

Elasticity A measure of how much one economic variable responds to changes in another economic variable.

Whether you are managing a service station, a pizza parlor, or a coffee shop, you need to know how an increase or a decrease in the price of your products will affect the quantity consumers are willing to buy. We know that cutting the price of a good increases the quantity demanded and that raising the price reduces the quantity demanded. But the critical question is: *How much* will the quantity demanded change as a result of a price increase or decrease? Economists use the concept of **elasticity** to measure how one economic variable—such as the quantity demanded—responds to changes in another economic variable—such as the price. For example, the responsiveness of the quantity demanded of a good to changes in its price is called the *price elasticity of demand*. Knowing the price elasticity of demand allows you to compute the effect of a price change on the quantity demanded.

We also know that the quantity of a good that consumers demand depends not just on the price of the good but also on consumer income and on the prices of related goods. As a manager, you would also be interested in measuring the responsiveness of demand to these other factors. As we will see, we can use the concept of elasticity here as well. We are also interested in the responsiveness of the quantity supplied of a good to changes in its price, which is called the *price elasticity of supply*.

Elasticity is an important concept not just for business managers but for policymakers as well. If the government wants to discourage teenage smoking, it can raise the price of cigarettes by increasing the tax on them. If we know the price elasticity of demand for cigarettes, we can calculate how many fewer packs of cigarettes will be demanded at a higher price. In this chapter, we will also see how policymakers use the concept of elasticity.

6.1 LEARNING OBJECTIVE

Define price elasticity of demand and understand how to measure it.

Price elasticity of demand The responsiveness of the quantity demanded to a change in price, measured by dividing the percentage change in the quantity demanded of a product by the percentage change in the product's price.

The Price Elasticity of Demand and Its Measurement

We know from the law of demand that when the price of a product falls, the quantity demanded of the product increases. But the law of demand tells firms only that the demand curves for their products slope downward. More useful is a measure of the responsiveness of the quantity demanded to a change in price. This measure is called the **price elasticity of demand**.

Measuring the Price Elasticity of Demand

We might measure the price elasticity of demand by using the slope of the demand curve because the slope of the demand curve tells us how much quantity changes as price changes. Using the slope of the demand curve to measure price elasticity has a drawback, however: The measurement of slope is sensitive to the units chosen for quantity and price. For example, suppose a \$1 per gallon decrease in the price of gasoline leads to an increase in the quantity demanded from 10.1 million gallons to 10.2 million gallons per day. The change in quantity is 0.1 million gallons, and the change in price is $-\$1$, so the slope is $0.1/-1 = -0.1$. But if we measure price in cents, rather than in dollars, the slope is $0.1/-100 = -0.001$. If we measure price in dollars and gallons in thousands, instead of millions, the slope is $100/-1 = -100$. Clearly, the value we compute for the slope can change dramatically, depending on the units we use for quantity and price.

To avoid this confusion over units, economists use *percentage changes* when measuring the price elasticity of demand. Percentage changes are not dependent on units of measurement. (For a review of calculating percentage changes, see the appendix to Chapter 1.) No matter what units we use to measure the quantity of gasoline, 10 percent more gasoline is 10 percent more gasoline. Therefore, the price elasticity of demand is measured by dividing the percentage change in the quantity demanded by the percentage change in the product's price. Or:

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$