Topic 3 Part 2

The Theory of Demand (Chapter 5)

LEARNING-BY-DOING EXERCISE 5.2

Finding a Demand Curve (No Corner Points)

A consumer purchases two goods, food and clothing. The utility function is $U(x, y) = xy$, where x denotes the amount of food consumed and y the amount of clothing. The marginal utilities are $MU_x = y$ and $MU_y = x$. The price of food is P_x, the price of clothing is P_y, and income is I.

Problem

(a) Show that the equation for the demand curve for food is $x = I/(2P_x)$.

(b) Is food a normal good? Draw D_1, the consumer's demand curve for food when the level of income is $I =$ \$120. Draw D_2, the demand curve when $I =$ \$200.

LEARNING-BY-DOING EXERCISE 5.3

Finding a Demand Curve (with a Corner Point Solution)

A consumer purchases two goods, food and clothing. He has the utility function $U(x, y) = xy + 10x$, where x denotes the amount of food consumed and y the amount of clothing. The marginal utilities are $MU_x = y + 10$ and $MU_y = x$. The consumer's income is \$100, and the price of food is \$1. The price of clothing is P_y.

Problem Show that the equation for the consumer's demand curve for clothing is

$$y = \frac{100 - 10P_y}{2P_y}, \quad \text{when } P_y < 10$$

$$y = 0, \quad \text{when } P_y \geq 10$$

Use this equation to fill in the following table to show how much clothing he will purchase at each price of clothing (these are points on his demand curve):

P_y	2	4	5	10	12
y					

Decomposition of the Price Effect

- When the price of a good changes, its quantity demanded changes.

- Economists believe that this change in demand is due to **the sum of two effects**:
  - Income Effect (IE)
  - Substitution Effect (SE)
- That is, **TE = SE + IE**.

- TE refers to Total Effect of the price change.

Decomposition of the Price Effect

A simple way to think about SE and IE

When the price of a good falls…

- The good becomes relatively cheaper and more attractive than other products, so the consumer substitutes other goods to buy more of it. (Substitution Effect)
- The consumer can buy more of the good, so it is as if the consumer's real income (purchasing power) increased. (Income Effect)

Decomposition of the Price Effect

When the price of a good falls…

- Substitution Effect implies that the consumer will buy more of the good.
- Income Effect implies that the real income increases AND
  - the consumer will buy more of the good if it is a normal good.
  - the consumer will buy less of the good if it is an inferior good.

- We can illustrate this idea as follows.

Decomposition of the Price Effect

CASE 1: **When Px falls, real income rises, and X is a normal good…**

- IE and SE work in the same direction.
- **TE is that Qx rises.**

Decomposition of the Price Effect

CASE 2: **When Px falls, real income rises, and X is an inferior good…**

- IE and SE work in the opposite direction, with SE > IE.
- **TE is that Qx rises.**

Decomposition of the Price Effect

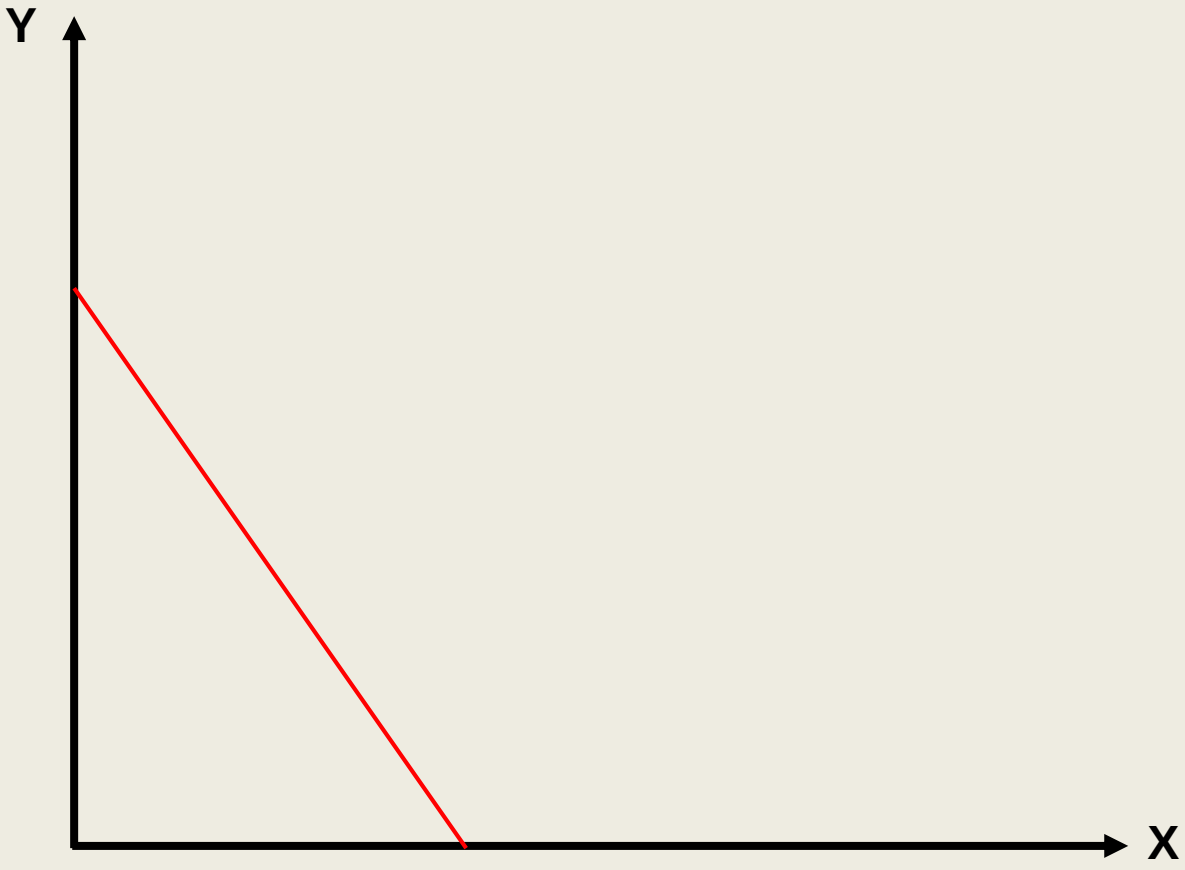
CASE 3: **When Px falls, real income rises, and X is a Giffen good…**

- IE and SE work in the opposite direction, **with SE < IE**.
- **TE is that Qx falls when Px falls.**
- Note that a Giffen good is an inferior good, so higher income means that the consumer will buy less.

Decomposition of the Price Effect

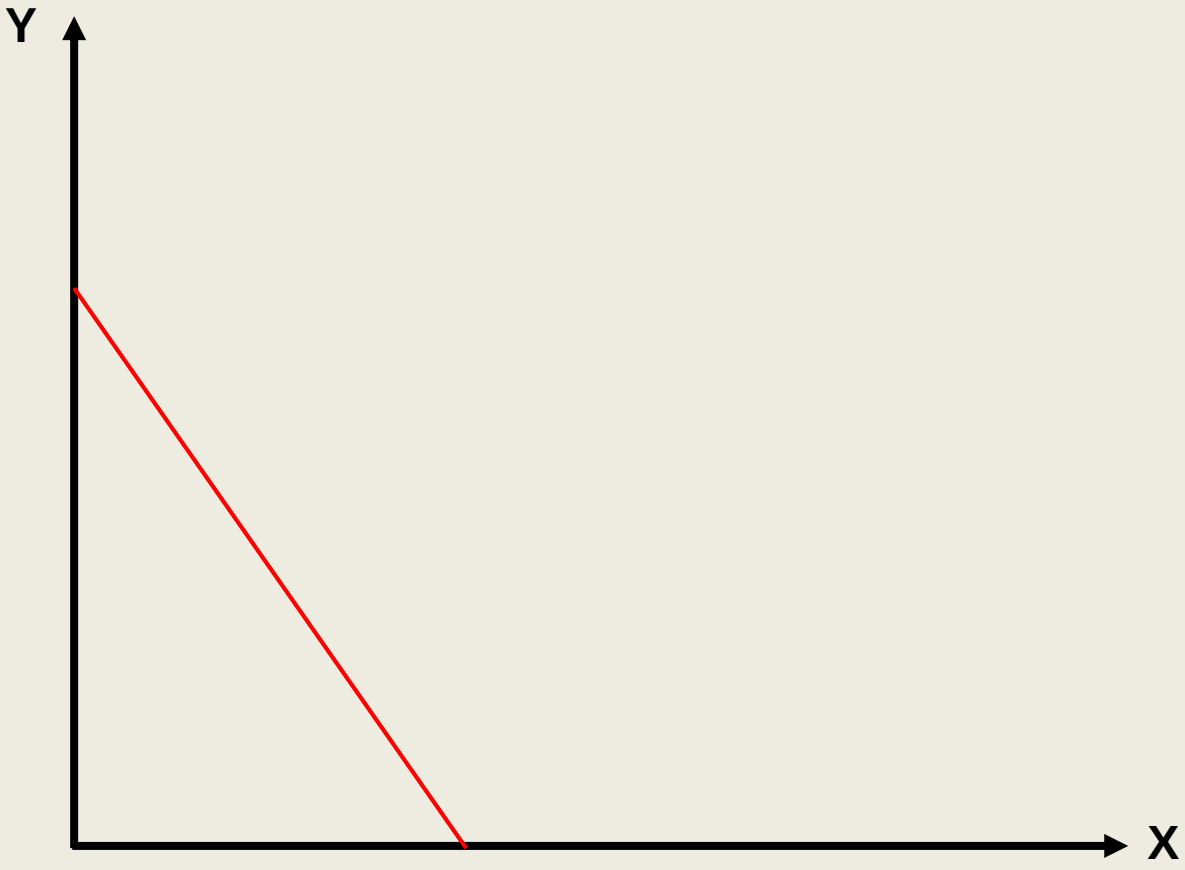
- We can use the consumer choice diagram to plot the previous results.
- We will consider the case when Px falls.
- We will use the following names to denote bundles:
  - Bundle A for the optimal bundle BEFORE Px falls.
  - Bundle B for the optimal bundle AFTER Px falls, without the IE, i.e. B is a result of the SE only.
  - Bundle C for the optimal bundle AFTER Px falls, taking into account both SE and IE.
- **Thus, moving from A to B represents the SE, and moving from B to C represents the IE.**

Hicksian Demand Decomposition



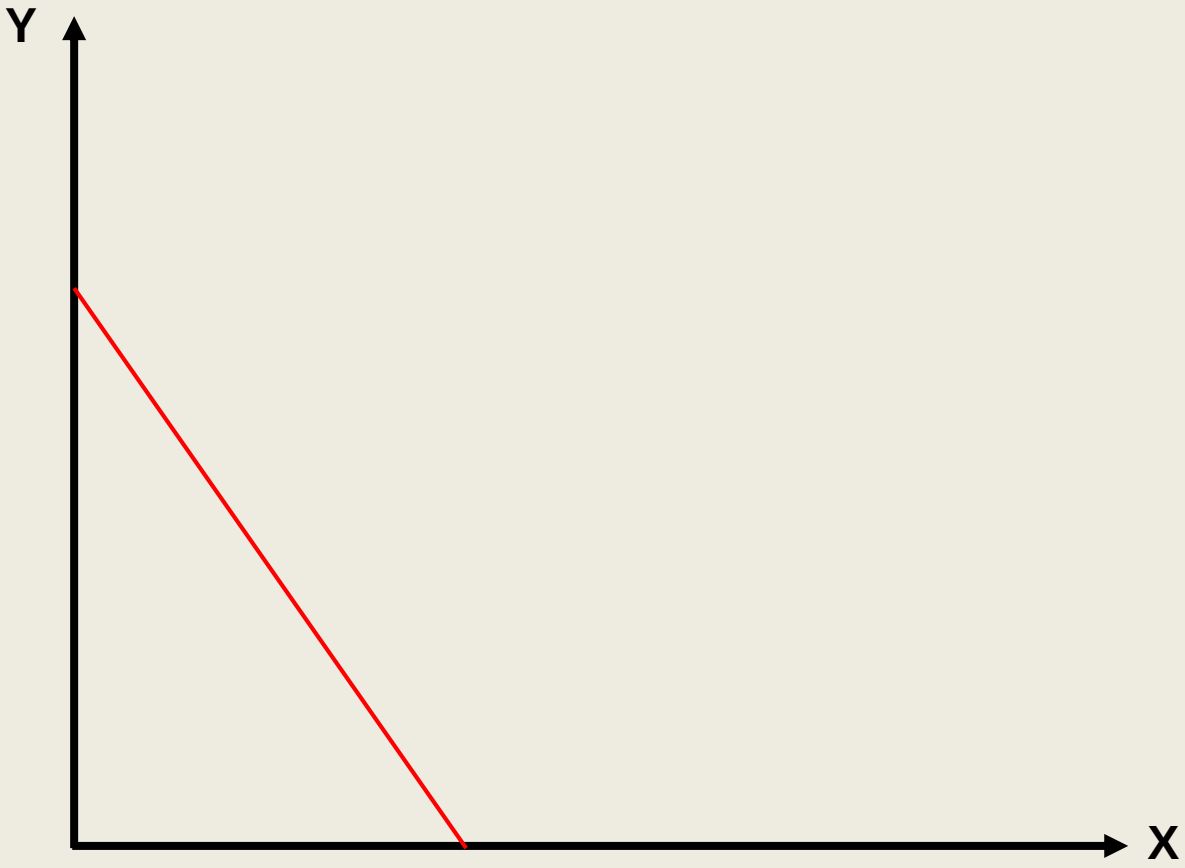
Case 1: Px falls, and X is a normal good.

Hicksian Demand Decomposition



Case 2: Px falls, and X is an inferior good.

Hicksian Demand Decomposition



Case 3: Px falls, and X is a Giffen good.

Decomposition of the Price Effect

- Notice that we find Bundle B from "rolling the budget line along the original indifference curve".
- In doing so, the consumer is kept at the same utility level, even with the price change.

- Using this method, we are defining the SE as **"the change in the demand for a good as its price changes, holding the utility constant"**.
- We call this method "the Hicksian Method".
- This is named after Sir John Hicks, a British economist.

Decomposition of the Price Effect

- However, there is another way to look at the SE.
- It is called “the Slutskian Method”.
- It is named after Eugen Slutsky, a Russian economist.

- Using this method, we now define the SE as **“the change in the demand for a good as its price changes, holding the purchasing power constant”**.

Decomposition of the Price Effect

- Now, instead of “rolling the budget line along the original indifference curve” (as in the Hicksian Method), we will find Bundle B from “pivoting the budget line around the original bundle A”.

- In doing so, we are **holding the purchasing power constant because the consumer can still buy the original bundle A even with the price change.**

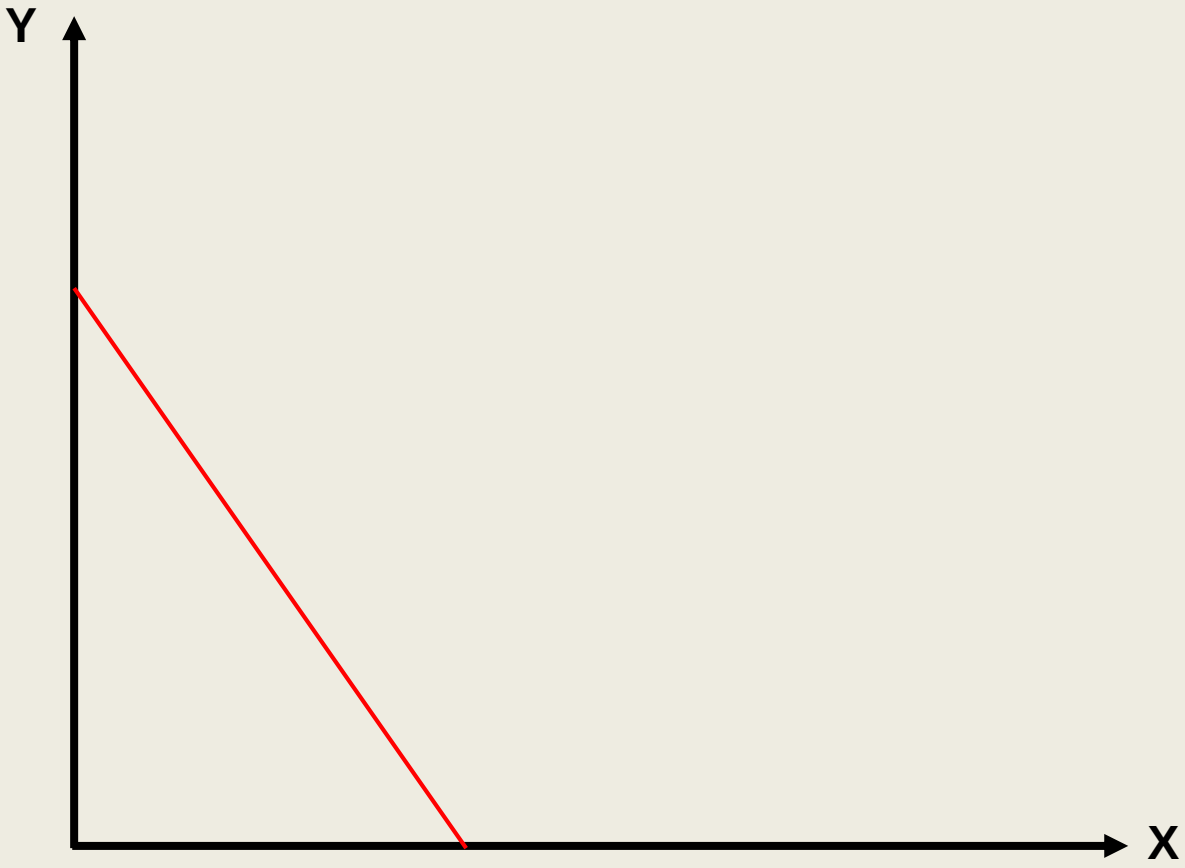
Decomposition of the Price Effect

Hicksian vs Slutskian Method

To find Bundle B, which is the bundle as a result of the SE,

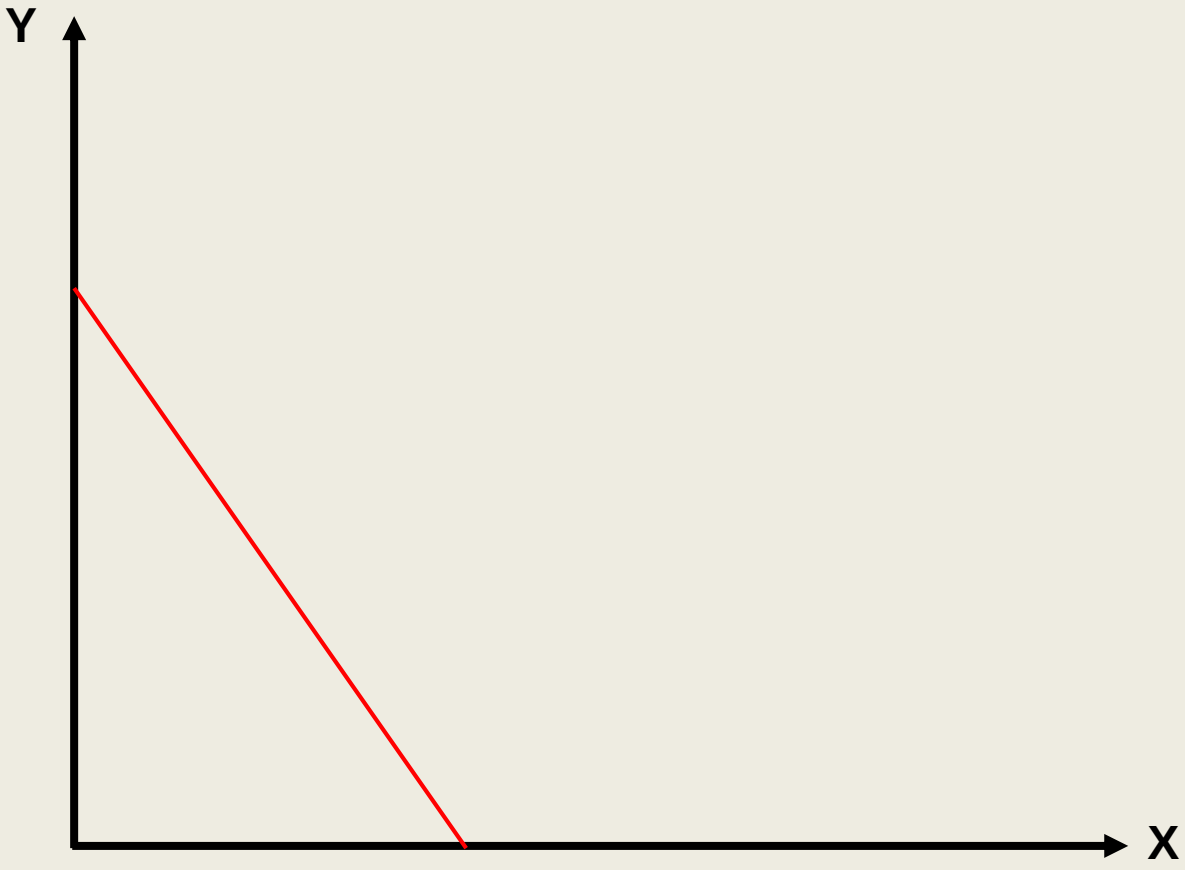
- The Hicksian Method asks:
  Which Bundle after the price change, would keep the consumer at the utility level that he had prior the price change?
- The Slutskian Method asks:
  Which Bundle after the price change, would keep the consumer at the purchasing power that he had prior the price change?

Slutskian Demand Decomposition



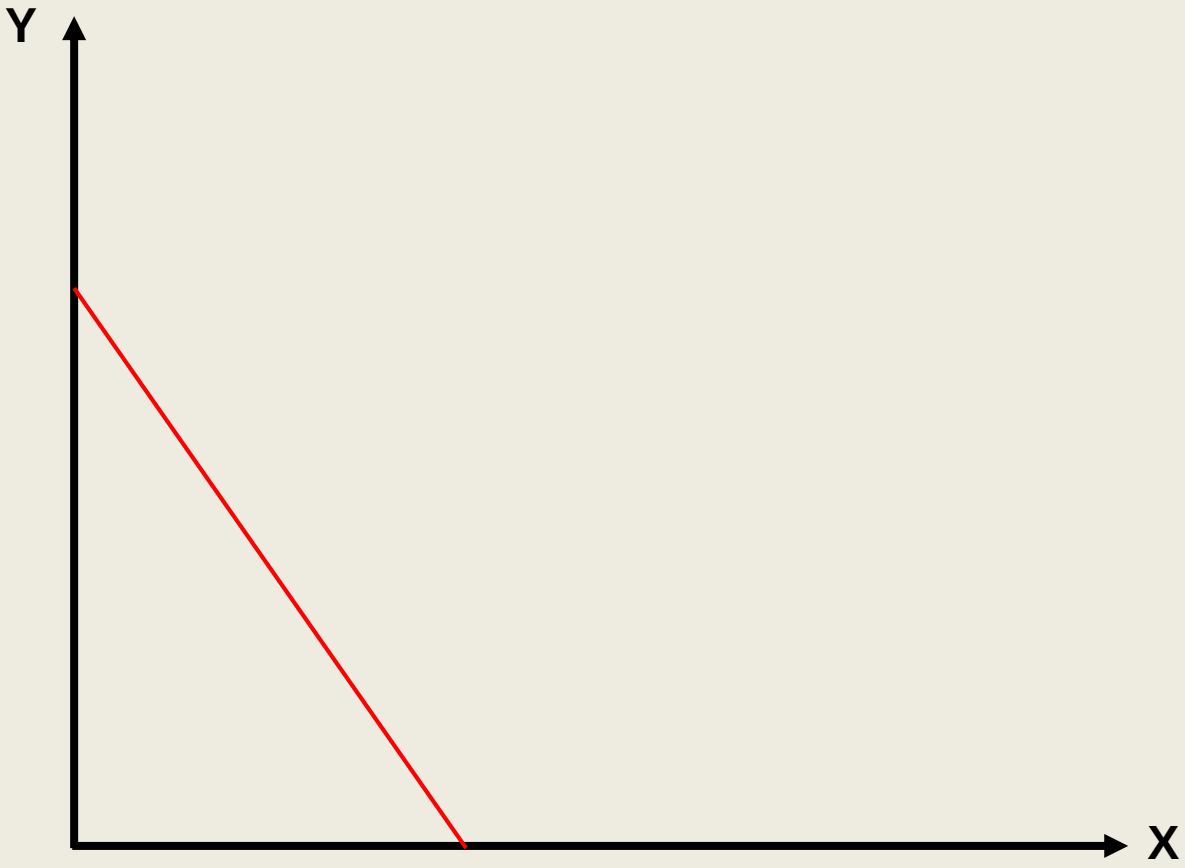
Case 1: Px falls, and X is a normal good.

Slutskian Demand Decomposition



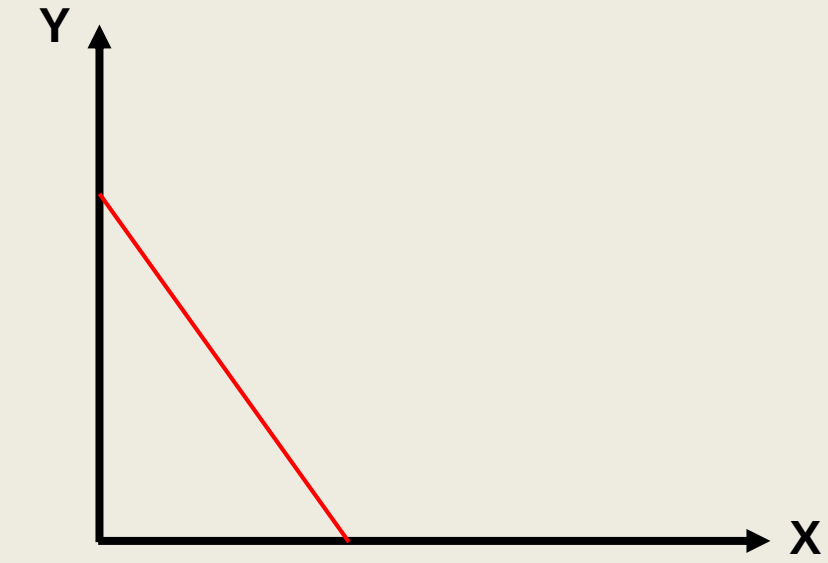
Case 2: Px falls, and X is an inferior good.

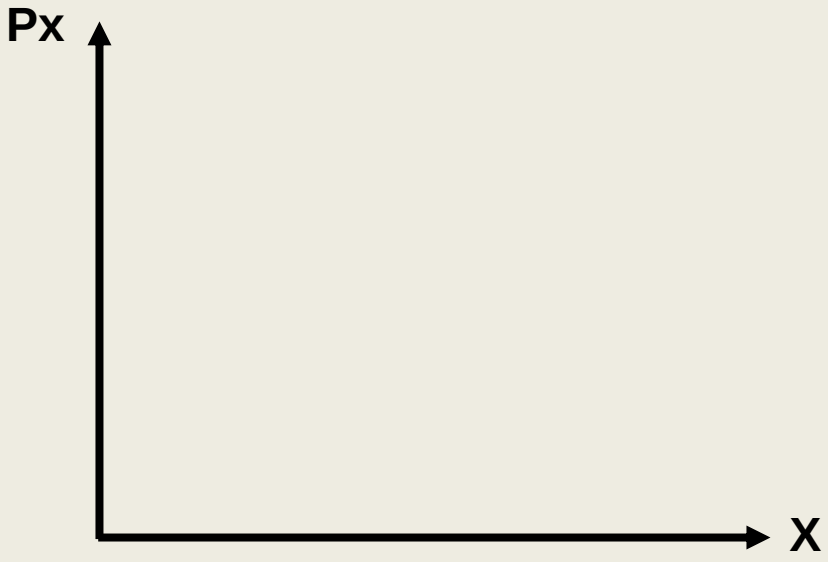
Slutskian Demand Decomposition



Case 3: Px falls, and X is a Giffen good.

Deriving the standard Demand Curve

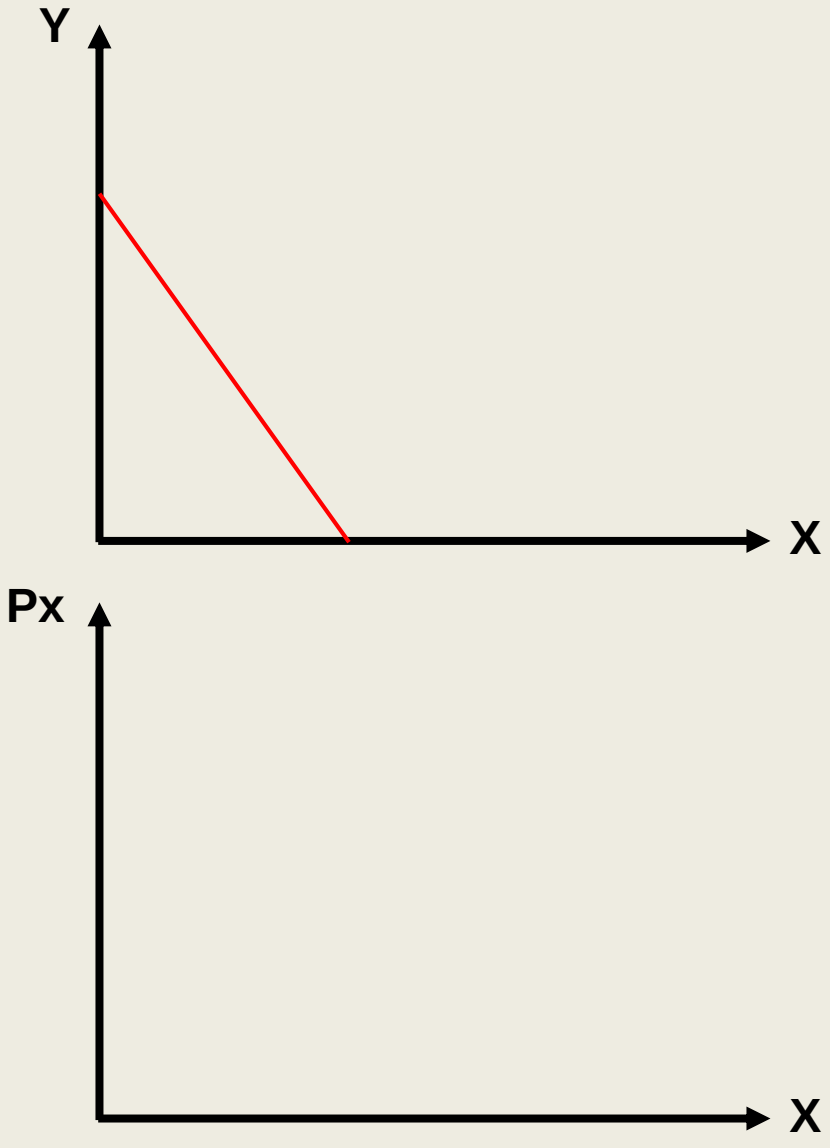




Case 1: Px falls, and X is a normal good.

Standard Demand Curve is also known as "Marshallian Demand"

Deriving the Hicksian Demand Curve



Case 1: Px falls, and X is a normal good.

Other Key Points

- We refer the Hicksian (and Slutskian) demand curve as **"compensated"** demand curve, whereas the Marshallian demand curve is referred as "uncompensated" demand.
  - Slutskian Method gives the consumer just enough money to get back to his original bundle A.
  - Hicksian Method gives the consumer just enough money to get back to his original utility.
- The Hicksian demand curve is always downward-sloping because **it ignores the IE**.
- For the same reason, the Hicksian demand for a normal good is steeper than the Marshallian demand.

LEARNING-BY-DOING EXERCISE 5.4

Finding Income and Substitution Effects Algebraically

In Learning-By-Doing Exercises 4.2 and 5.2, we met a consumer who purchases two goods, food and clothing. He has the utility function $U(x, y) = xy$, where x denotes the amount of food consumed and y the amount of clothing. His marginal utilities are $MU_x = y$ and $MU_y = x$. Now suppose that he has an income of \$72 per week and that the price of clothing is $P_y = \$1$ per unit. Suppose that the price of food is initially $P_{x_1} = \$9$ per unit and that the price subsequently falls to $P_{x_2} = \$4$ per unit.

Problem Find the numerical values of the income and substitution effects on food consumption, and graph the results.