

Topic 3 Part 1

The Theory of Demand (Chapter 5)

Review of Concepts

Demand

The quantity of a good that consumers are willing and able to buy at a given price.

Law of Demand

Ceteris Paribus, as the price of a good increases, its quantity demanded falls.

Review of Concepts

Price Elasticity of Demand (PED)

A measure of the responsiveness of the quantity demanded of a good, given a change in its price.

- Usually, PED is a negative number.
- $|PED| > 1$, the demand is price elastic.
- $|PED| < 1$, the demand is price inelastic.
- $|PED| = \infty$, the demand is perfectly price elastic.
- $|PED| = 0$, the demand is perfectly price inelastic.

Review of Concepts

Income Elasticity of Demand (IED)

A measure of the responsiveness of the quantity demanded of a good, given a change in income.

Formulas for PED and IED

$$PED = \frac{\% \Delta \text{ in } Q}{\% \Delta \text{ in } P} = \frac{dQ}{dP} \times \frac{P}{Q}$$

$$IED = \frac{\% \Delta \text{ in } Q}{\% \Delta \text{ in } I} = \frac{dQ}{dI} \times \frac{I}{Q}$$

Review of Concepts

Using PED as a criterion, there are two types of goods:

Ordinary Good ($PED < 0$)

- A good that follows the law of demand
- That is, $P \uparrow \ggg Q \downarrow$

Giffen Good and Veblen Good ($PED > 0$)

- A good that violates the law of demand
- That is, $P \uparrow \ggg Q \uparrow$

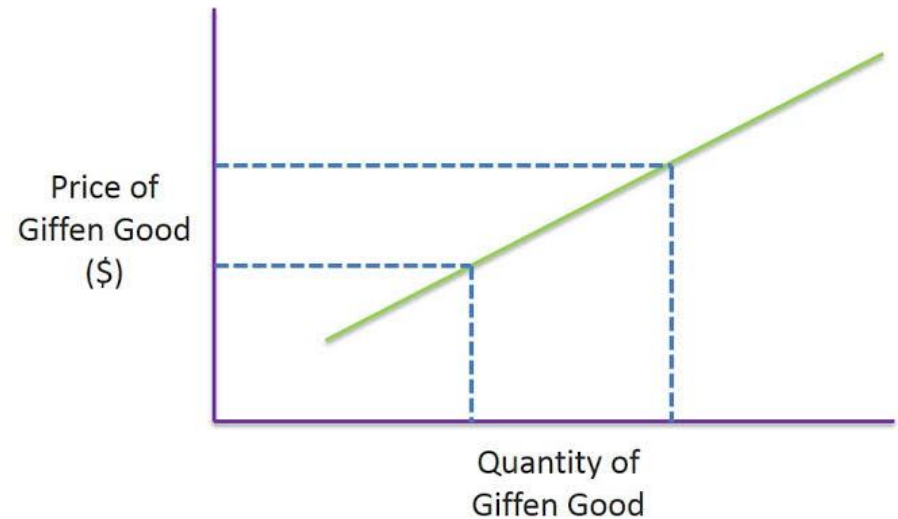
Review of Concepts

Ordinary Good

Demand Curve



Giffen Good



Review of Concepts

Using IED as a criterion, there are two main types of goods:

Normal Good ($IED > 0$)

- A good that is consumed more when income increases
- That is, $I \uparrow \gg Q \uparrow$

Inferior Good ($IED < 0$)

- A good that is consumed less when income increases
- That is, $I \uparrow \gg Q \downarrow$

Review of Concepts

There are two sub-types of normal goods ($IED > 0$):

Luxury Good ($IED > 1$)

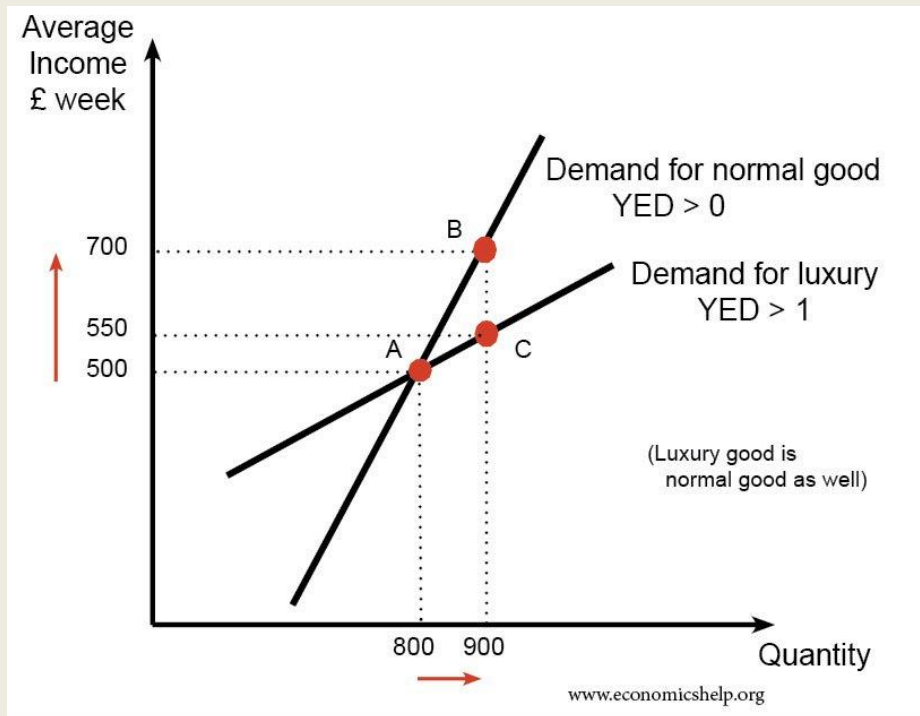
- A good for which demand increases more than proportionally as income rises

Necessity Good ($0 < IED < 1$)

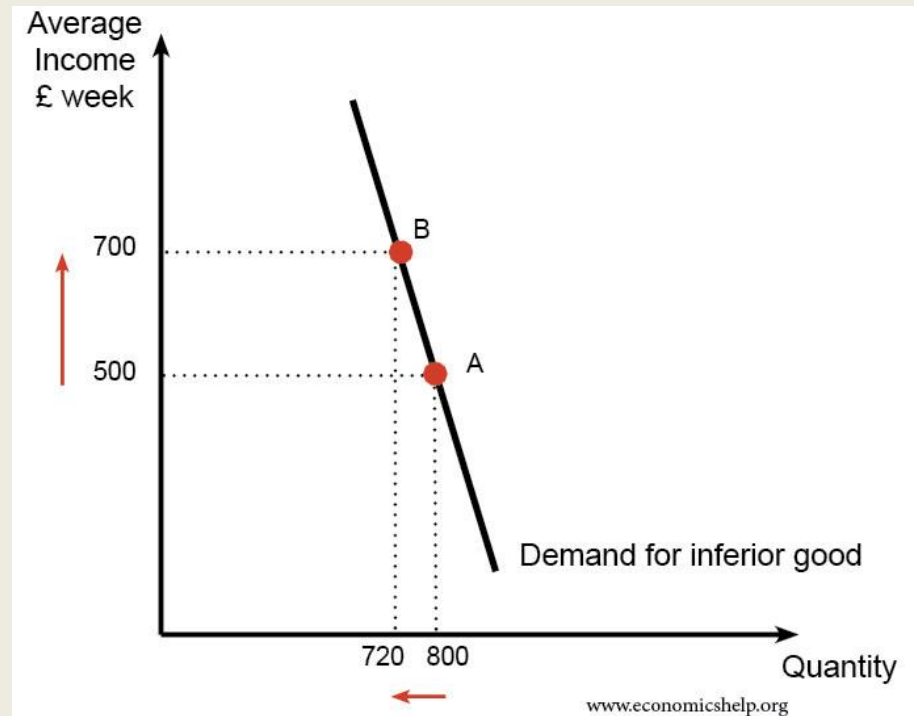
- A good for which demand increases less than proportionally as income rises

Review of Concepts

Normal Good



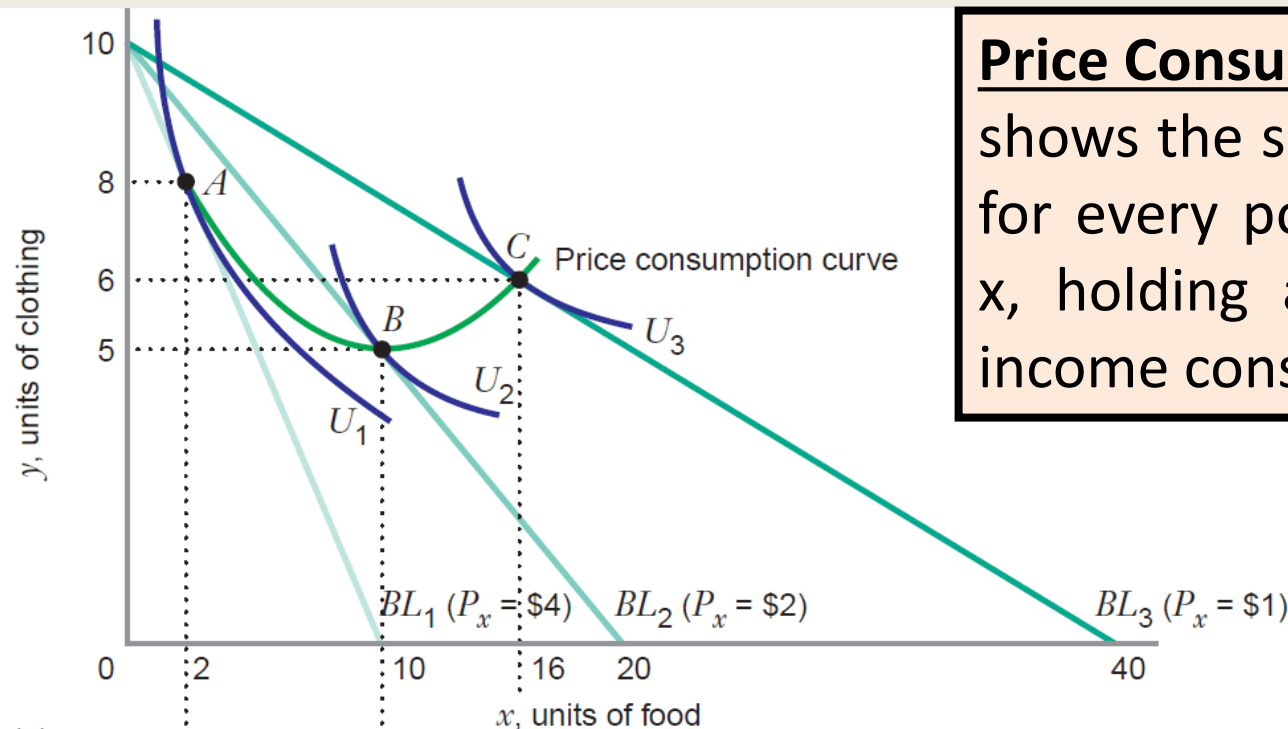
Inferior Good



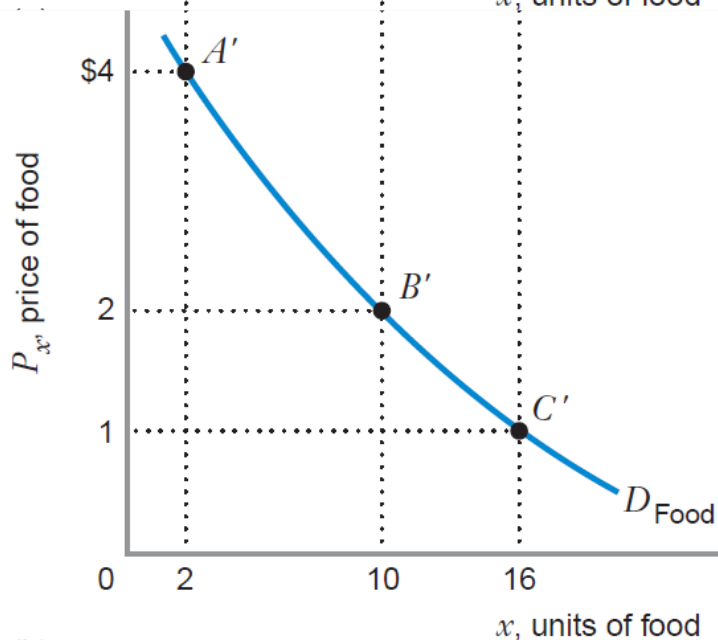
These lines are called “ENGEL Curves”.

Individual Demand Curve

- We have learnt how to find the optimal choice.
- Given income and prices of other goods, we know how much a consumer will demand of X for a given price of X, e.g. (X_1, P_1) and (X_2, P_2) .
- Note that (X_1, P_1) and (X_2, P_2) are essentially points on a demand curve.
- Finding all points by varying the price of X allows us to draw the whole demand curve.

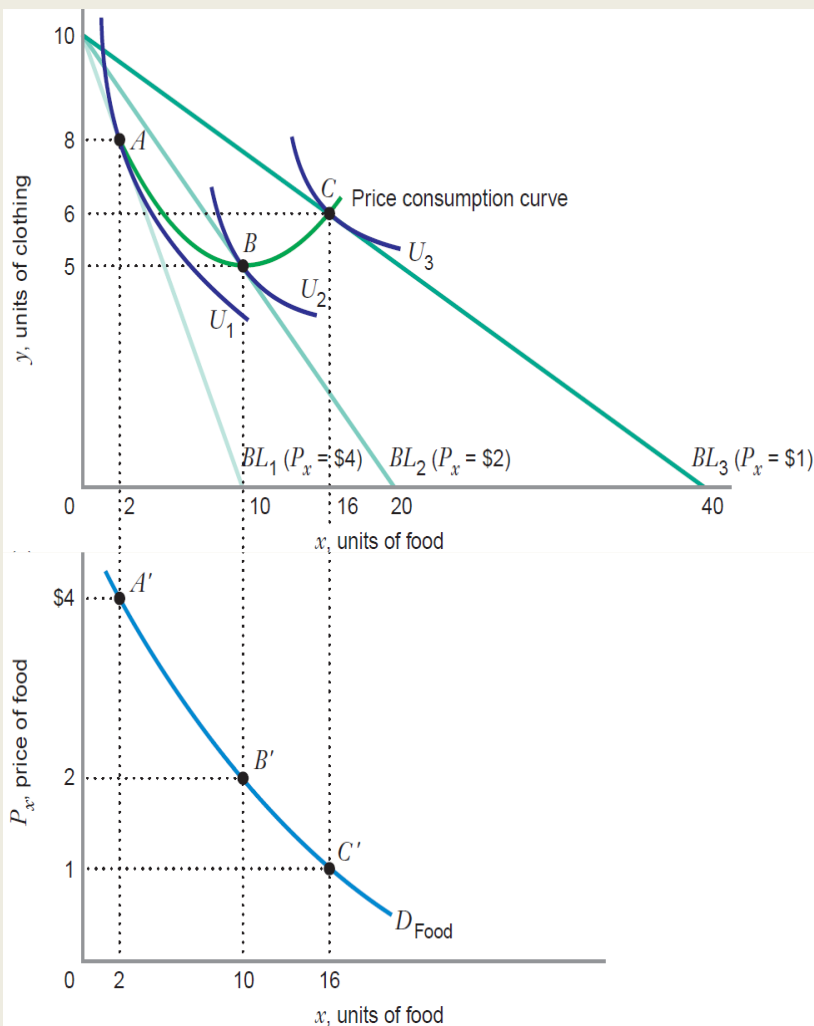


Price Consumption Curve (PCC)
shows the set of optimal baskets for every possible price of good x , holding all other prices and income constant.



The Price Consumption Curve for good X can be used to plot the quantity consumed of good X at any price of X .
This new plot is the consumer's demand curve for good X .

Individual Demand Curve



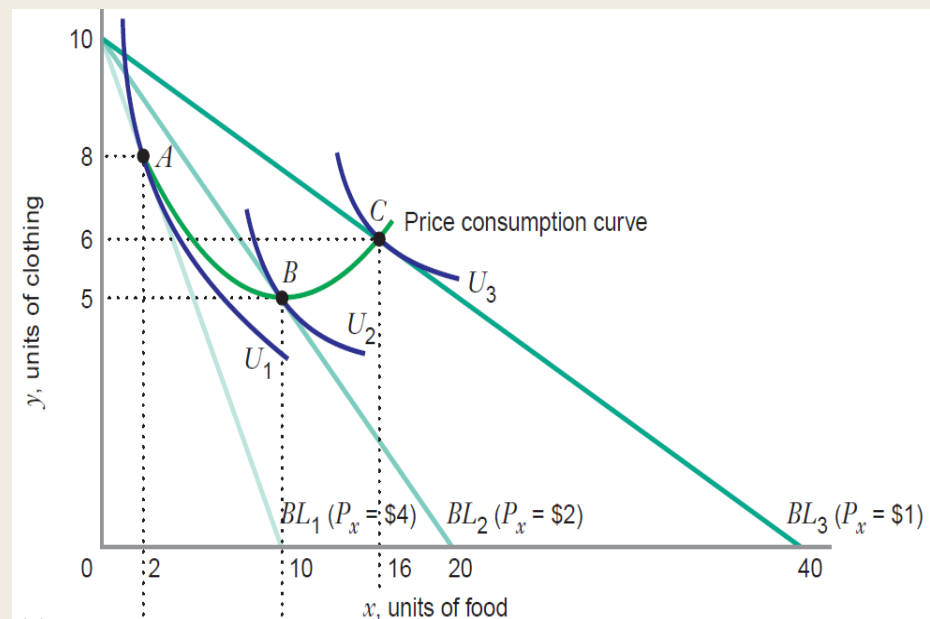
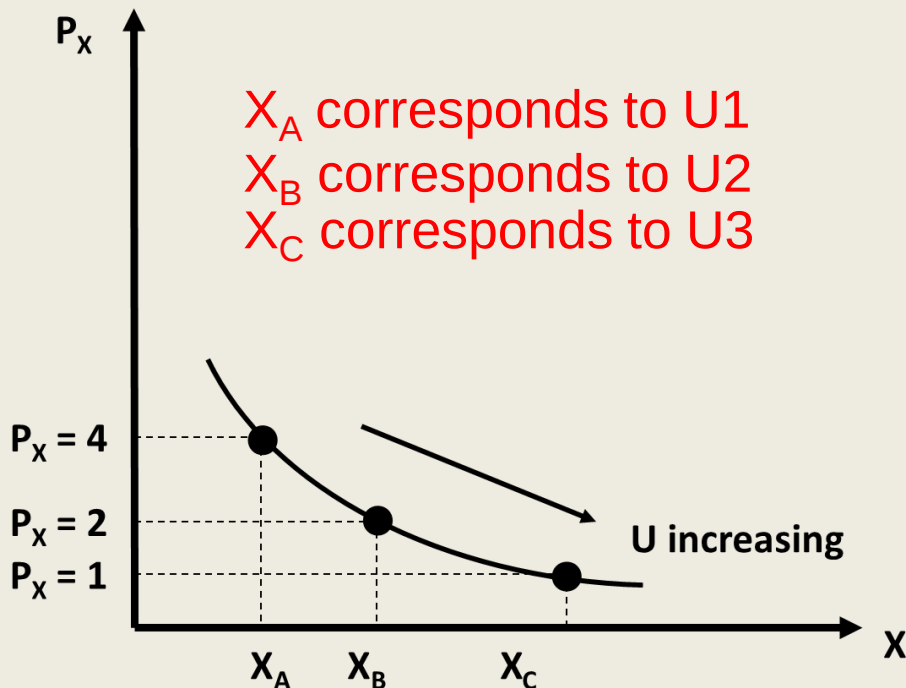
Key Points 1

- The consumer is maximizing utility at every point on the demand curve.
- As P_x falls, it causes the consumer to move down and to the right along the demand curve as utility increases in that direction.
- The MRS_{xy} ($= P_x/P_y$) falls along the demand curve as the price of x falls (assuming an interior solution).

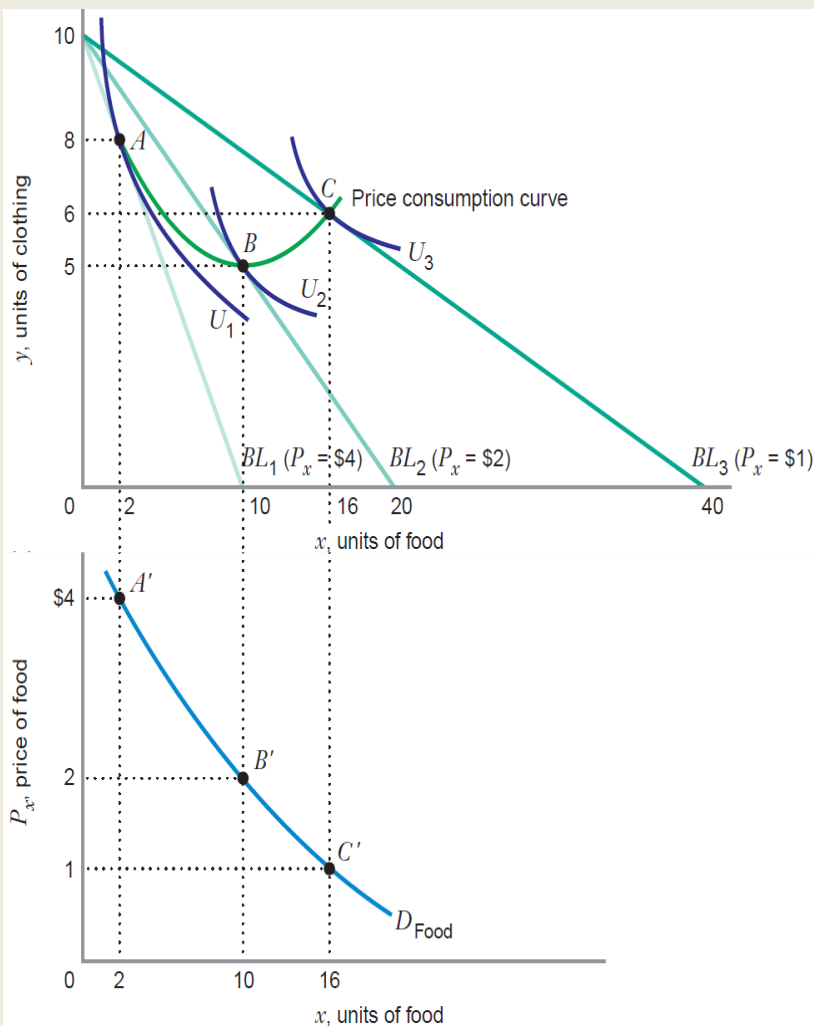
Individual Demand Curve

Key Points 1 (Explained)

- As P_x falls, it causes the consumer to move down and to the right along the demand curve as utility increases in that direction.



Individual Demand Curve



Key Points 2

- As MRS_{xy} falls, this means the consumer is willing to trade smaller Y in exchange for one more unit of X.
- The demand curve also shows the “willingness to pay”, and willingness to pay for an additional unit of X falls as more X is consumed.
- When P_x changes, we have a movement along the demand curve.

Price Consumption Curve

- Price Consumption Curve can have different shapes.
 - Upward-Sloping Curve
 - Downward-Sloping Curve
 - Horizontal Straight Line
 - Backward-Bending Curve
- **Assuming a composite good on the Y-axis**, these shapes tell us two things.
 - PED of the good on the X-axis.
 - How goods X and Y are related.

PCC and how goods X & Y are related

Consider the case where P_x falls.
Y is a composite good with $P_y = 1$.

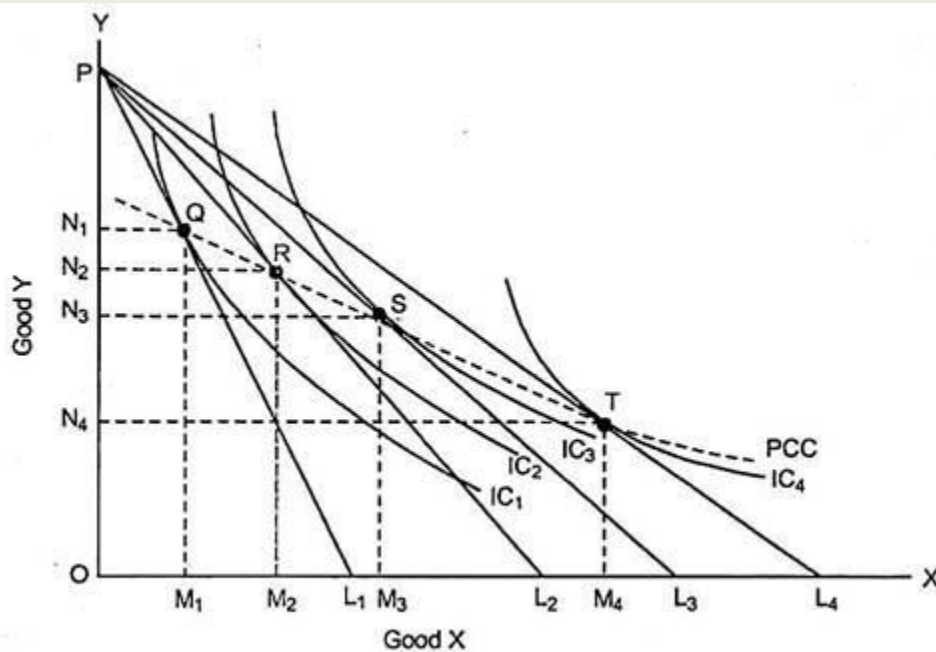


Fig. 8.31. Downward-Sloping Price Consumption Curve

We buy **MORE X** but **LESS Y**.
Thus, X and Y are substitutes

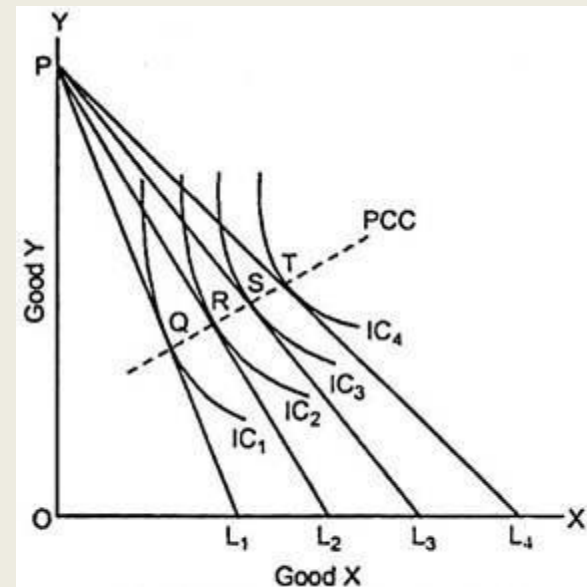
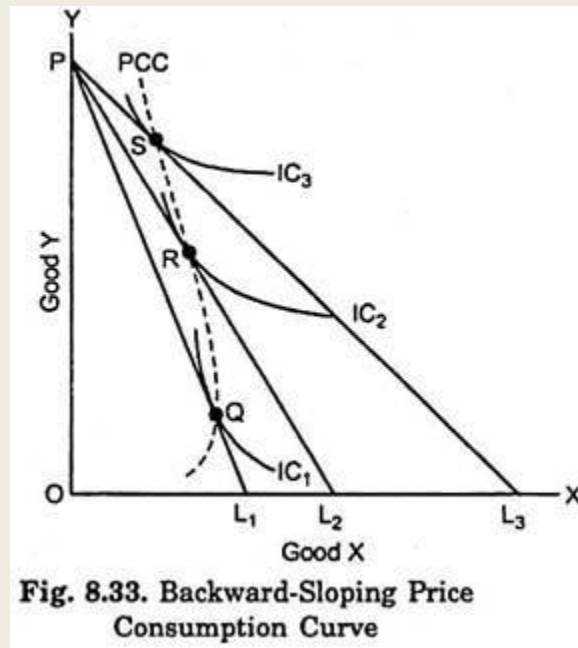


Fig. 8.32. Upward-Sloping Price Consumption Curve

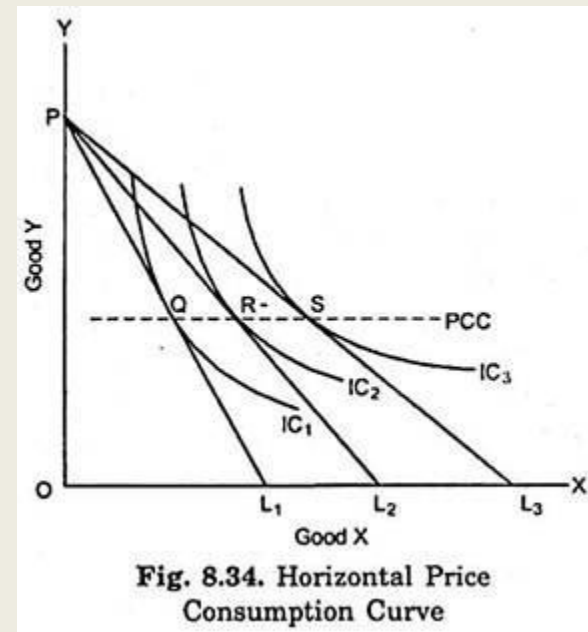
We buy **MORE X** and **MORE Y**.
Thus, X and Y are complements.

PCC and how goods X & Y are related

Consider the case where P_x falls.
Y is a composite good with $P_y = 1$.



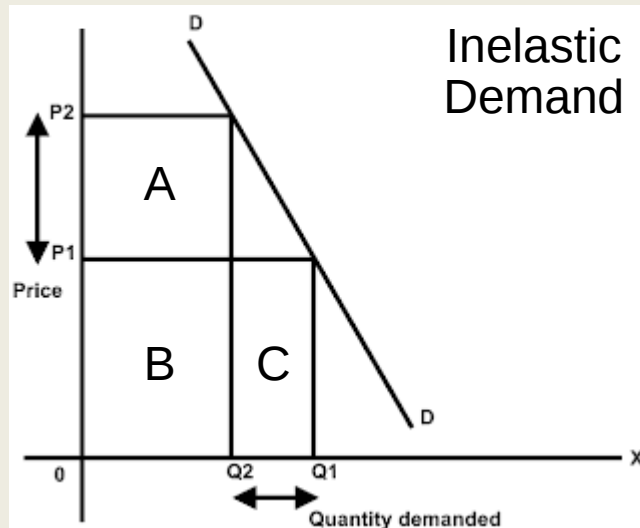
We buy **LESS X** when P_x falls.
Thus, X is a Giffen good.



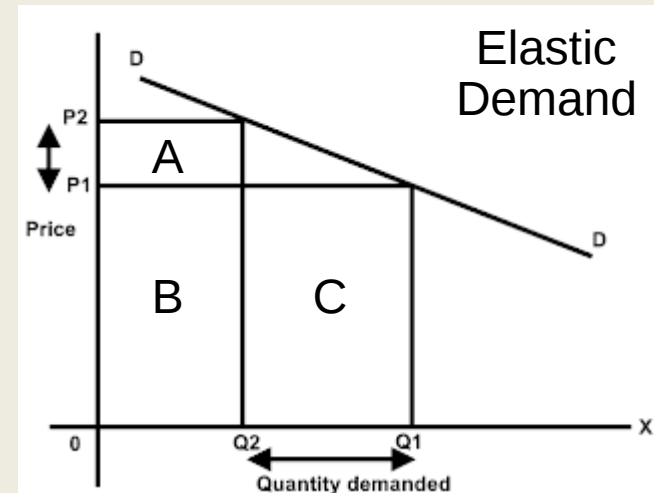
Y is the same when P_x changes.
Thus, X and Y are unrelated goods

PCC and PED

- To understand about PCC and PED, we must first understand the implications of PED.
- Consider the case when Price falls (i.e. from P_2 to P_1).**



When Price falls, the expenditure on the good falls
i.e. $A+B$ decreases to $B+C$
=> INELASTIC DEMAND



When Price falls, the expenditure on the good rises.
i.e. $A+B$ increases to $B+C$
=> ELASTIC DEMAND

PCC and PED

**Consider the case where P_x falls.
Income = P , and Y is a composite good with $P_y = 1$.**

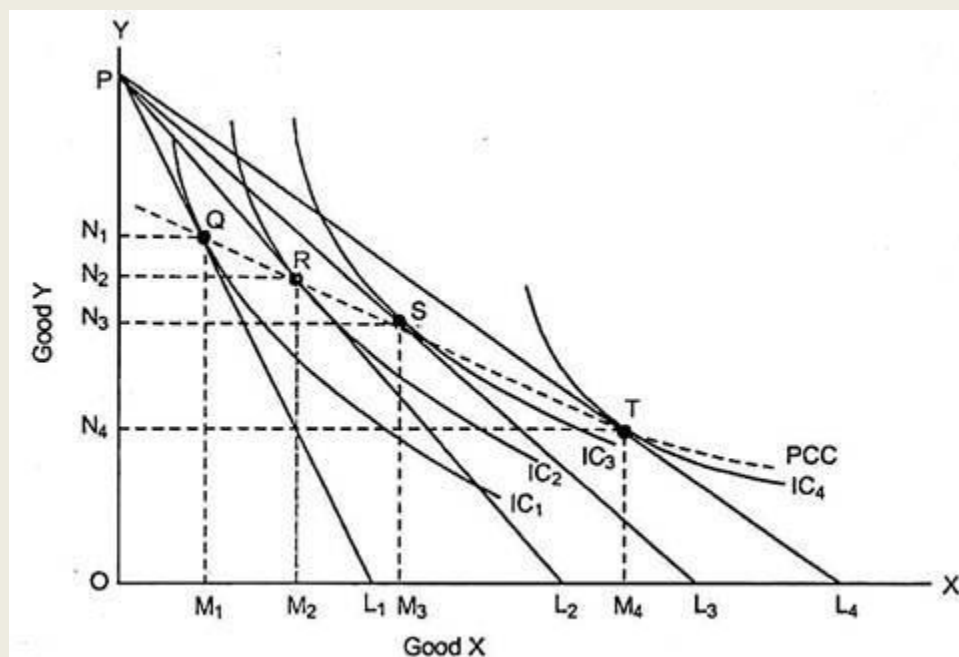


Fig. 8.31. Downward-Sloping Price Consumption Curve

For simplicity, we will consider Points Q (before P_x falls) and T (after P_x falls).

At Q, we spend N_1 on Y .
(At Q, there are N_1 units of Y , which costs $P_y = \$1$ per unit.)
Our income = P , and we spend the rest on X , so we spend $P - N_1$ on X .

At T, we spend N_4 on Y .
Our income = P , and we spend the rest on X , so we spend $P - N_4$ on X .

**Here, after P_x falls, our expenditure on X increases from $P - N_1$ to $P - N_4$.
Thus, the demand for X is price elastic.**

PCC and PED

Consider the case where P_x falls.
Income = P , and Y is a composite good with $P_y = 1$.

Exp.
on X
after
 P_x
falls

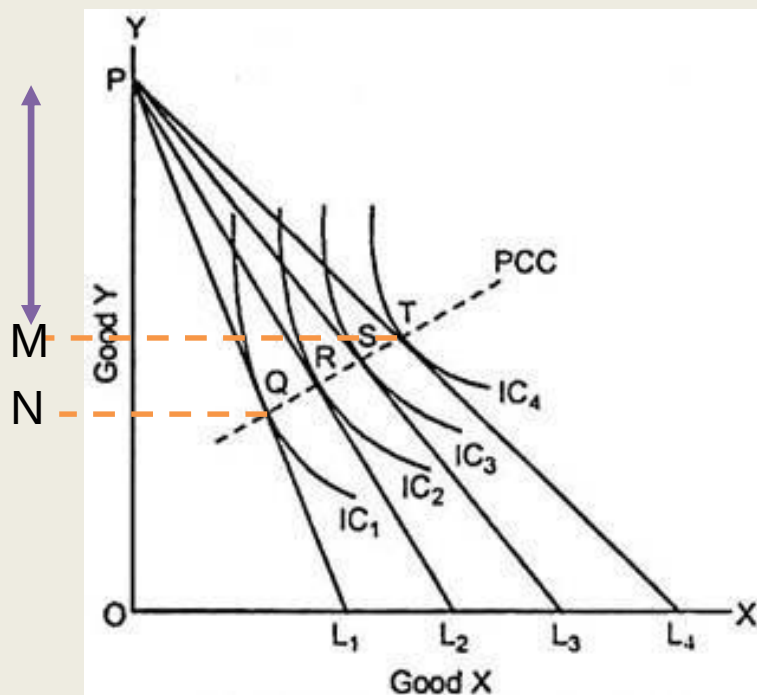


Fig. 8.32. Upward-Sloping Price Consumption Curve

For simplicity, we will consider Points Q (before P_x falls) and T (after P_x falls).

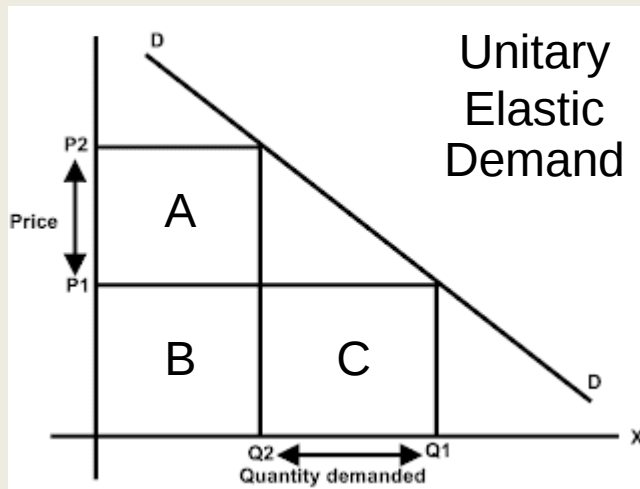
At Q, we spend N on Y .
Our income = P , and we spend the rest on X , so we spend $P - N$ on X .

At T, we spend M on Y .
Our income = P , and we spend the rest on X , so we spend $P - M$ on X .

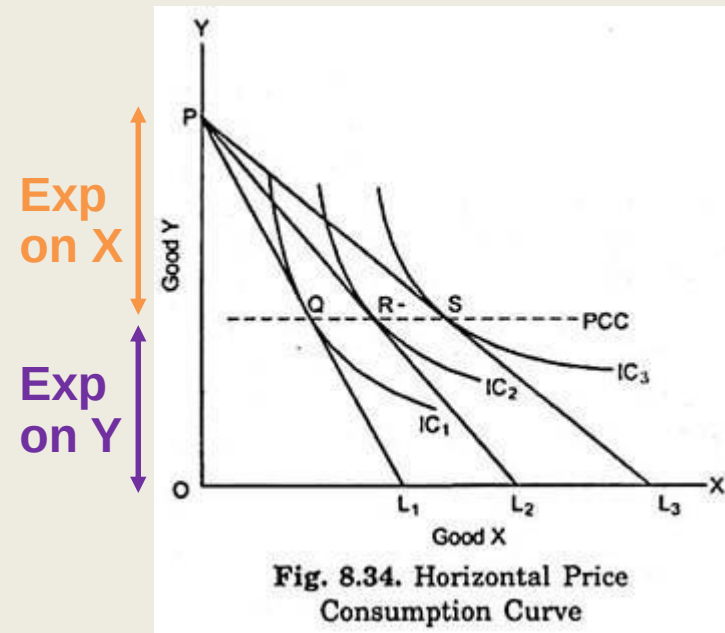
Here, after P_x falls, our expenditure on X decreases from $P - N$ to $P - M$.
Thus, the demand for X is price inelastic.

PCC and PED

**Consider the case where P_x falls.
Income = P , and Y is a composite good with $P_y = 1$.**

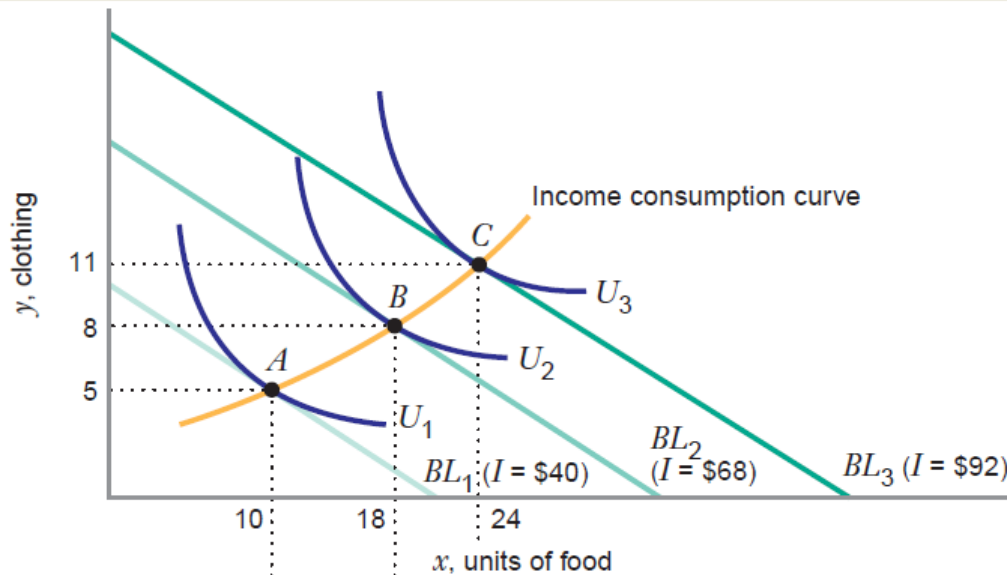


When Price changes, the expenditure on the good does not change.
i.e. $A+B$ is still equal to $B+C$

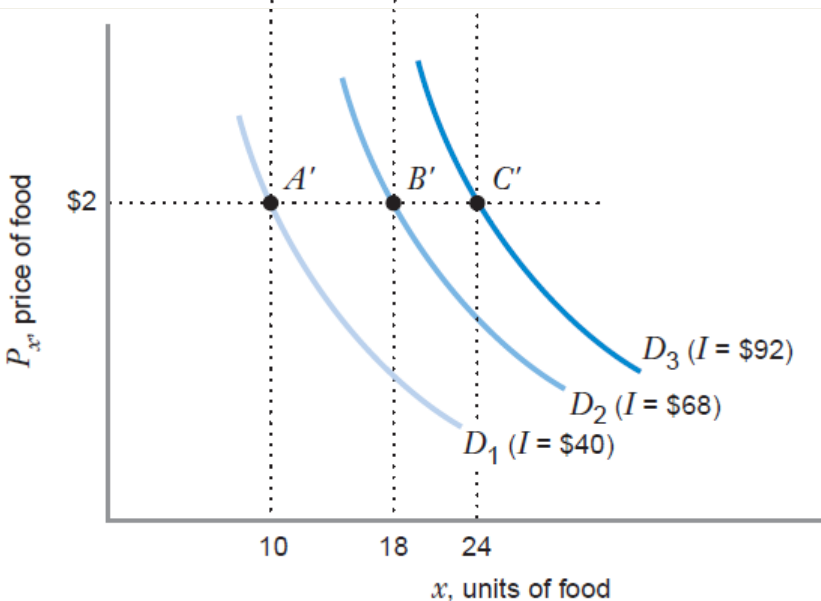


Here, after P_x falls, we buy more X , but our expenditure on X remains the same. Thus, demand is price unitary elastic.

Income Consumption Curve (ICC)

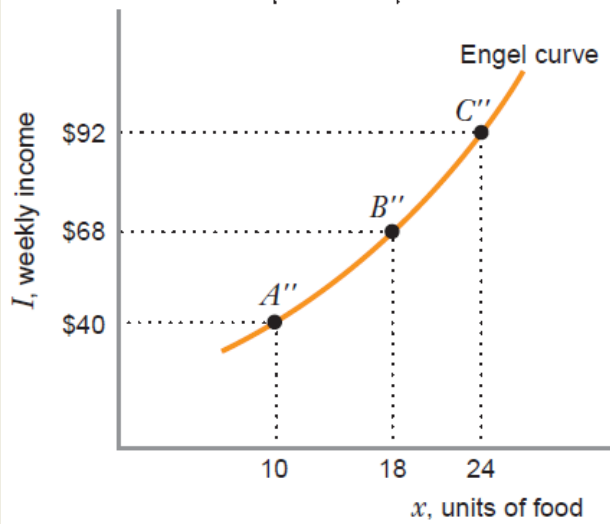
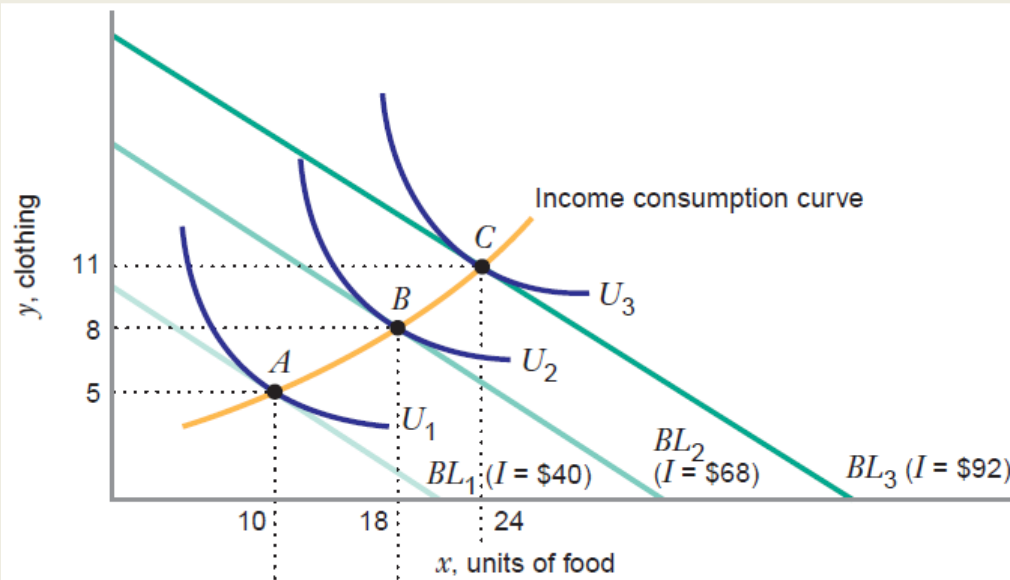


The ICC of good x is the set of optimal baskets for every possible level of income.



We can graph the points on the ICC as points from shifting the demand curve.

Engel Curves



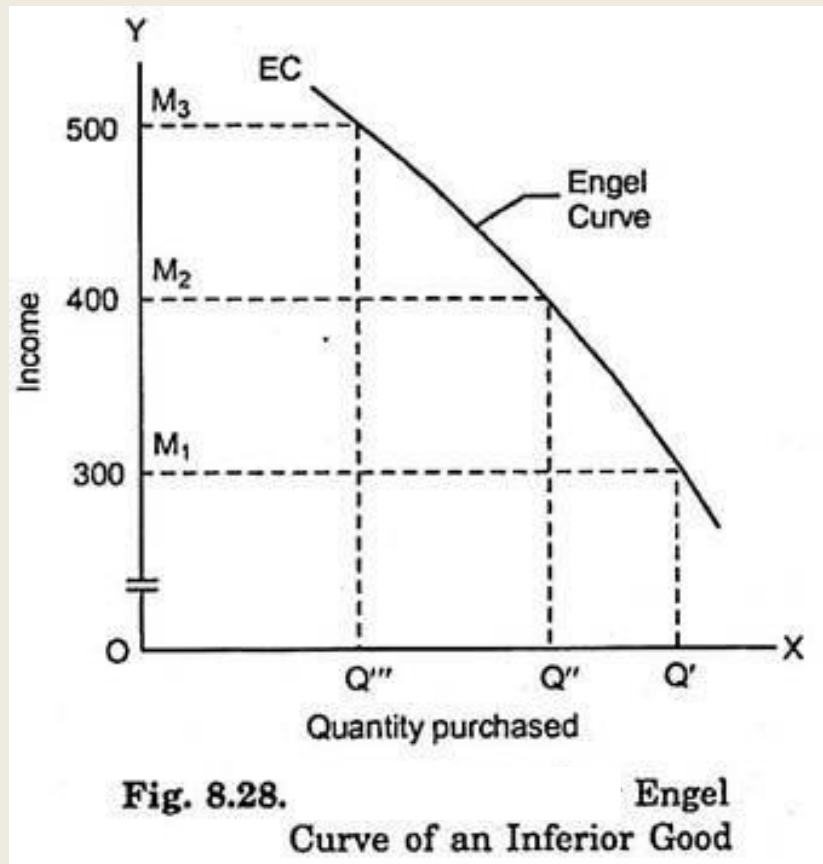
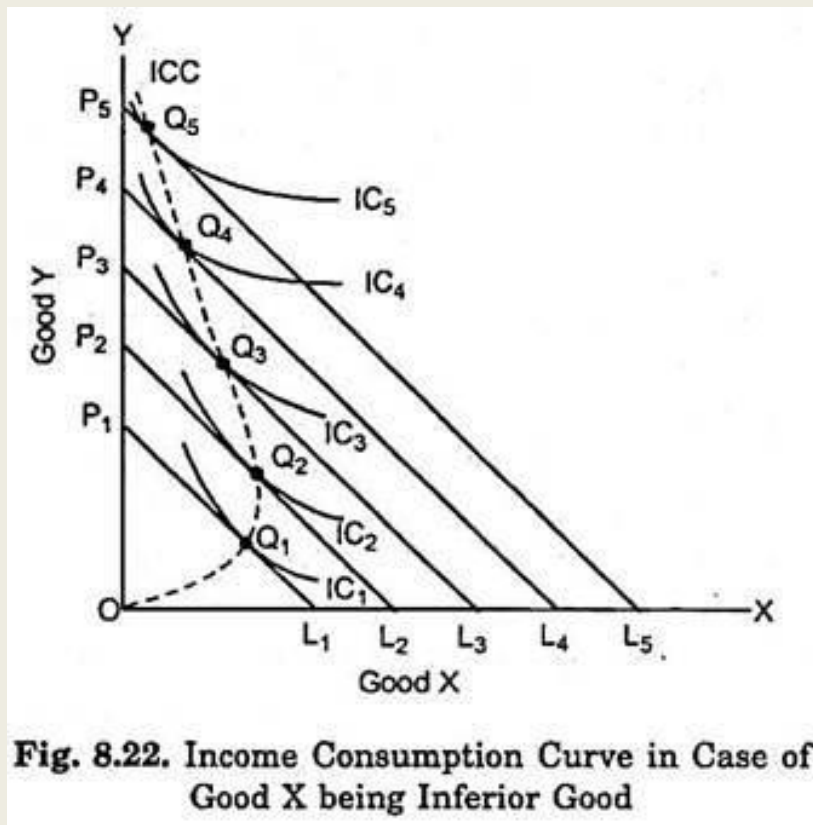
X is a normal good

The ICC for good x can be written as the quantity consumed of good x for any income level.

This is the **Engel Curve** for good x. When the income consumption curve is positively sloped, the slope of the Engel Curve is positive.

Engel Curves

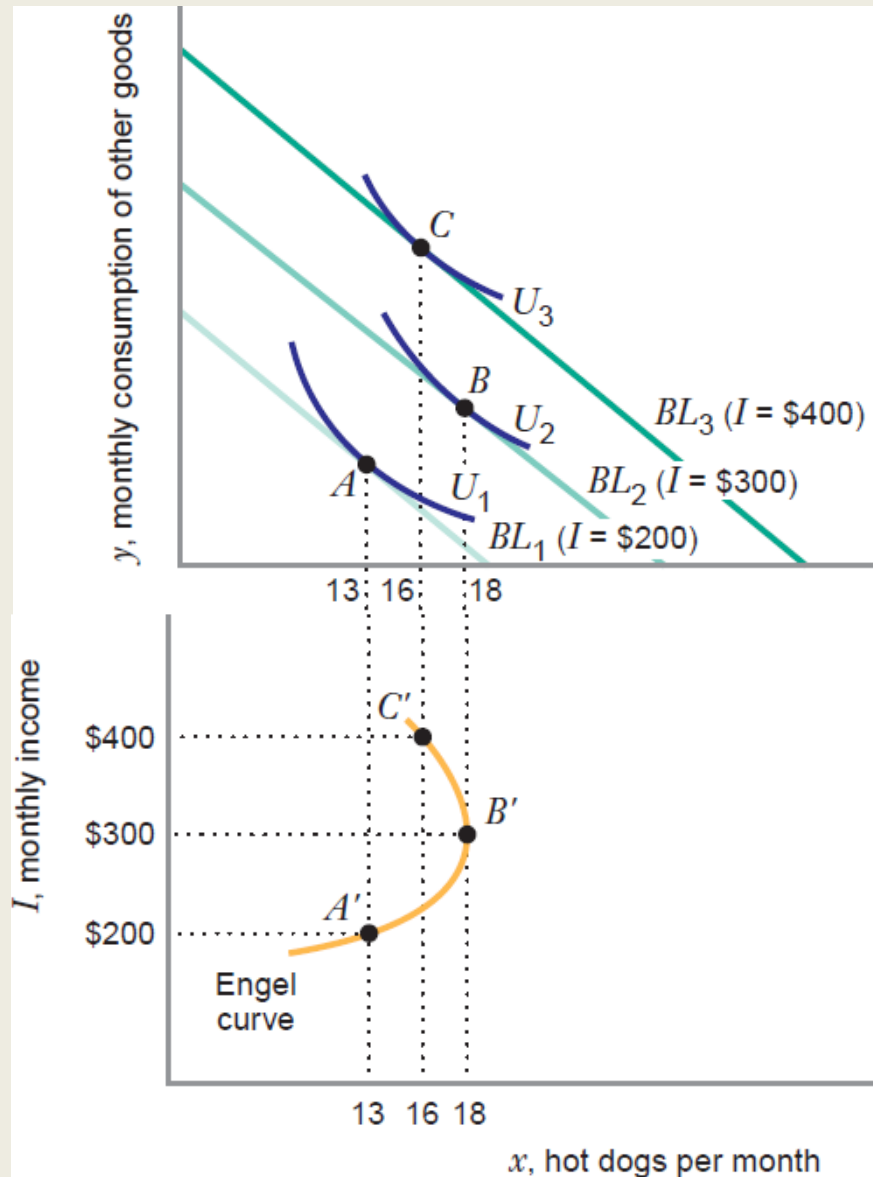
X is an inferior good



ICC, Engel Curve, and Types of Goods

- If the ICC shows that the consumer purchases more of good x as her income rises, good x is a **normal** good.
- Equivalently, if the slope of the Engel curve is positive, the good is a normal good.
- If the ICC shows that the consumer purchases less of good x as her income rises, good x is an **inferior** good.
- Equivalently, if the slope of the Engel curve is negative, the good is an inferior good.

Backward-Bending Engel Curve



Backward-Bending Engel Curve

A good can be normal over some ranges and inferior over others.

(a) As income rises from \$200 to \$300, the consumer's weekly consumption of hot dogs increases from 13 (basket A) to 18 (basket B). However, as income rises from \$300 to \$400, the consumer's weekly consumption of hot dogs decreases from 18 to 16 (basket C).

(b) Hot dogs are a normal good between points A' and B' (i.e., over the income range \$200 to \$300), where the Engel curve has a positive slope. But between points B' and C' (i.e., over the income range \$300 to \$400), hot dogs are an inferior good, and the Engel curve has a negative slope.