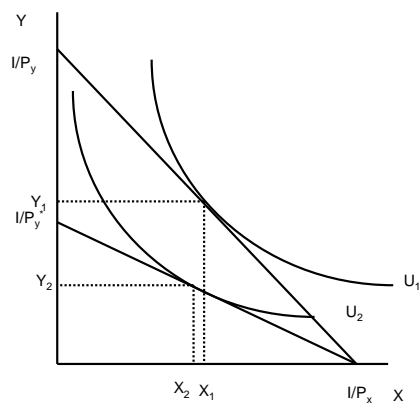
21

- Substitution effect
  - $Y_1$  to  $Y_3$  (-)
  - $X_1$  to  $X_3$  (+)
- Income Effect
  - $Y_3$  to  $Y_2$  (-)
  - $X_3$  to  $X_2$  (-)

22



23



24

