chapter:

6

>> Elasticity

**Krugman/Wells
Economics**

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WHAT YOU WILL LEARN IN THIS CHAPTER

➢ What is the definition of **elasticity?**

➢ What is the meaning and importance of:

- price elasticity of demand?
- income elasticity of demand?
- price elasticity of supply?

➢ What factors influence the size of these various elasticities?

➢ How the cross-price elasticity of demand measures the responsiveness of demand for one good to changes in the price of another good

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Defining and Measuring Elasticity

- The **price elasticity of demand** is the ratio of the percent change in the quantity demanded to the percent change in the price as we move along the demand curve (dropping the minus sign).

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The Price Elasticity of Demand

$$\% \text{ change in quantity demanded} = \frac{\text{Change in quantity demanded}}{\text{Initial quantity demanded}} \times 100$$

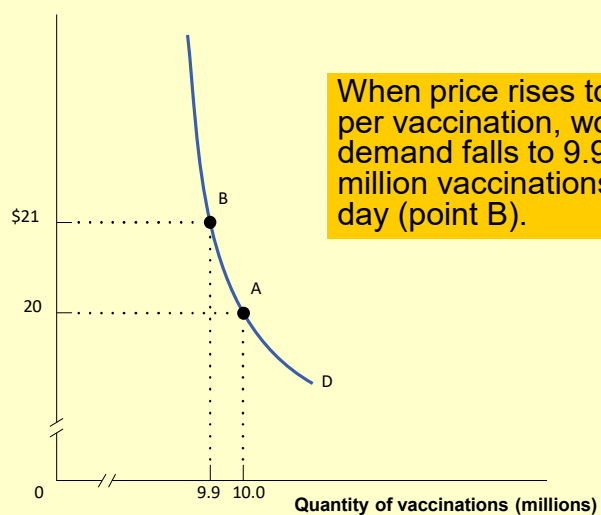$$\% \text{ change in price} = \frac{\text{Change in price}}{\text{Initial price}} \times 100$$

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

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Demand for Vaccinations

Price of vaccination

When price rises to $21 per vaccination, world demand falls to 9.9 million vaccinations per day (point B).

$21 .... B

20 .... A

D

0   9.9 10.0

Quantity of vaccinations (millions)

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Using the Midpoint Method

- The **midpoint method** is a technique for calculating the percent change. In this approach, we calculate changes in a variable compared with the average, or midpoint, of the starting and final values.

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Using the Midpoint Method

$$\% \text{ change in } X = \frac{\text{Change in } X}{\text{Average value of } X} \times 100$$

$$\text{Average value of } X = \frac{\text{Starting value of } X + \text{final value of } X}{2}$$

$$\text{Price elasticity of demand} = \frac{\dfrac{Q_2 - Q_1}{(Q_1 + Q_2)/2}}{\dfrac{P_2 - P_1}{(P_1 + P_2)/2}}$$

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Some Estimated Price Elasticities of Demand

Good	Price elasticity	
Inelastic demand		
▪ Eggs	0.1	**Price elasticity of demand<1**
▪ Beef	0.4	
▪ Stationery	0.5	
▪ Gasoline	0.5	
Elastic demand		
▪ Housing	1.2	**Price elasticity of demand>1**
▪ Restaurant meals	2.3	
▪ Airline travel	2.4	
▪ Foreign travel	4.1	

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Two Extreme Cases of Price Elasticity of Demand

(a) Perfectly Inelastic Demand: Price Elasticity of Demand = 0

Price of shoelaces (per pair)

D_1

An increase in price…

$3

$2

… leaves the quantity demanded unchanged.

0

1

Quantity of shoelaces (billions of pairs per year)

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Two Extreme Cases of Price Elasticity of Demand

(b) Price Elastic Demand: Price Elasticity of Demand = ∞

Price of pink tennis balls (per dozen)

At any price above $5, quantity demanded is zero

At exactly $5, consumers will buy any quantity

$5

D_2

At any price below $5, quantity demanded is infinite

0

Quantity of tennis balls (dozens per year)
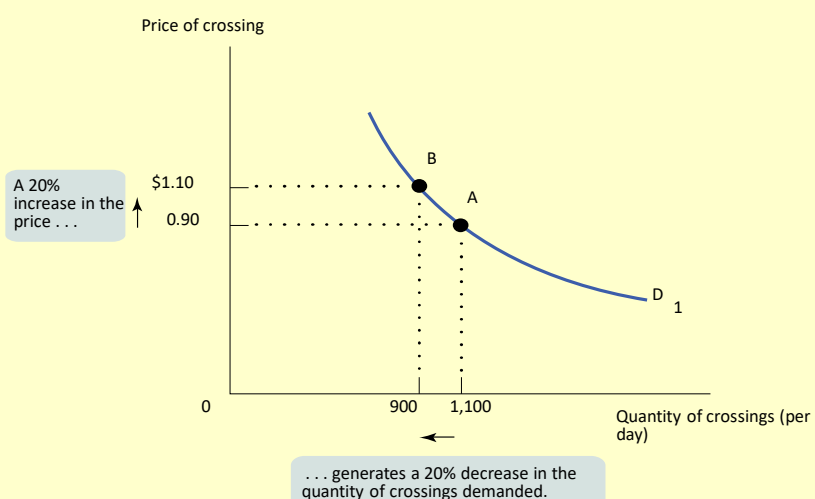
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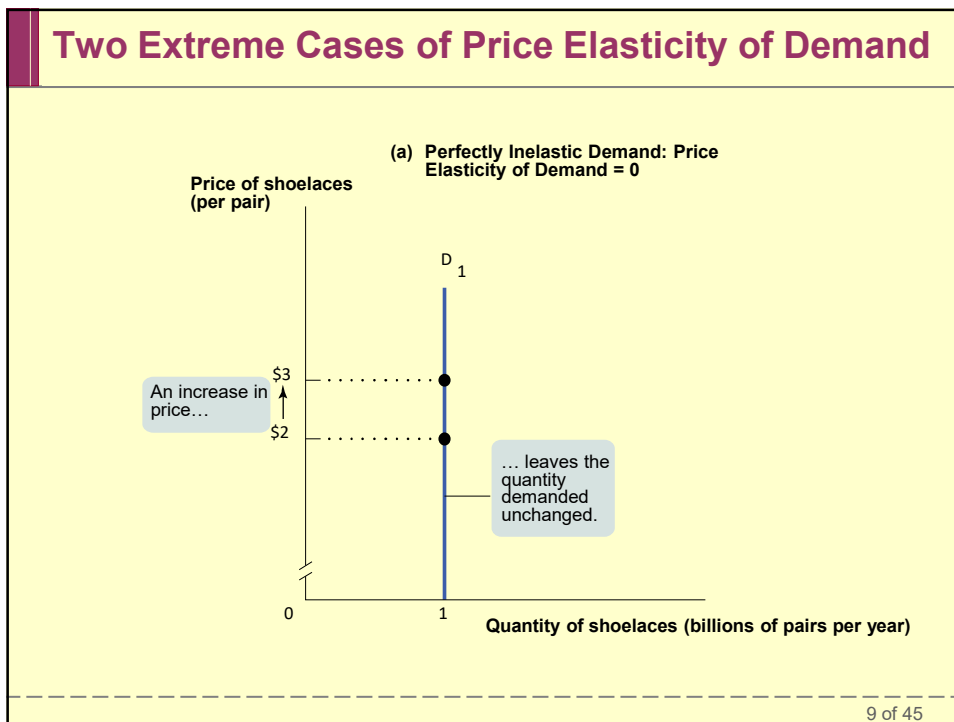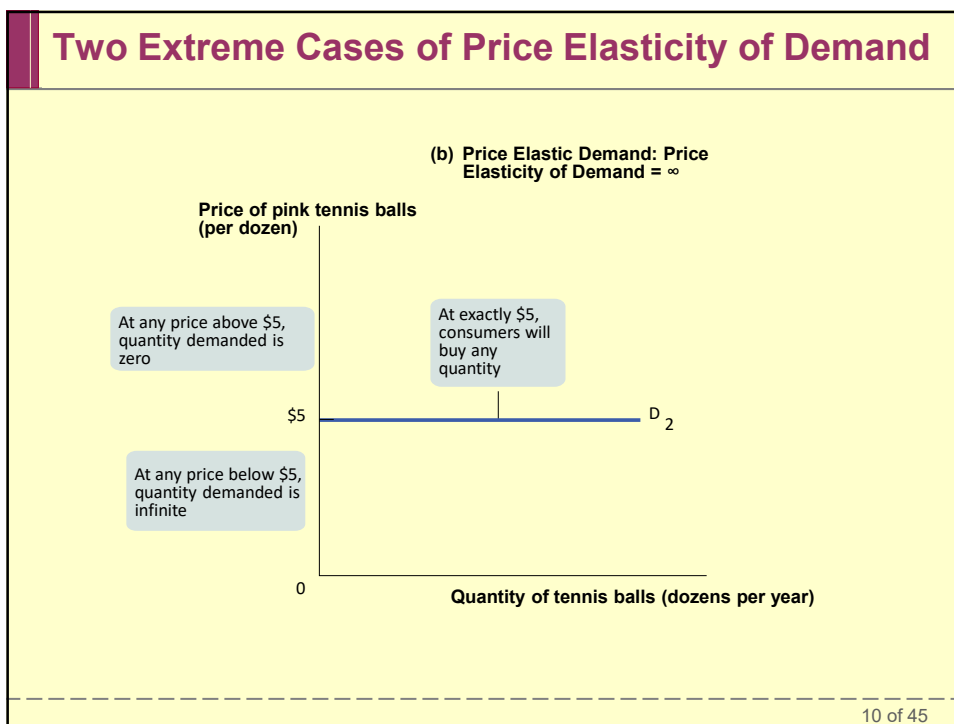
Interpreting the Price Elasticity of Demand

- Demand is **elastic** if the price elasticity of demand is greater than 1.
- Demand is **inelastic** if the price elasticity of demand is less than 1.
- Demand is **unit-elastic** if the price elasticity of demand is exactly 1.

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Unit Elasticity of Demand

(a) Unit-Elastic Demand: Price Elasticity of Demand = 1

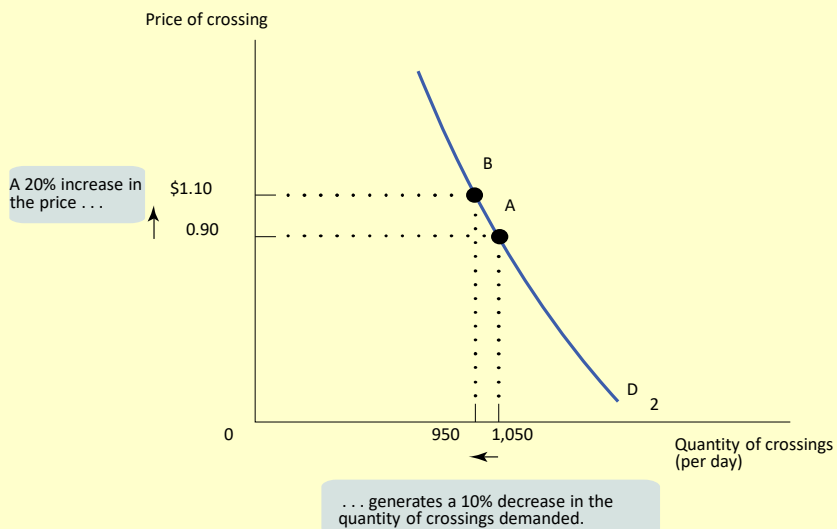12

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Inelastic Demand
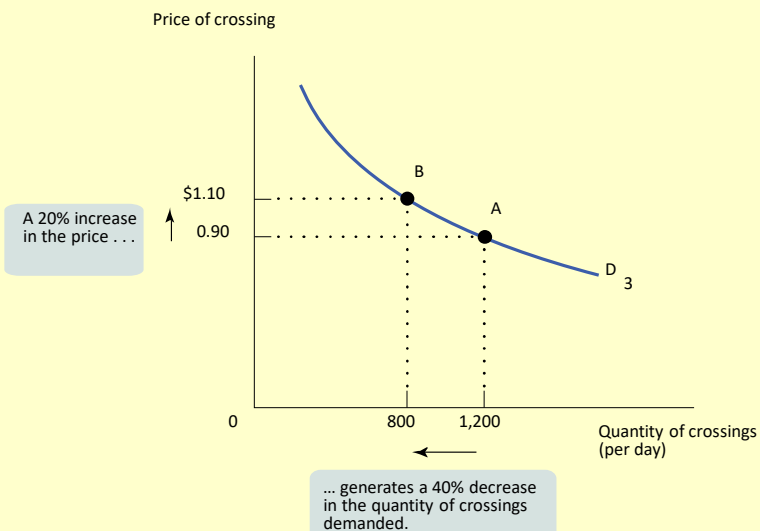
(b) Inelastic Demand: Price Elasticity of Demand = 0.5

Price of crossing

A 20% increase in the price . . .

$1.10

0.90

B

A

950 1,050

D
2

0

Quantity of crossings
(per day)

. . . generates a 10% decrease in the
quantity of crossings demanded.

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Elastic Demand

(c) Elastic Demand: Price Elasticity of Demand = 2

Price of crossing

A 20% increase
in the price . . .

$1.10

0.90

B

A

800 1,200

D
3

0

Quantity of crossings
(per day)

… generates a 40% decrease
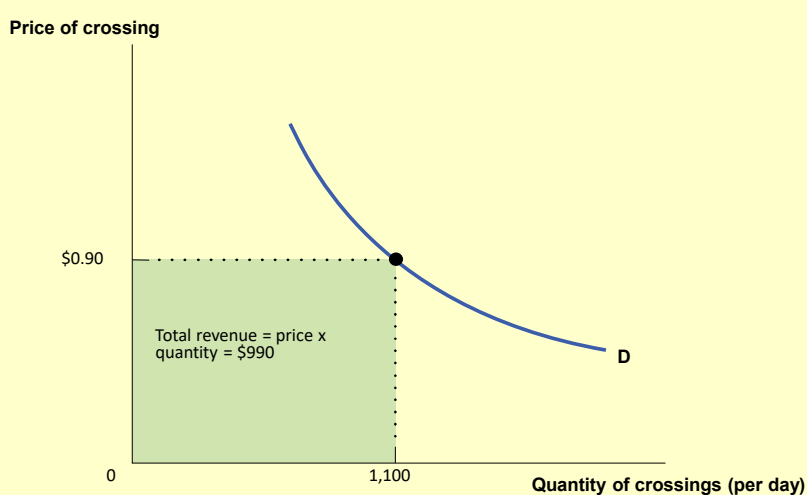in the quantity of crossings
demanded.

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Why Does It Matter Whether Demand is Unit-Elastic, Inelastic, or Elastic?

- Because this classification predicts how changes in the price of a good will affect the *total revenue* earned by producers from the sale of that good.

- The **total revenue** is defined as the total value of sales of a good or service, i.e.

- Total Revenue = Price × Quantity Sold

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Total Revenue by Area

Price of crossing

$0.90 ....●

Total revenue = price x quantity = $990

D

0   1,100   **Quantity of crossings (per day)**

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Elasticity and Total Revenue

- When a seller raises the price of a good, there are two countervailing effects in action (except in the rare case of a good with perfectly elastic or perfectly inelastic demand):

    - *A price effect:* After a price increase, each unit sold sells at a higher price, which tends to raise revenue.

    - *A quantity effect:* After a price increase, fewer units are sold, which tends to lower revenue.

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Effect of a Price Increase on Total Revenue
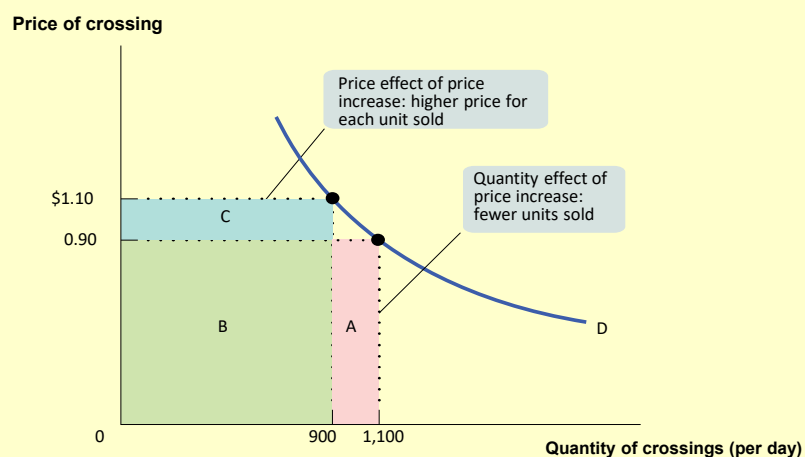
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Elasticity and Total Revenue

- If demand for a good is *elastic* (the price elasticity of demand is greater than 1), an increase in price reduces total revenue.
  - In this case, the quantity effect is stronger than the price effect.
- If demand for a good is *inelastic* (the price elasticity of demand is less than 1), a higher price increases total revenue.
  - In this case, the price effect is stronger than the quantity effect.
- If demand for a good is *unit-elastic* (the price elasticity of demand is 1), an increase in price does not change total revenue.
  - In this case, the sales effect and the price effect exactly offset each other.

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Demand Schedule and Total Revenue
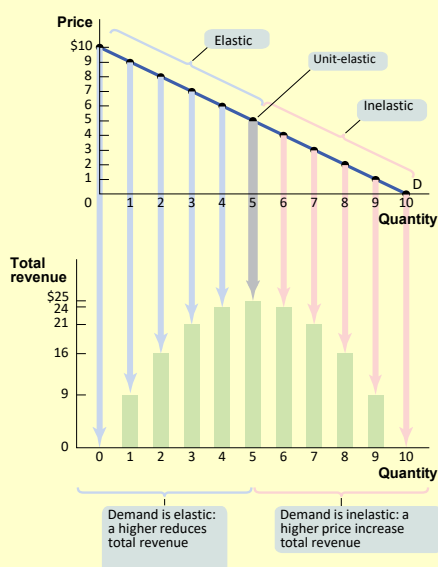
Demand Schedule and Total Revenue for a Linear Demand Curve		
Price	Quantity demanded	Total Revenue
$0	10	$0
1	9	9
2	8	16
3	7	21
4	6	24
5	5	25
6	4	24
7	3	21
8	2	16
9	1	9
10	0	0

The price elasticity of demand changes along the demand curve

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What Factors Determine the Price Elasticity of Demand?

Price Elasticity of Demand is determined by:

- Whether Close Substitutes Are Available
- Whether the Good Is a Necessity or a Luxury
- Share of Income Spent on the Good
- Time

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Other Demand Elasticities: Cross-Price Elasticity

- The **cross-price elasticity of demand** between two goods measures the effect of the change in one good's price on the quantity demanded of the other good. It is equal to the percent change in the quantity demanded of one good divided by the percent change in the other good's price.

The Cross-Price Elasticity of Demand between Goods A and B

$$= \frac{\text{\% change in quantity of A demanded}}{\text{\% change in price of B}}$$

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Cross-Price Elasticity

- Goods are **substitutes** when the *cross-price elasticity of demand* is positive.

- Goods are **complements** when the cross-price elasticity of demand is negative.

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The Income Elasticity of Demand

- The **income elasticity of demand** is the percent change in the quantity of a good demanded when a consumer's income changes divided by the percent change in the consumer's income.

$$\text{Income elasticity of demand} = \frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$

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Normal Goods and Inferior Goods

- When the income elasticity of demand is positive, the good is a *normal good* - that is, the quantity demanded at any given price increases as income increases.

- When the income elasticity of demand is negative, the good is an *inferior good* - that is, the quantity demanded at any given price decreases as income increases.

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No domínio contínuo

$$q = g_D(x_1, x_2, ..., x_j, ..., x_n) \quad \cdots\cdots\cdots\rightarrow \quad \text{Função de procura}$$

$$\varepsilon_{q,x_j} = \frac{\partial q}{\partial x_j} \times \frac{x_j}{q} \quad \cdots\cdots\cdots\rightarrow$$

Elasticidade da procura em relação à variável x_j, que poderá ser o preço do próprio bem (elasticidade da procura preço directa), o preço de outro bem (elasticidade da procura preço cruzada) ou o rendimento do consumidor (elasticidade da procura rendimento).

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Measuring the Price Elasticity of Supply

- The **price elasticity of supply** is a measure of the responsiveness of the quantity of a good supplied to the price of that good. It is the ratio of the percent change in the quantity supplied to the percent change in the price as we move along the supply curve.
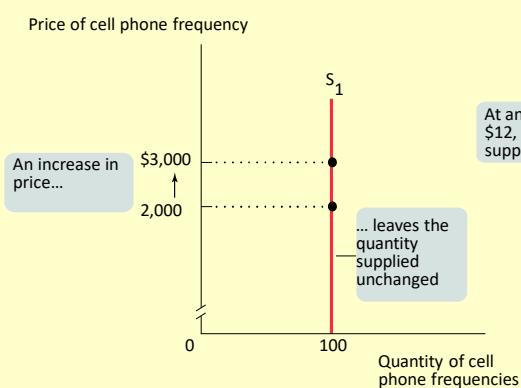
$$\text{Price elasticity of supply} = \frac{\%\ \text{change in quantity supplied}}{\%\ \text{change in price}}$$
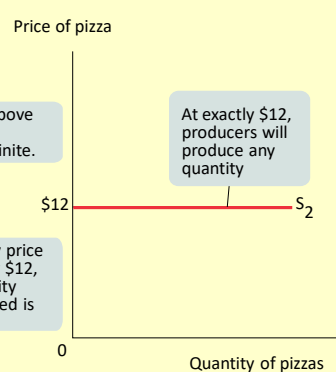
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Two Extreme Cases of Price Elasticity of Supply

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What Factors Determine the Price Elasticity of Supply?

- **The Availability of Inputs:** The price elasticity of supply tends to be large when inputs are readily available and can be shifted into and out of production at a relatively low cost. It tends to be small when inputs are difficult to obtain.

- **Time:** The price elasticity of supply tends to grow larger as producers have more time to respond to a price change. This means that the long-run price elasticity of supply is often higher than the short-run elasticity.

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No domínio contínuo

$q = g_S(x_1, x_2, ..., x_j, ..., x_n)$ ·······················› Função de oferta

$$\varepsilon_{q,x_j} = \frac{\partial q}{\partial x_j} \times \frac{x_j}{q}$$ ····················› Elasticidade da oferta em relação à variável x_j, que, normalmente, é o preço do próprio bem (elasticidade da oferta preço).

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The End of Chapter 6

Coming attraction:
Chapter 7:
Taxes

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