BUDGET CONSTRAINT

The Budget Constraint

- Opportunity Set
  - The set of consumption bundles that are affordable.
    - $P_xX + P_yY \leq M.$

- Budget Line
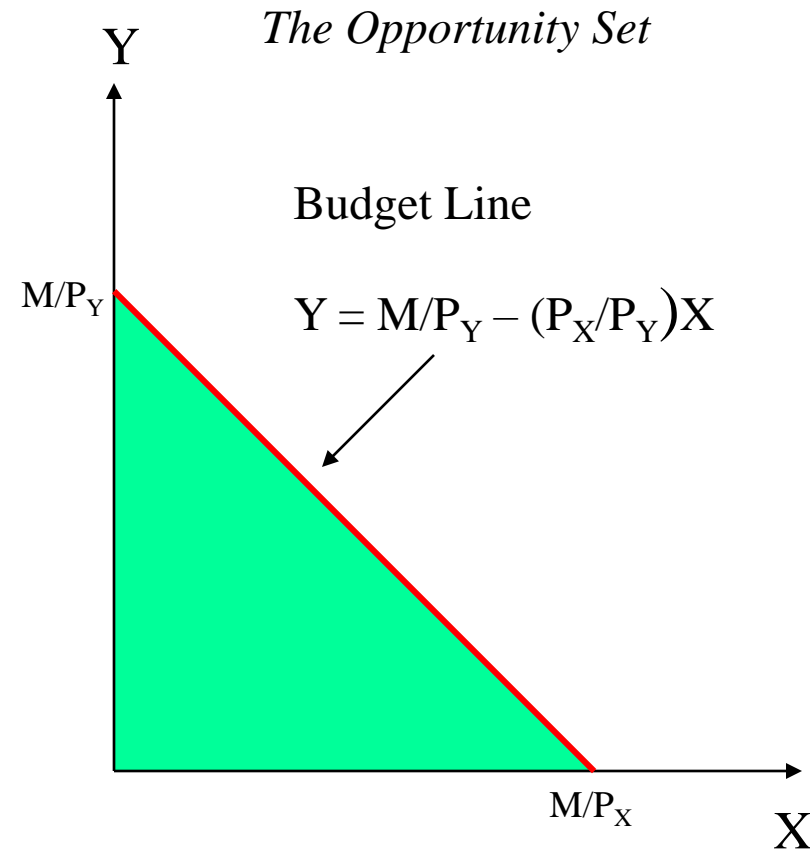 - The bundles of goods that exhaust a consumers income.
    - $P_xX + P_yY = M.$

- **Market Rate of Substitution**
  - The slope of the budget line
    - $-P_x / P_y$

The Opportunity Set

Budget Line

$Y = M/P_Y - (P_X/P_Y)X$
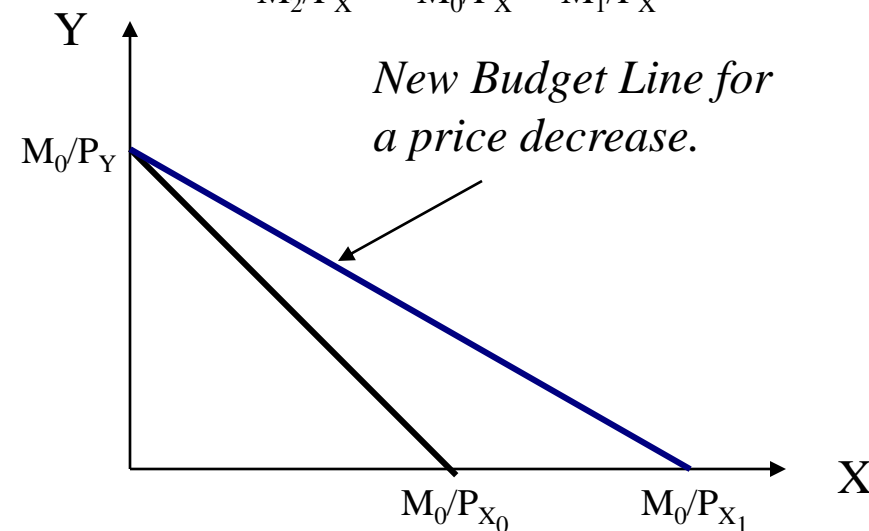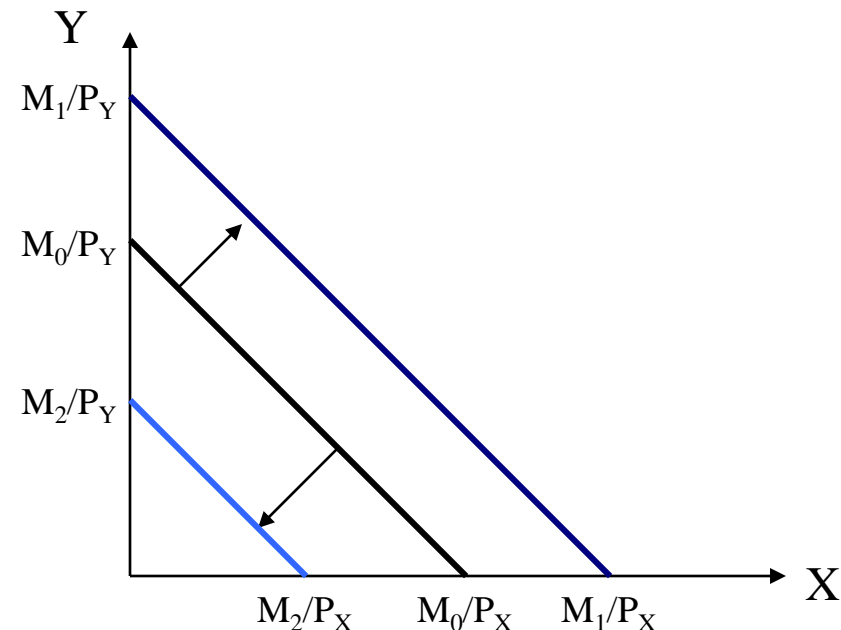
Changes in the Budget Line

- **Changes in Income**
  - Increases lead to a parallel, outward shift in the budget line ($M_1 > M_0$).
 - Decreases lead to a parallel, inward shift ($M_2 < M_0$).

- **Changes in Price**
  - A decreases in the price of good X rotates the budget line counter-clockwise ($P_{X_0} > P_{X_1}$).
  - An increases rotates the budget line clockwise (not shown).

New Budget Line for a price decrease.

Consumer Equilibrium

- The **equilibrium consumption bundle** is the *affordable* bundle that yields the *highest* level of satisfaction.

- No incentive to change.

- Consumer equilibrium occurs at a point where
  $MRS = P_X / P_Y.$

  - Equivalently, the slope of the indifference curve equals the slope of budget line.

  - At A, consumer has to give up less to the market to get an additional unit of X, so it pays to increase X

  - At B, consumer has to give up more Y to the market to get an additional unit of X, so he shall reduce his consumption of X. *Alternatively, he has to give up less of X to get an additional unit of Y. So Y is increased.*
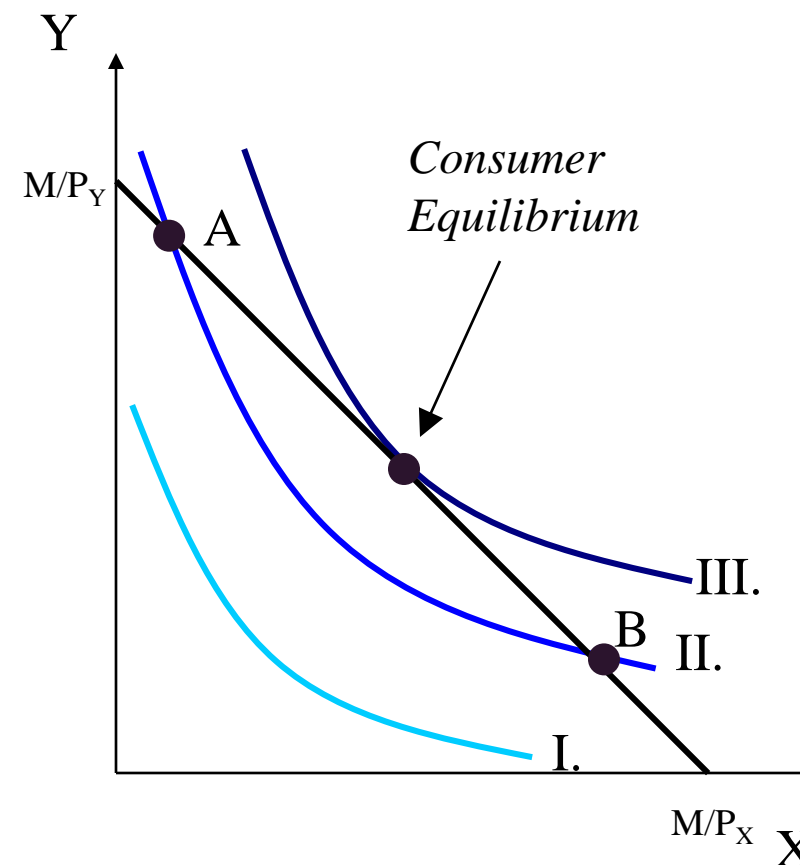
Tax and Subsidy

- Quantity tax: the consumer has to pay a certain amount to the government for each unit of the good he purchases.

$(P_x + t) X + P_y Y = M$

- Value tax is a tax on the value—the price—of a good, rather than the quantity purchased of a good. A value tax is usually expressed in percentage terms

$P_x (1 + t) X + P_y Y = M$

- Lump sum tax $(\Delta M < 0)$

$P_x X + P_y Y = M - T$

- Quantity subsidy: In the case of a quantity subsidy, the government gives an amount to the consumer that depends on the amount of the good purchased.
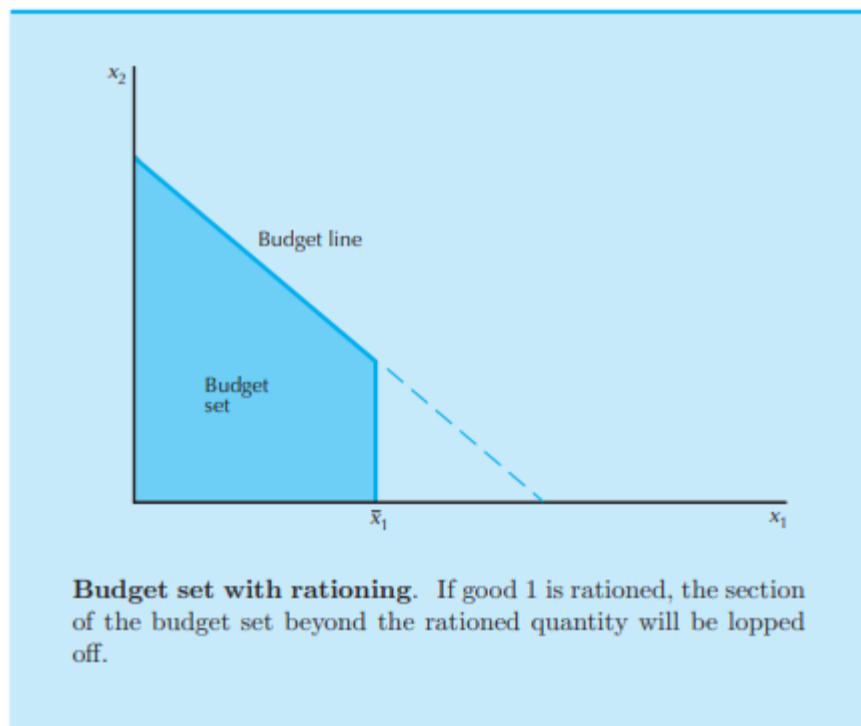
$(P_x - s) X + P_y Y = M$

- Ad valorem subsidy is a subsidy based on the price of the good being subsidized.

$P_x (1 - s) X + P_y Y = M$

- Lump sum subsidy $(\Delta M > 0)$

$P_x X + P_y Y = M + S$

Rationing

Budget set with rationing. If good 1 is rationed, the section of the budget set beyond the rationed quantity will be lopped off.

+ Income Changes and Consumer Equilibrium

- Normal Goods
  - Good X is a normal good if an increase (decrease) in income leads to an increase (decrease) in its consumption.
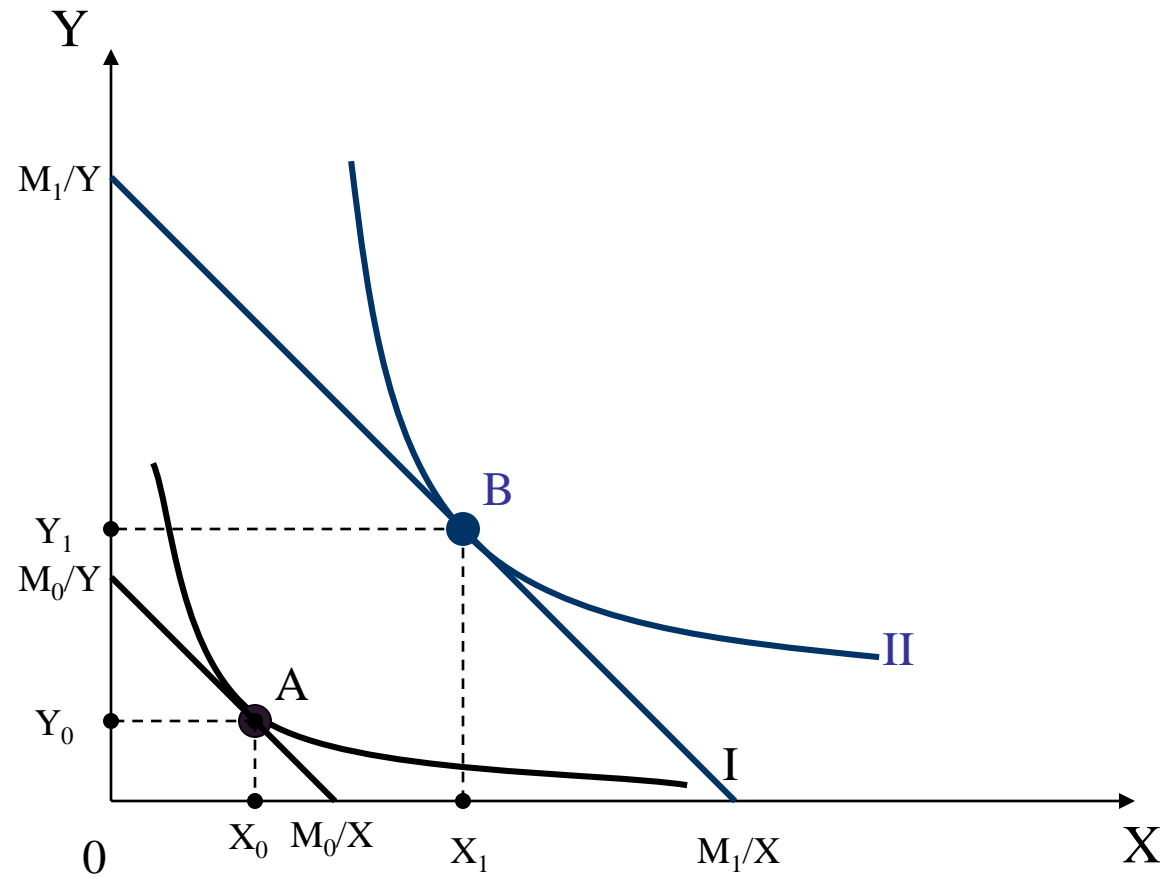
- Inferior Goods
  - Good X is an inferior good if an increase (decrease) in income leads to a decrease (increase) in its consumption.

Normal Goods

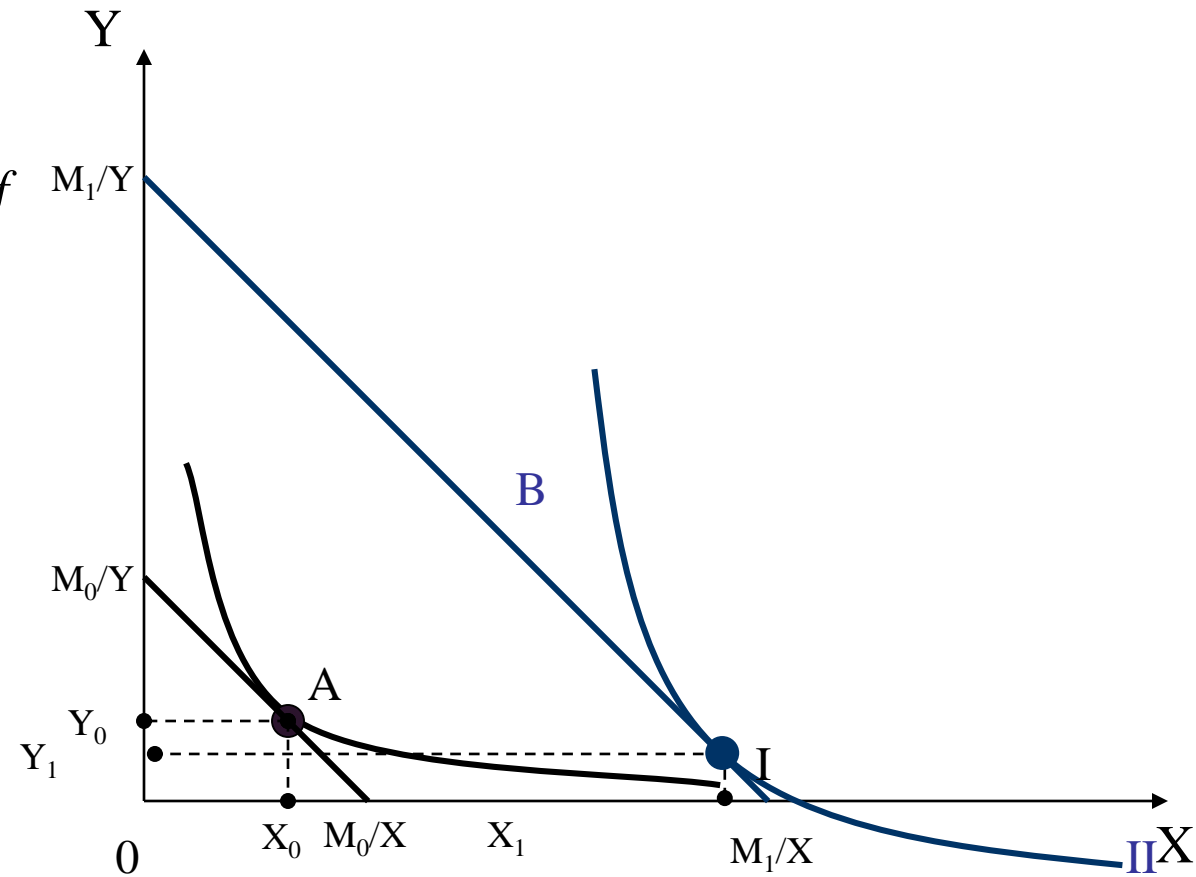*An increase in income increases the consumption of normal goods.*
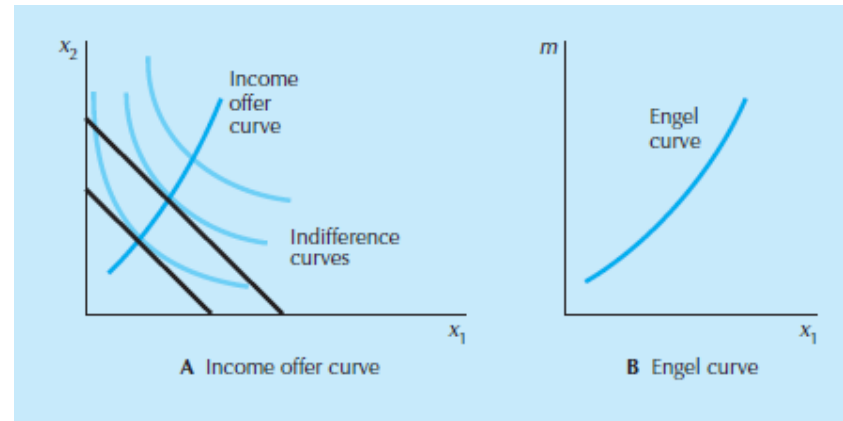
$(M_0 < M_1)$.

Inferior Good Y

An increase in income decreases the consumption of Y which is an inferior good.

$(M_0 < M_1).$

+

- We can connect together the demanded bundles that we get as we shift the budget line outward to construct the **income offer curve**.

- When we plot the optimal choice of good 1 against income, m, we get the Engel curve

Price Changes and Consumer Equilibrium

- Substitute Goods
  - An increase (decrease) in the price of good X leads to an increase (decrease) in the consumption of good Y.
    - Examples:
      - Coke and Pepsi.
      - Verizon Wireless or AT&T.

- Complementary Goods
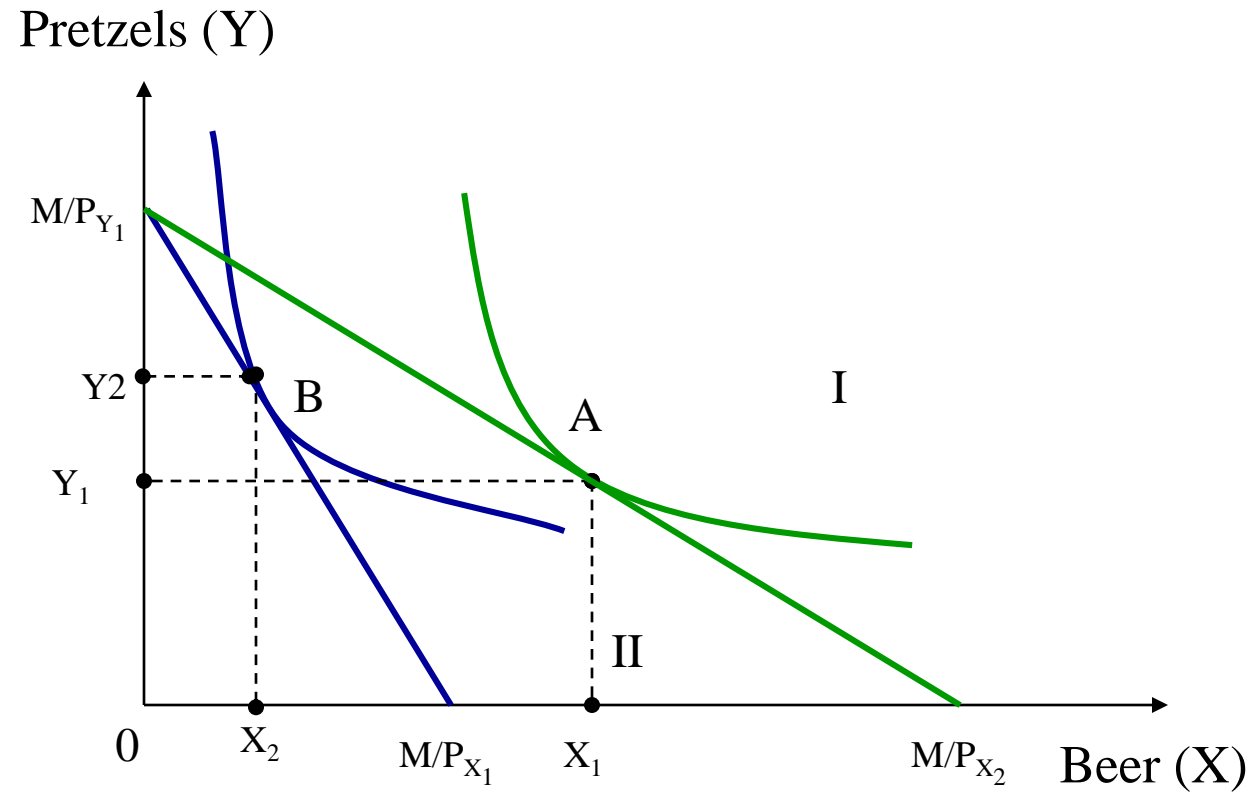 - An increase (decrease) in the price of good X leads to a decrease (increase) in the consumption of good Y.
    - Examples:
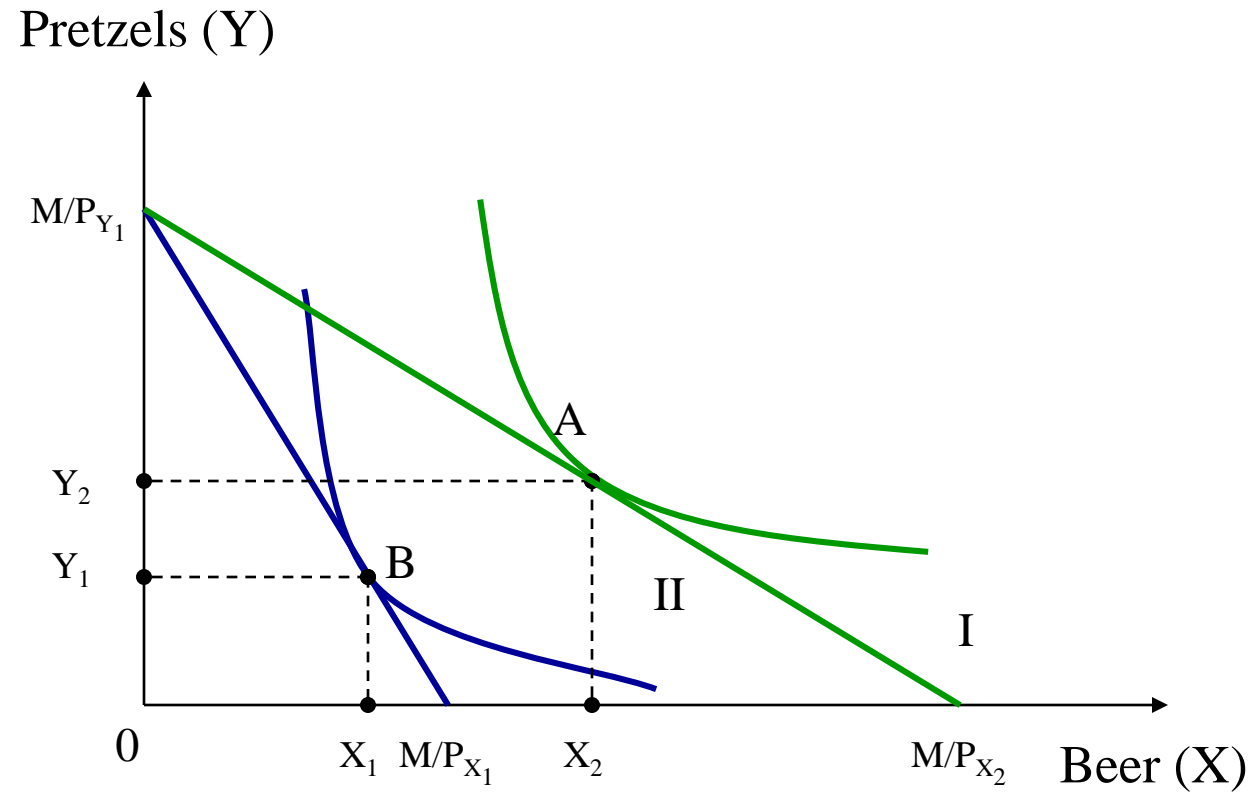   - DVD and DVD players.
      - Computer CPUs and monitors.

Substitute Goods

When the price of good X rises and the consumption of Y rises, then X and Y are substitute goods. ($P_{X_1} > P_{X_2}$)
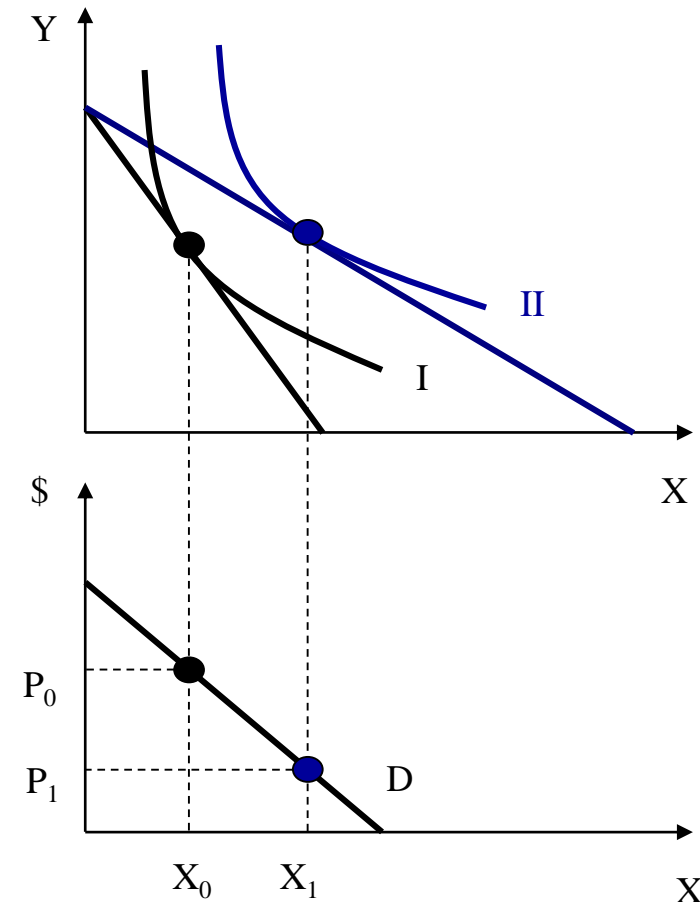
Complementary Goods

When the price of good X rises and the consumption of Y falls, then X and Y are complementary goods. ($P_{X_1} > P_{X_2}$)
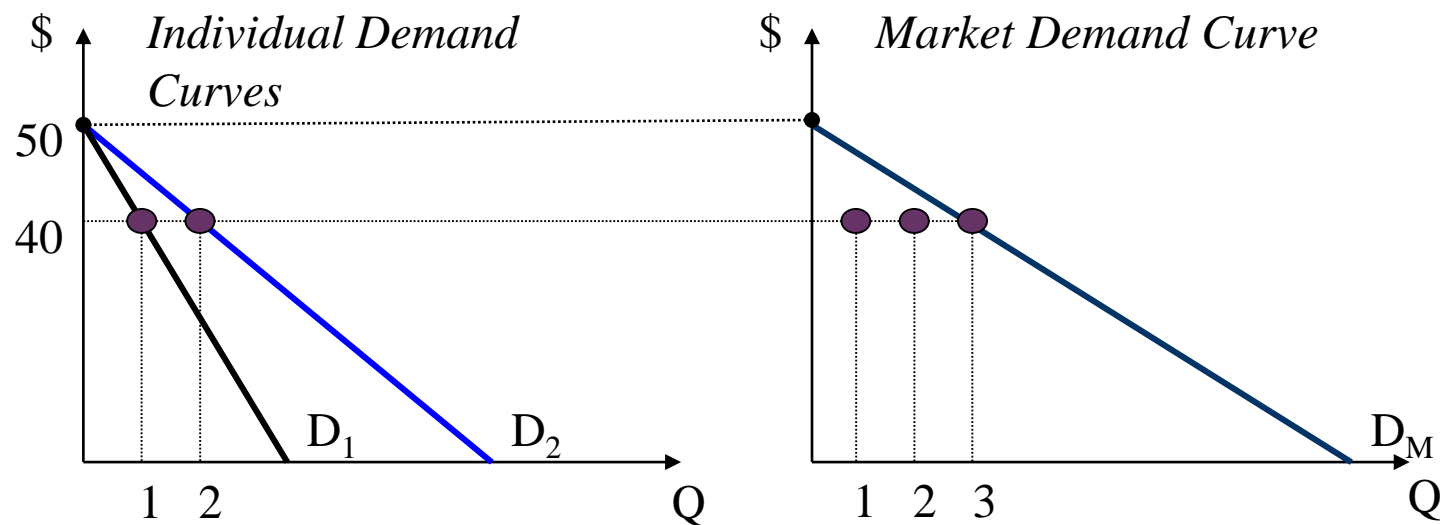
Individual Demand Curve

■ An individual's demand curve is derived from each new equilibrium point found on the indifference curve as the price of good X is varied.

Market Demand

- The market demand curve is the horizontal summation of individual demand curves.

- It indicates the total quantity all consumers would purchase at each price point.

+ Decomposing the Price Effect into Income and Substitution Effects

Initially, bundle A is consumed. A decrease in the price of good X expands the consumer's opportunity set.

The substitution effect (SE) causes the consumer to move from bundle A to B.

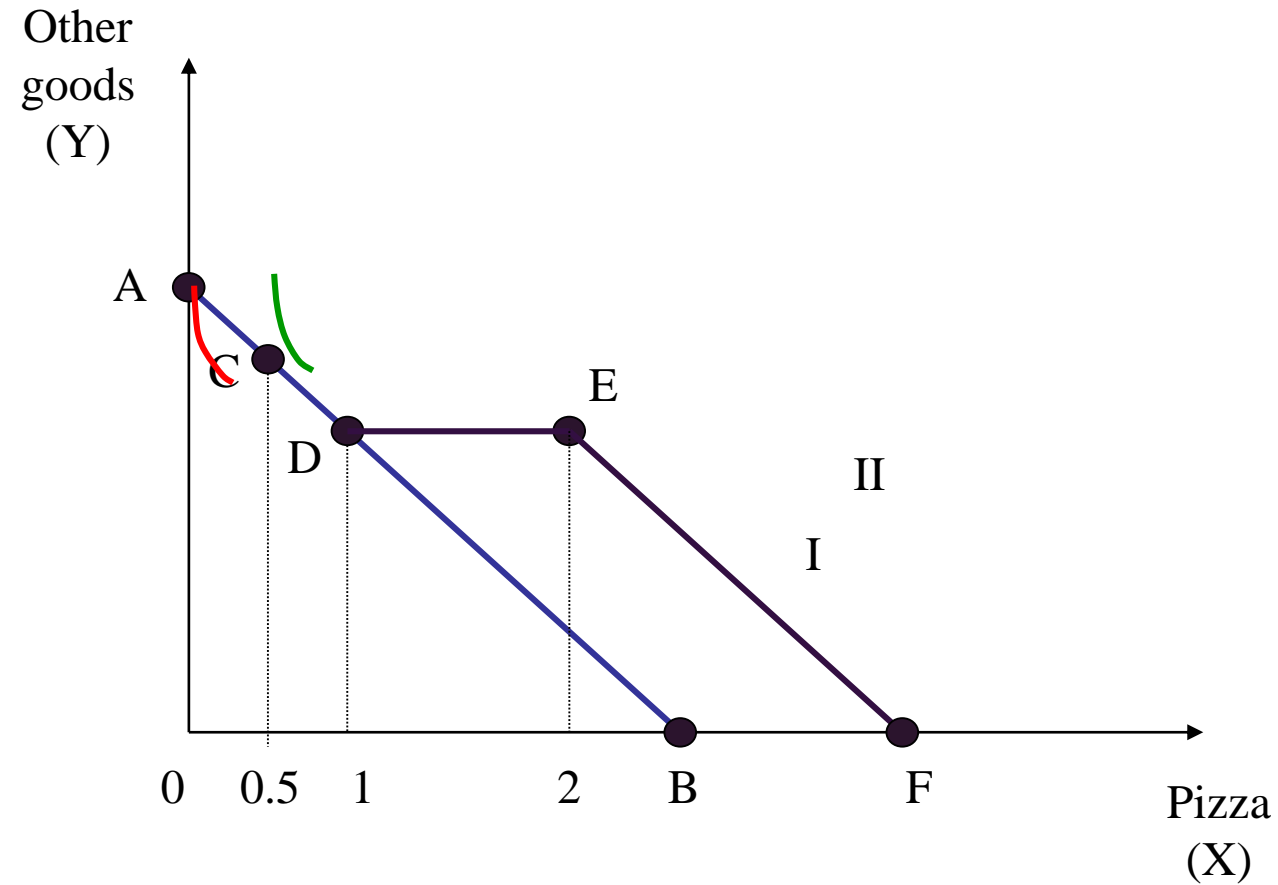*A higher "real income" allows the consumer to achieve a higher indifference curve.*

The movement from bundle B to C represents the income effect (IE). The new equilibrium is achieved at point C.
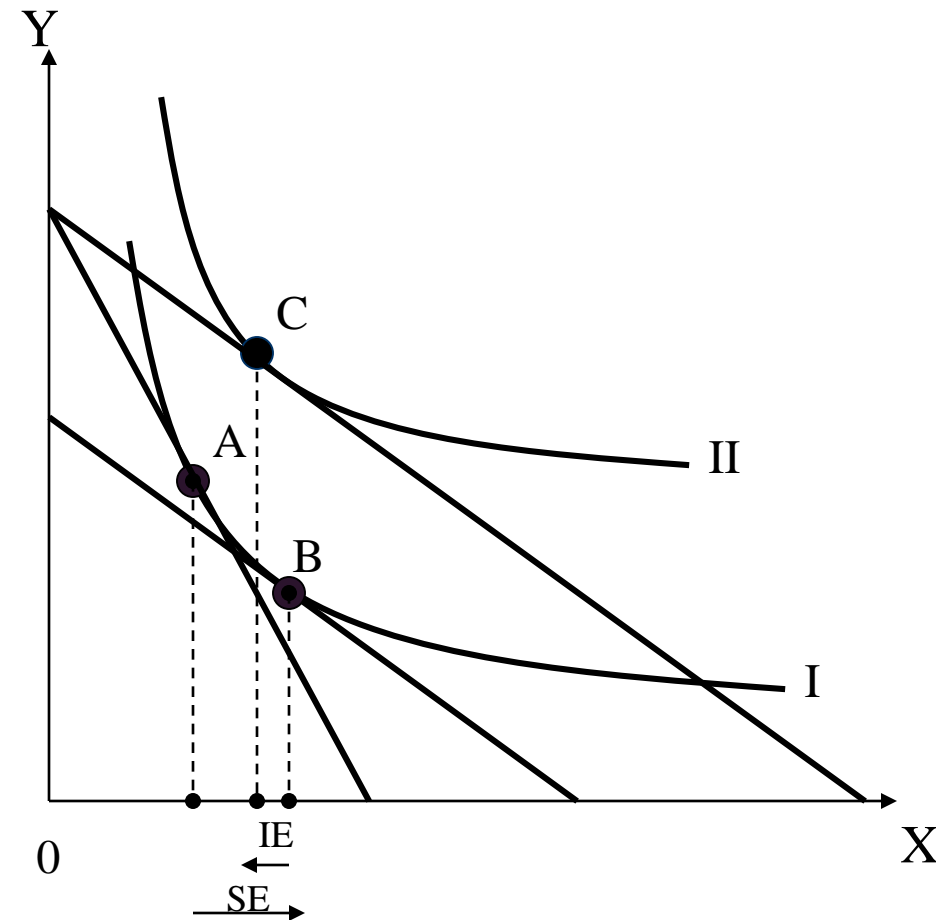
A Classic Marketing Application

A buy-one, get-one free pizza deal.

+ Conclusion

- Indifference curve properties reveal information about consumers' preferences between bundles of goods.
  - Completeness.
  - More is better.
  - Diminishing marginal rate of substitution.
  - Transitivity.

- Indifference curves along with price changes determine individuals' demand curves.

- Market demand is the horizontal summation of individuals' demands.