1.3 Lecture 3: Budget Constraints

1.3.1 Budget constraint

- Consumers have limited resources: their **budget constraint**. One simplifying assumption is that budget is equal to income (I). Budget over two goods X and Y is defined to be

$$I = p_X X + p_Y Y$$

- The slope of budget constraint is defined as **marginal rate of transformation (MRT)**: rate at which you can transform one good into the other in the marketplace

$$MRT = -\frac{p_X}{p_Y}$$

  Intuitively, with a fixed budget, by choosing one thing you are by definition reducing the money you have to spend on other things.

- Shifts in price and income alter the position and slope of the budget constraint.
  - For example, if the price of good X increases, the budget constraint flattens.
  - If the income decreases, the budget constraint shifts inwards.

1.3.2 Constrained optimization

- The goal of constrained choice is to maximize utility subject to the budget constraint. Preferences are represented by indifference curves.

- The optimal bundle that a consumer can choose is defined by the point where indifference curve is tangent to the budget constraint:

$$MRS = -\frac{MU_X}{MU_Y} = -\frac{\delta U/\delta X}{\delta U/\delta Y} = -\frac{p_X}{p_Y} = MRT$$

  At this point, slope of indifference curve = slope of budget constraint. This is equivalent to equating the marginal cost and benefit of consuming each good.

- The above equation defines an interior solution (in which the consumer consumes some of each good); if indifference curves are fat, there can also be **corner solutions** in which the consumer only consumes one good

1.3.3 TO KNOW – Graphical and Math Understanding

- Know how to write down a budget constraint given prices and income

- Show graphically how to find the bundle that maximizes the consumer's utility subject to the budget constraint

- Solve for the optimal bundle mathematically for a consumer given a utility function, prices of the two goods, and income; be sure to check for corner solutions

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