Principles of Economics (Spring 2024)
Lecture 3
Budget Constraint

Part I

Budget – Constraints that consumers face as a result of limited income. Determined by

- Income: expenditure cannot exceed income unless we borrow.
- Prices: the prices of what we want.

quantity of x

$$P_x \cdot q_x + P_y \cdot q_y \leq M$$

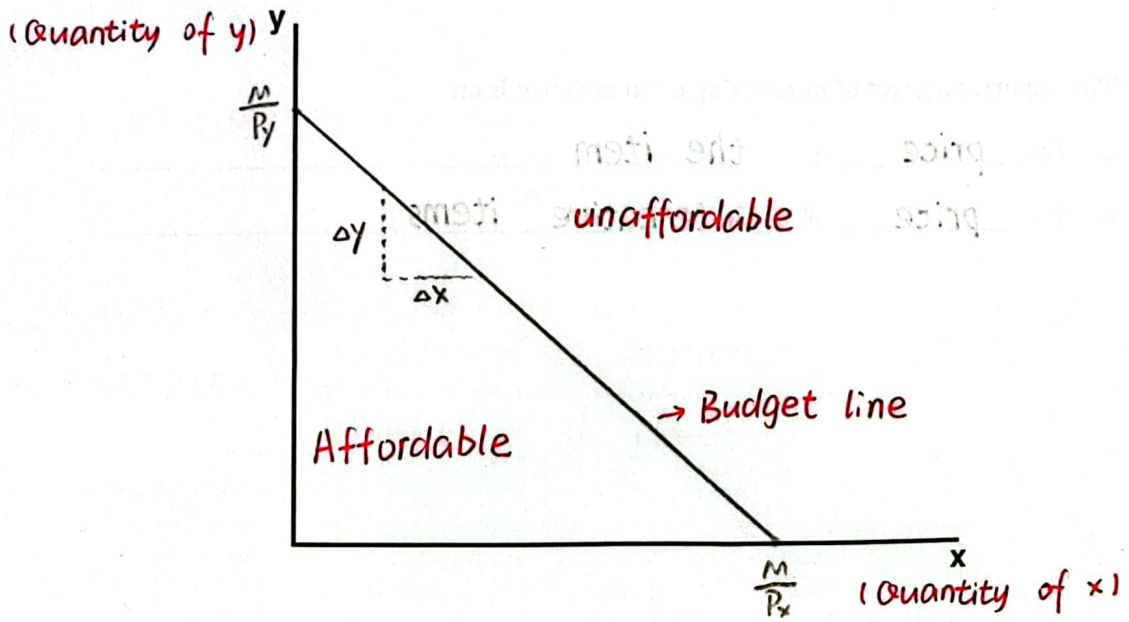
price of x; income

- **Budget Constraint (also called Budget Line)** – All feasible combination of goods for which the total amount of money spent is equal to income.

$$\Rightarrow P_x \cdot x + P_y \cdot y = M$$

Rearrange algebra

$$\Rightarrow y = \frac{M}{P_y} - \frac{P_x}{P_y} x$$



- Budget line is the boundary between affordable and unaffordable combinations of items.
- For points on the budget line: Expenditure = Income.
- Economic Meanings of the Line
  - Vertical Intercept = M/P_y

    The quantity of y could be purchased if all income is spent on y.
  - Horizontal Intercept = M/P_x

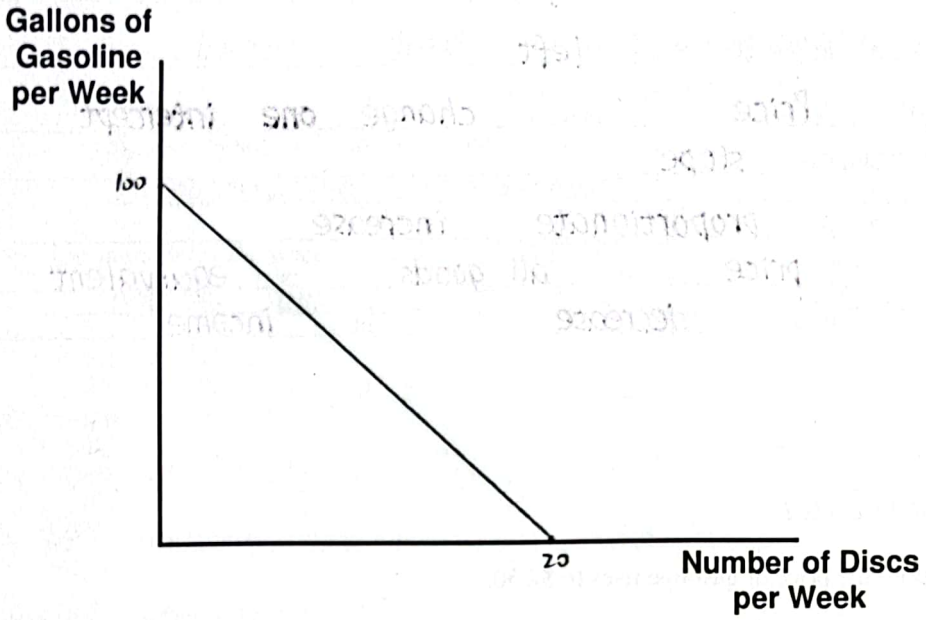
    The quantity of x could be purchased if all income is spent on x.
  - Slope = $\Delta y/\Delta x$ = $-P_x/P_y$

    Measures the opportunity cost of purchasing/consuming x (the item on the horizontal axis): in order to purchase more of X, have to give up some purchase of Y.

- **The opportunity cost of purchasing an item depends on**
  - The price of the item.
  - The price of alternative items.

Example 1

Suppose your total income is \$100 per week, and you do not save or loan. You spend all your income consuming discs and gasoline. The price of each discs is \$5, and price of gasoline is \$1 per gallon.



1) The budget line is given by $5D + G = 100$ / $5Q_D + Q_G = 100$.
2) The slope of the budget line is -5.
3) The opportunity cost of a compact disc is 5 gallons of gasoline.

Q: How to compute opportunity cost if we don't have a budget line ?

Example:

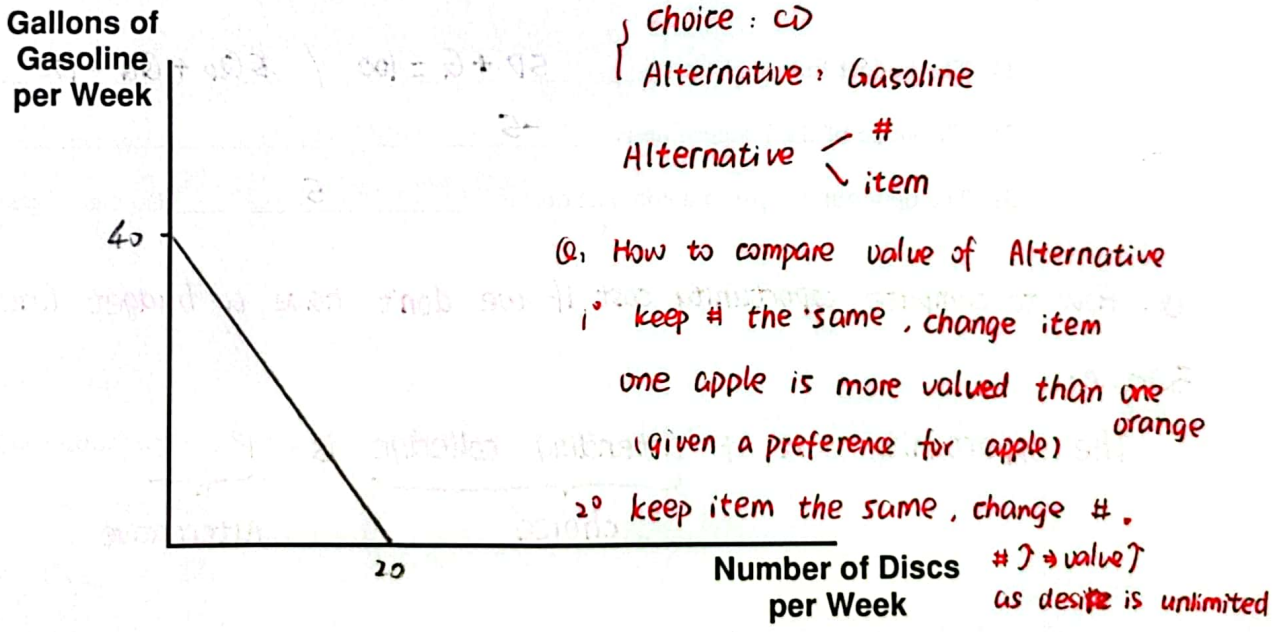
The opportunity cost of attending colledge (choice) is P (Alternative)

$$\text{opportunity cost} = \frac{\text{Maximum \# of Alternative}}{\text{Maximum \# of choice}} = \frac{\frac{\text{Income}}{\text{Price of Gasoline}}}{\frac{\text{Income}}{\text{Price of CD}}} = \frac{100}{20} = 5$$

- **Changes in Budget Line**
  - Income changes: parallel shifts of the budget line.
    - M ↑ ⇒ Shift BL right
    - M ↓ ⇒ Shift BL left
  - Price changes: change one intercept and the slope.
    - A proportionate increase in the price of all goods is equivalent to a decrease in income.

Continue with Example 1

Suppose the price of gasoline rises to $2.50.



Choice : CD
Alternative : Gasoline
Alternative < # / item

Q1 How to compare value of Alternative
1° keep # the same, change item
one apple is more valued than one orange (given a preference for apple)
2° keep item the same, change #.
↑ → value ↑ as desire is unlimited

1) The maximum amount of gasoline per week that can be bought with $100 falls to 40 gallons.
2) The slope of the budget line is -2.
3) The opportunity cost of a compact disc falls to 2 gallons of gasoline even though the money price of compact disc remains $5.

- Conclusions
  - The highest valued alternative increases in its value, the opportunity cost increases.
  - The highest valued alternative decreases in its value, as long as it is still the highest valued alternative, the opportunity cost decreases.
- The increase in the price of gasoline decreases the options available to the consumer.

Alternative: ≠ item

↑ Price of one item

⇒ ↓ quantity of item

⇒ ↓ the value of alternative

⇒ Since gasoline is the same,
5 gallons of gasoline is higher
in value than 2 gallons

⇒ An increase in the price of gasoline
decreases the opportunity cost of
consuming CD

Exercise 1

E If prices and income in a two-good society double, what will happen to the budget line?

A. The intercepts of the budget line will increase.
B. The intercepts of the budget line will decrease.
C. The slope of the budget line may either increase or decrease.
D. Insufficient information is given to determine what effect the change will have on the budget line, but we know society is worse off.
E. There will be no effect on the budget line.