



Chapter 3

Benefits and Costs, Supply and Demand

ECON 260
ENVIRONMENTAL ECONOMICS

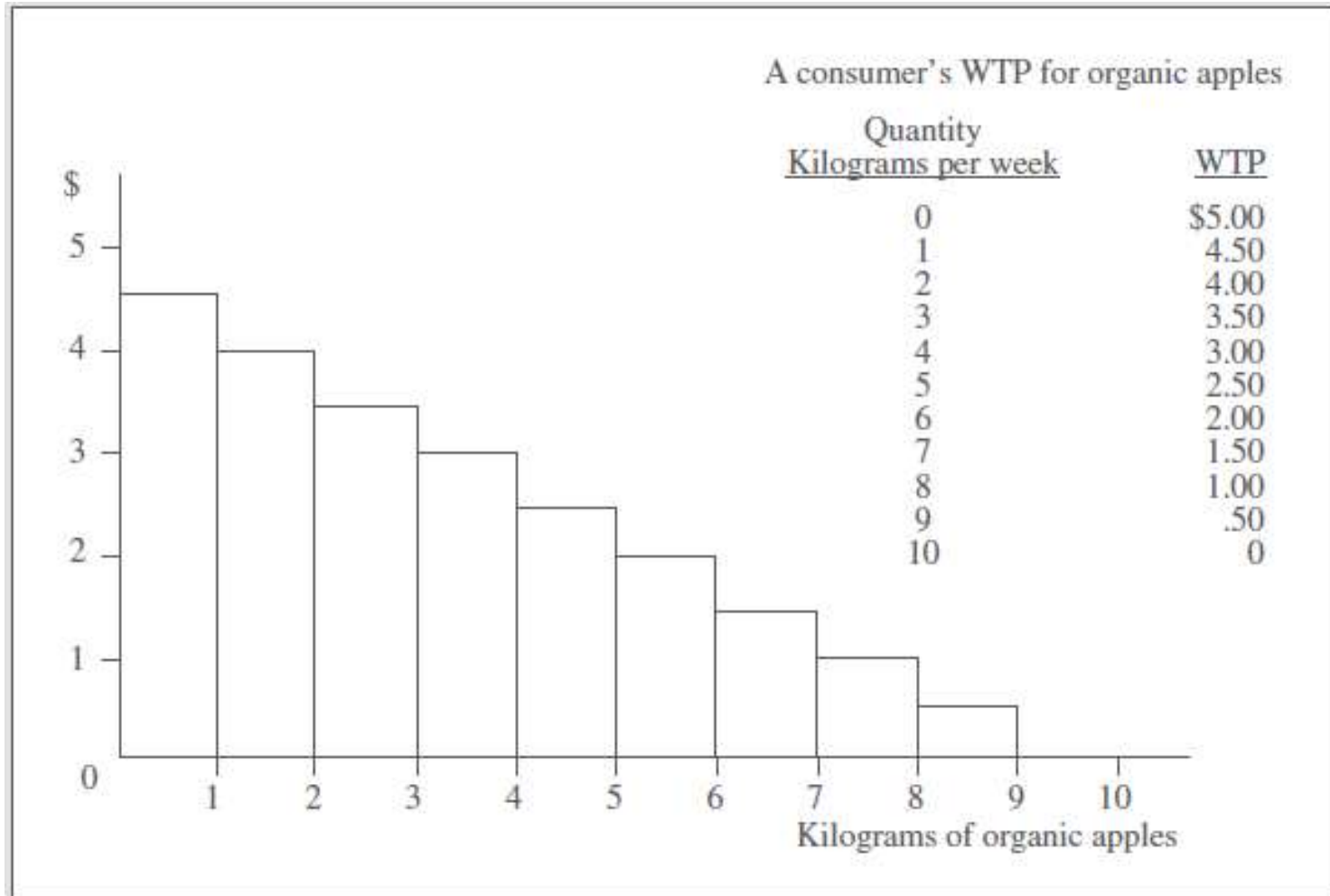
Learning Objectives

1. Derive the demand curve for an individual from his willingness to pay and show how to aggregate to a market demand curve
2. Derive the supply curve for a firm and show how to aggregate to a market supply curve
3. Illustrate the impact of technological progress on marginal cost curves

Demand, Value and Willingness to Pay (WTP)

- A Demand Curve represents all the different potential quantities of a good available and the WTP of consumers for each quantity
- A single Quantity Demanded (Q_d) is associated with each price level

WTP for Organic Apples



Law of Diminishing Marginal Utility

- A Demand Curve is downward sloping due to the Law of Diminishing Marginal Utility
 - The more you have of something, the less you are willing to pay for an additional unit of the good
 - Across groups of people (aggregate demand) WTP falls because different people hold different values for a good

Marginal Willingness to Pay

- MWTP = your willingness to pay for the next item (one more)
- The points on a demand curve show MWTP for a product
- Your MWTP is affected by:
 - How many of the same items you already have
 - Tastes and preferences
 - Time and situation

Total Willingness to Pay

- TWTP = the total amount you are willing to pay for a set of items
- It is calculated by summing the MWTP for each item
- TWTP represents the total value of a set of goods
- It can be calculated by finding the area under the demand curve

The Price of 1, 6, and 12 Cans of Sprite

Example of diminishing WTP and how we can sum MWTP to find TWTP

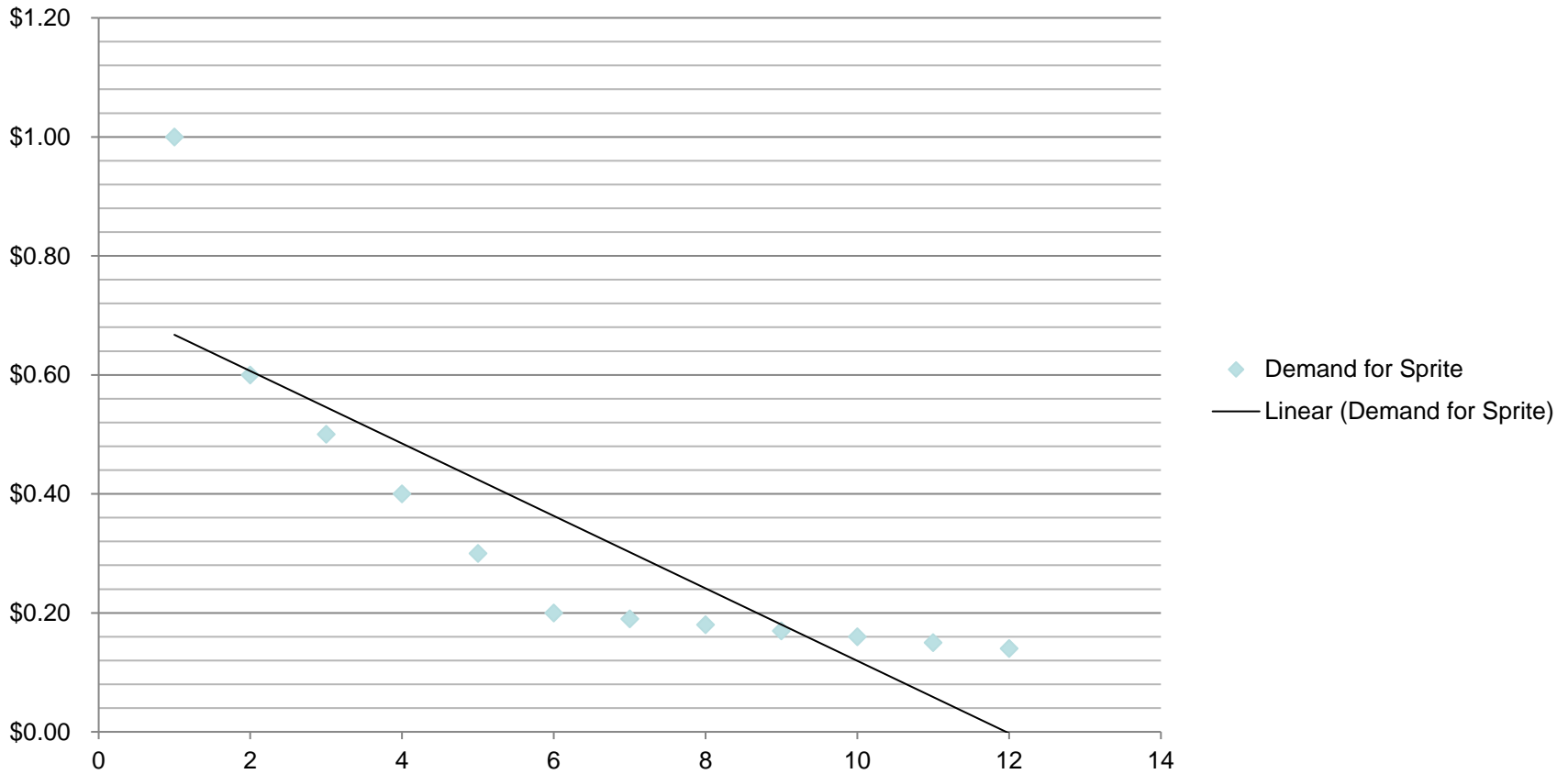
- If 1 Can of Sprite costs \$1.00
- And 6 cans cost \$3.00
- And 12 cans cost \$3.99

What is the MWTP for each can, TWTP, AWTP?

Number of Cans	Marginal Willingness to Pay (MWTP)	Total Willingness to Pay (TWTP)	Average Willingness to Pay (AWTP)
1	\$1	\$1	\$1
2	\$.60	\$1.60	\$.80
3	\$.50	\$2.10	\$.70
4	\$.40	\$2.50	\$.63
5	\$.30	\$2.80	\$.56
6	\$.20	\$3.00	\$.50
7	\$.19	\$3.19	\$.46
8	\$.18	\$3.37	\$.42
9	\$.17	\$3.54	\$.39
10	\$.16	\$3.70	\$.37
11	\$.15	\$3.85	\$.35
12	\$.14	\$3.99	\$.33

Sprite Demand Curve

Demand for Sprite



Aggregate Demand

- We can aggregate the demand curves of individuals to find the “aggregate demand curve” for a group of people or society

$$D^A: P = 5 - 1/2Q^A \quad \text{or} \quad Q^A = 10 - 2P$$

$$D^B: P = 5 - Q^B \quad \text{or} \quad Q^B = 5 - P$$

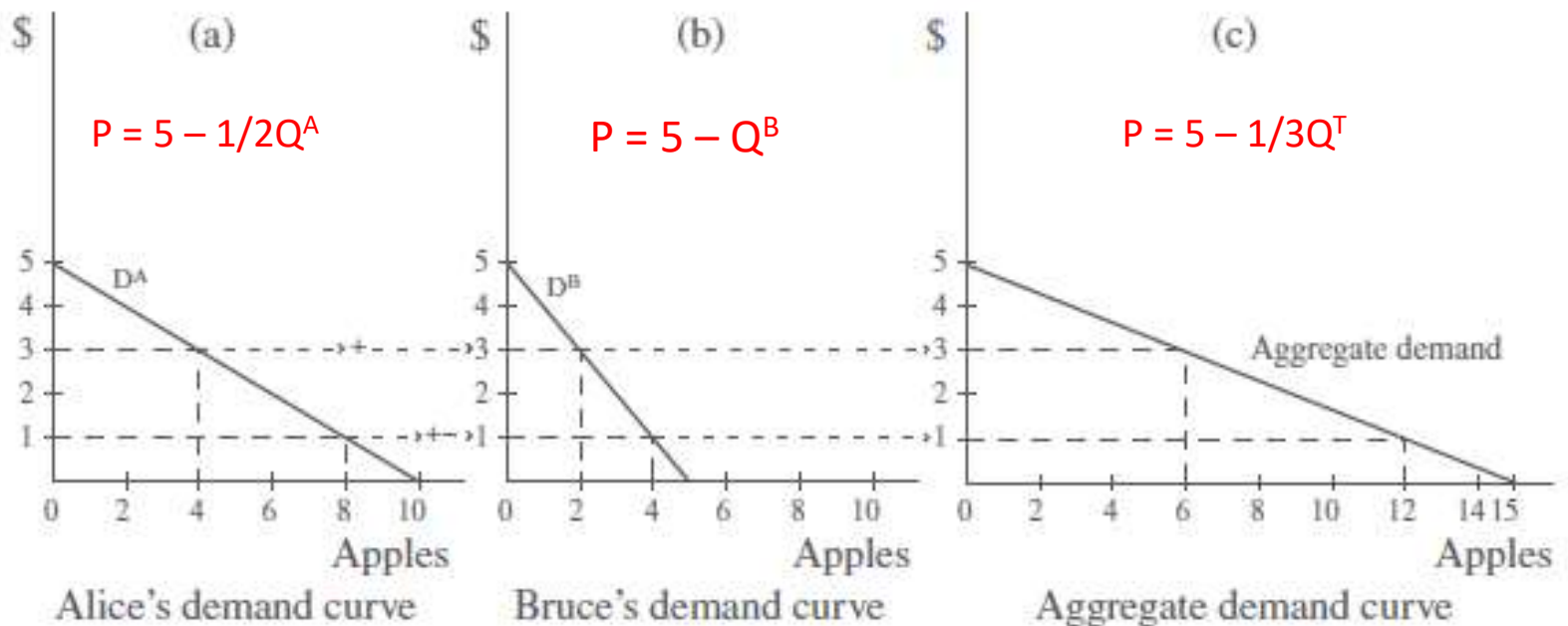
$$\text{Sum: } Q^T = Q^A + Q^B = (10 - 2P) + (5 - P) = 15 - 3P$$

Rewrite to graph

$$P = 5 - 1/3Q^T \quad \text{when } P = 5 \quad Q^T = 0, \quad \text{when } P = 0, \quad Q^T = 15$$

Aggregate Demand

FIGURE 3-4 Aggregating Demand Curves for Organic Apples



Questions on Demand

- Why does Willingness to Pay (WTP) diminish as you get more and more items?
- What is an example of diminishing WTP for goods you buy?
- What is the relationship between WTP and the total value of a good? How is it found using a demand curve?
- Does a low price mean a good has little value?

Shifts in Demand Curves

- A change in price yields movement along a demand curve, but not a shift of the curve
 - If the price of oil rises, the demand for oil will stay the same (in the short run)
- A demand curve might shift due to:
 - Changes in Tastes and Preferences
 - Changes in Time
 - Changes in Income
 - **Ability to Pay is an important factor in determining Demand, and therefore MWTP and TWTP for a good**

Supply and Marginal Cost (MC)

- A Supply Curve represents the number of units a supplier is willing to produce at different price levels
- Supply curves are generally upward sloping, because the Marginal Cost (MC) of production rises as more units are produced
- Costs rise because of what are known as Opportunity Costs – resources used in production must be bid away from alternative uses

Opportunity Costs and Marginal Cost

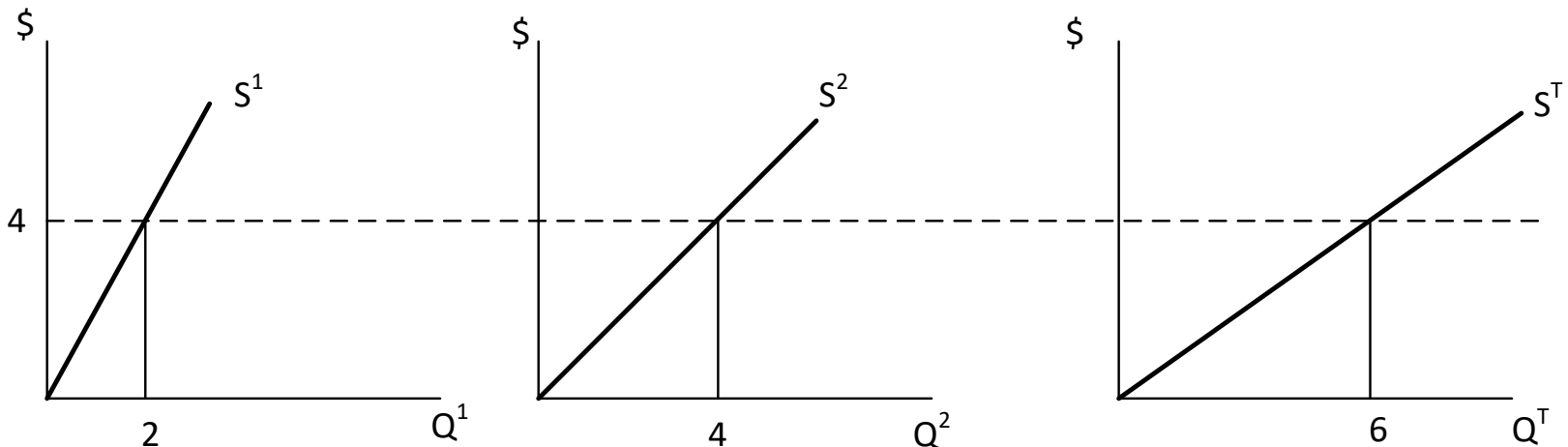
- To produce goods, firms must hire workers (labor), rent buildings, buy raw materials and other inputs
- As production increases, the number of workers, amount of raw material required etc. increases
- To produce more units, more resources must be bid away from their alternative uses. The opportunity cost of these resources rise as more and more are sought (Buy the cheap units first, then the more expensive)

Increasing Returns to Scale

- Some Supply curves indicate falling MC up to some level of production
 - This is known as Economies of Scale or Increasing Returns to Scale
 - The 100,000th car is cheaper to produce than the 1000th (due to specialization, scale)
 - At some point, however, MC must begin to rise as production continues to increase (normal, upward sloping supply curve)

Aggregate Supply Curves

- Aggregate supply curves are a horizontal summation of the individual supply curves of different individuals or firms



Shifts in a supply curve

A Supply Curve will shift due to:

- Changes in the costs of the resources used to produce a good
- Changes in technology (productivity)
 - When technology improves, the supply curve shifts down, it gets cheaper to produce each unit of the good

Questions on Supply

- Why does Marginal Cost rise as you produce more and more items?
- What is the relationship between MC and the total cost of producing a good? How is it found using a supply curve?
- How do technological improvements change MC and the supply curve?

Chapter Overview

This chapter provided an overview of supply and demand curves.

- The concepts of diminishing Willingness to Pay (WTP) and Demand Curve were introduced
- Aggregate demand can be found by summing individual demand curves
- Total WTP was shown to be the area under the demand curve, the TWTP of all people for the good in question
- Supply and its relationship to Marginal Cost (MC) was introduced
- Supply curves slope up due to rising MC caused by Opportunity Costs
- An aggregate supply curve can be created by summing the supply curves of individual firms
- Technology can allow firms to produce goods more cheaply, shifting supply curves down