

Elasticity

LEARNING OBJECTIVES

After learning about this chapter, you should know

L06-1 How to compute price elasticity of demand.

L06-2 The relationships between price changes, price elasticity, and total revenue.

L06-3 What the cross-price elasticity of demand measures.

L06-4 What the income elasticity of demand tells us.

L06-5 What the elasticity of supply measures.

Price Elasticity

Law of demand: the quantity of a good demanded in a given time period increases as its price falls, ceteris paribus.

□ *The critical question is **how much** quantity demanded will change due to a price change.*

Price elasticity of demand: the percentage change in quantity demanded divided by the percentage change in price.

Price Elasticity II

$$\text{Price elasticity (E)} = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

A 10% increase in quantity demanded in response to a 20% price decrease yields a price elasticity of 0.5.

Computing Price Elasticity

We use the average method of computation.

1. *Take the quantity before and the quantity after the price change and average them.*
2. *Divide the average quantity into the change in quantity to get the percentage change in quantity.*

If quantity went from 2 to 4, then the average is 3. The change is 2, so the percentage change is $\frac{2}{3}$ or 0.667.

*We do the same thing to get the **percentage change in price**.*

Computing Price Elasticity II

The % change in quantity is 0.667 and the % change in price is 0.118.

$$\text{Price elasticity } (E) = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

we can now compute the price elasticity of demand:

$$E = 0.667 / 0.118 = 5.65$$

A **1% change in price** brings about a **5.65% change in quantity demanded**.

Interpreting Elasticity

If $E > 1$, demand is **elastic**.

- Consumer response is large relative to the price change.

If $E < 1$, demand is **inelastic**.

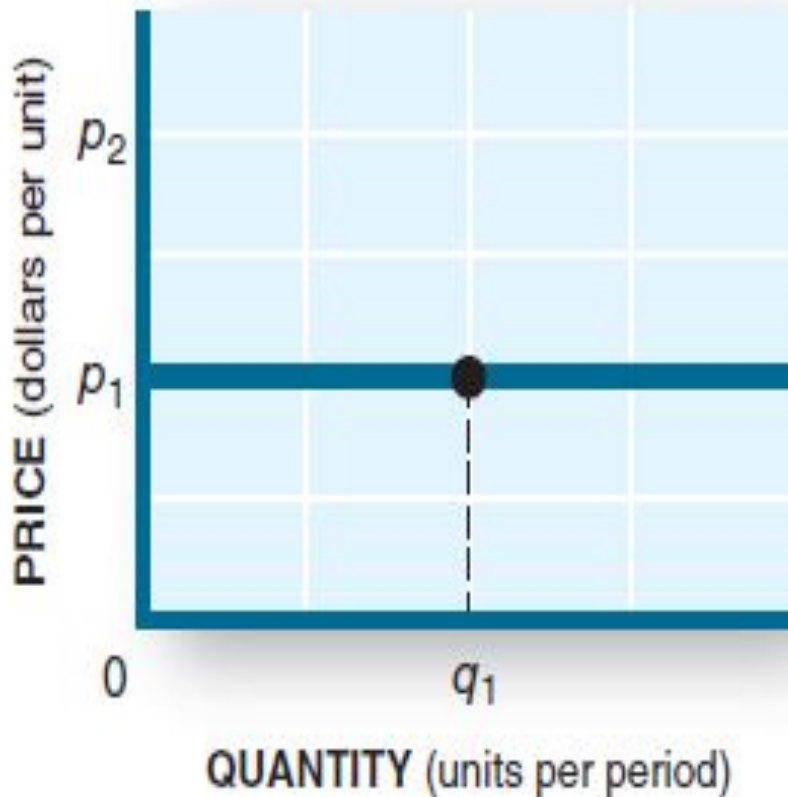
- Consumer response is small relative to the price change.

If $E = 1$, demand is **unitary elastic**.

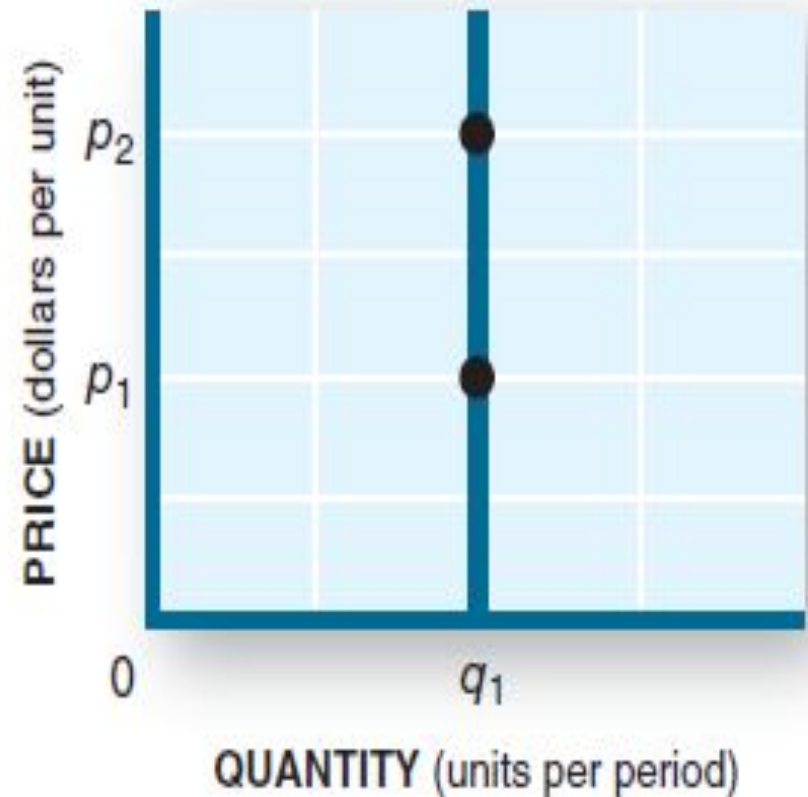
- % change in quantity demanded is exactly equal to % change in price.

Elasticity Extremes

(a) Completely elastic ($E = \infty$)



(b) Completely inelastic ($E = 0$)



Elasticity Estimates II

Product	Price Elasticity
<i>Relatively elastic ($E > 1$)</i>	
Airline travel, long run	2.4
Restaurant meals	2.3
Fresh fish	2.2
New cars, short run	1.2–1.5
<i>Unitary elastic ($E = 1$)</i>	
Private education	1.1
Radios and televisions	1.2
Shoes	0.9
Movies	0.9
<i>Relatively inelastic ($E < 1$)</i>	
Milk	0.6
Cigarettes	0.4
Coffee	0.3
Eggs	0.3
Gasoline, short run	0.2
Electricity (in homes)	0.1

4 Determinants of Elasticity

1. Necessities vs. luxuries

- Demand for necessities is relatively inelastic.
- Demand for luxuries is relatively elastic.

2. Availability of substitutes

- The greater the availability of substitutes, the more elastic is the product's demand.
- No or few substitutes? Inelastic demand.

4 Determinants of Elasticity II

3. Relative price to income

- Demand for low-priced goods is relatively inelastic.
- Demand for high-priced goods is relatively elastic.

4. Time

- The more time you have to adjust to a price change, the more elastic your response.
- No time to adjust? Highly inelastic demand.

Price Elasticity and Total Revenue

Total revenue is the amount of money received from product sales.

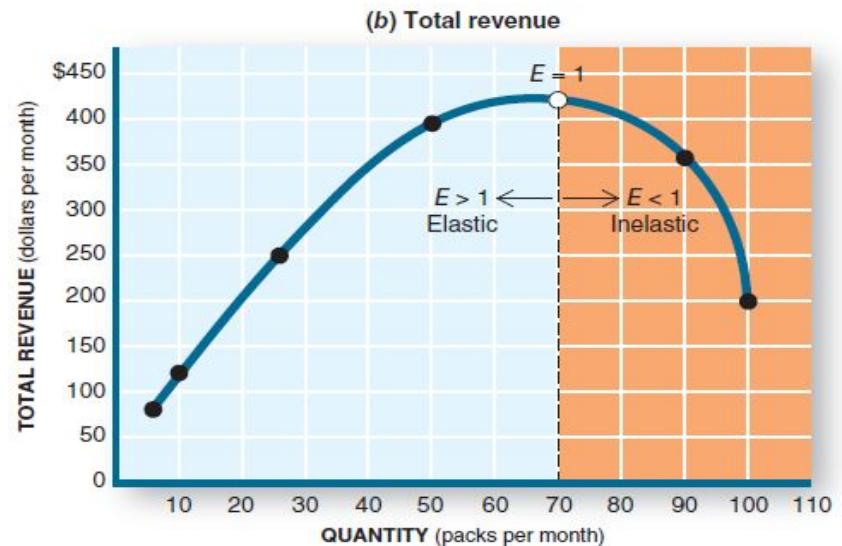
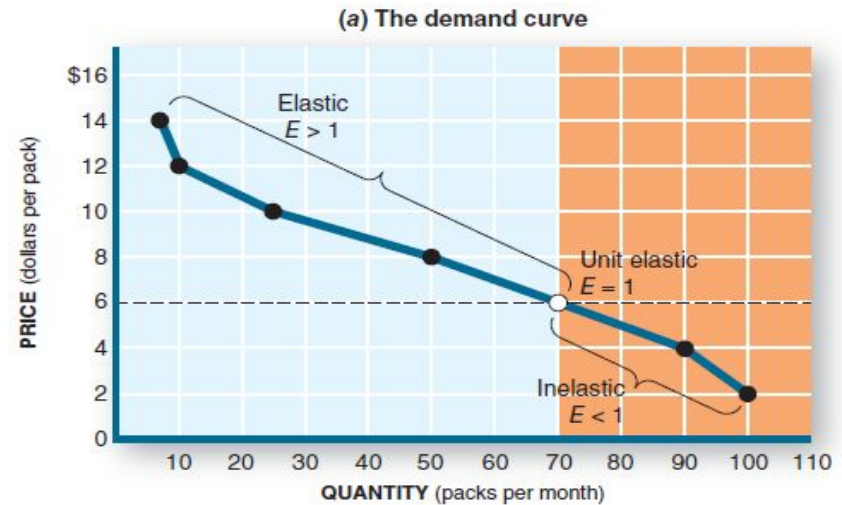
Total revenue = Price x Quantity sold

- If demand is inelastic ($E < 1$), a price rise increases total revenue, and vice versa.
- If demand is elastic ($E > 1$), a price rise decreases total revenue, and vice versa.
- If demand is unitary-elastic ($E = 1$), a price change does not change total revenue.

Elasticity on the Demand Curve

At low prices, demand is relatively inelastic. As prices rise, however, demand becomes less inelastic and more elastic.

Note that total revenue maxes out when demand switches from elastic to inelastic.



Cross-Price Elasticity

Suppose the price of candy in the theater falls. How would this affect the sales of popcorn?

- Candy and popcorn are **substitutes** for each other.
- Lower-priced candy will see an increase in quantity demanded. Also, the demand for popcorn will decrease. But by how much?

Cross-price elasticity of demand: the % change in quantity demanded of X divided by the % change in price of Y.

Cross-Price Elasticity II

Substitute goods: goods that can replace each other; when the price of good X rises, the demand for good Y increases, and vice versa, *ceteris paribus*.

Complementary goods: goods frequently consumed in combination; when the price of good X rises, the demand for good Y decreases, and vice versa, *ceteris paribus*.

Cross-Price Elasticity III

Substitutes

- If popcorn sales declined 20% when the candy price dropped 10%, the cross-price elasticity of demand for popcorn is $-20 / -10$ or $E_x = +2.0$, a relatively elastic response.
- Note that the sign is significant. When goods are **substitutes**, cross-price elasticity is **positive**.

Cross-Price Elasticity IV

Complements

- If popcorn sales declined 20% when the movie admission price increased 10%, the cross-price elasticity of popcorn is -2.0, a relatively elastic response.
- Again the sign is significant. When goods are **complements**, cross-price elasticity is **negative**.

Income Elasticity

As income increases, people have more money to spend. Demand for goods will shift rightward.

- *For a particular good, how much of a demand increase will occur?*

Income elasticity of demand: % change in quantity demanded divided by % change in income.

- *Your income rises by 10%. You go to the movies more and buy 20% more popcorn. Income elasticity of demand for popcorn is $20\% / 10\%$ or 2.0.*

Income Elasticity II

Normal goods and Inferior goods

- A increase in demand for a good when income rises is true for a **normal good**. Most goods are normal goods and the income elasticity is **positive**.
- For some goods the demand decreases as income rises. They are **inferior goods** and the income elasticity is **negative**.
 - *Examples are used clothes and ramen noodles.*
 - *As income increases, people upgrade to higher-quality substitutes for inferior goods.*

Elasticity of Supply

The law of supply: an increase in price causes an increase in quantity supplied. But how much more will be produced as the price rises?

Elasticity of supply: the % change in quantity supplied divided by the % change in price.

- *If it is highly elastic, producers are very responsive to a price change.*
- *If it is highly inelastic, producers have a sluggish response to a price change.*