CHAPTER 5

Elasticity

What you will learn in this chapter:

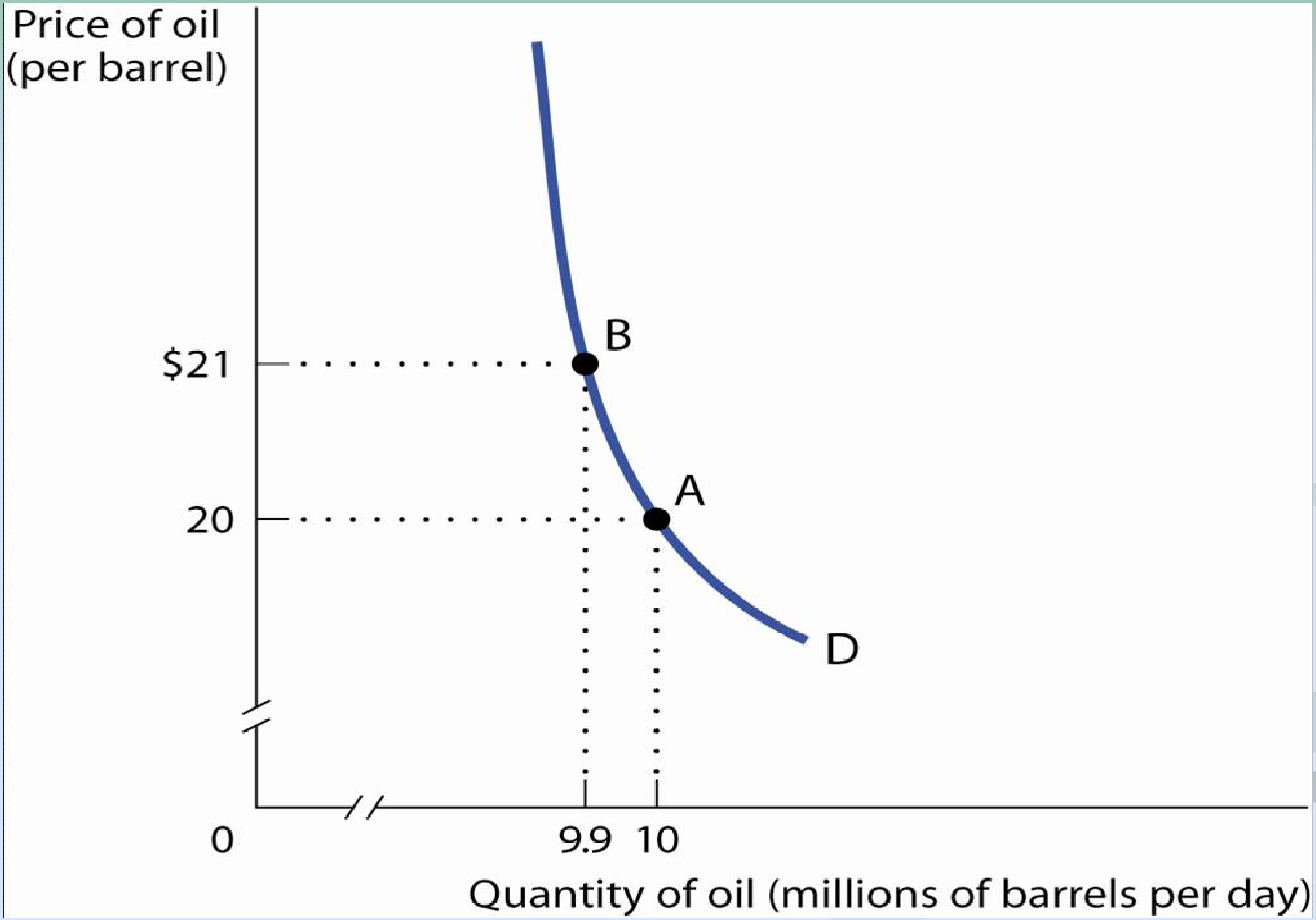
- Definition of **elasticity**
  - **price elasticity of demand**
  - **income elasticity of demand and**
  - **price elasticity of supply**
- Factors that influence the size of elasticities
- How elasticity affects the incidence of a tax, and who bears its burden?

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.

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

The World Demand for Oil



Using the Midpoint Method to Calculate Elasticities

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

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

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

Some Estimated Price Elasticities of Demand

Good	Price elasticity
Inelastic demand	
Eggs	0.1
Beef	0.4
Stationery	0.5
Gasoline	0.5
Elastic demand	
Housing	1.2
Restaurant meals	2.3
Airline travel	2.4
Foreign travel	4.1

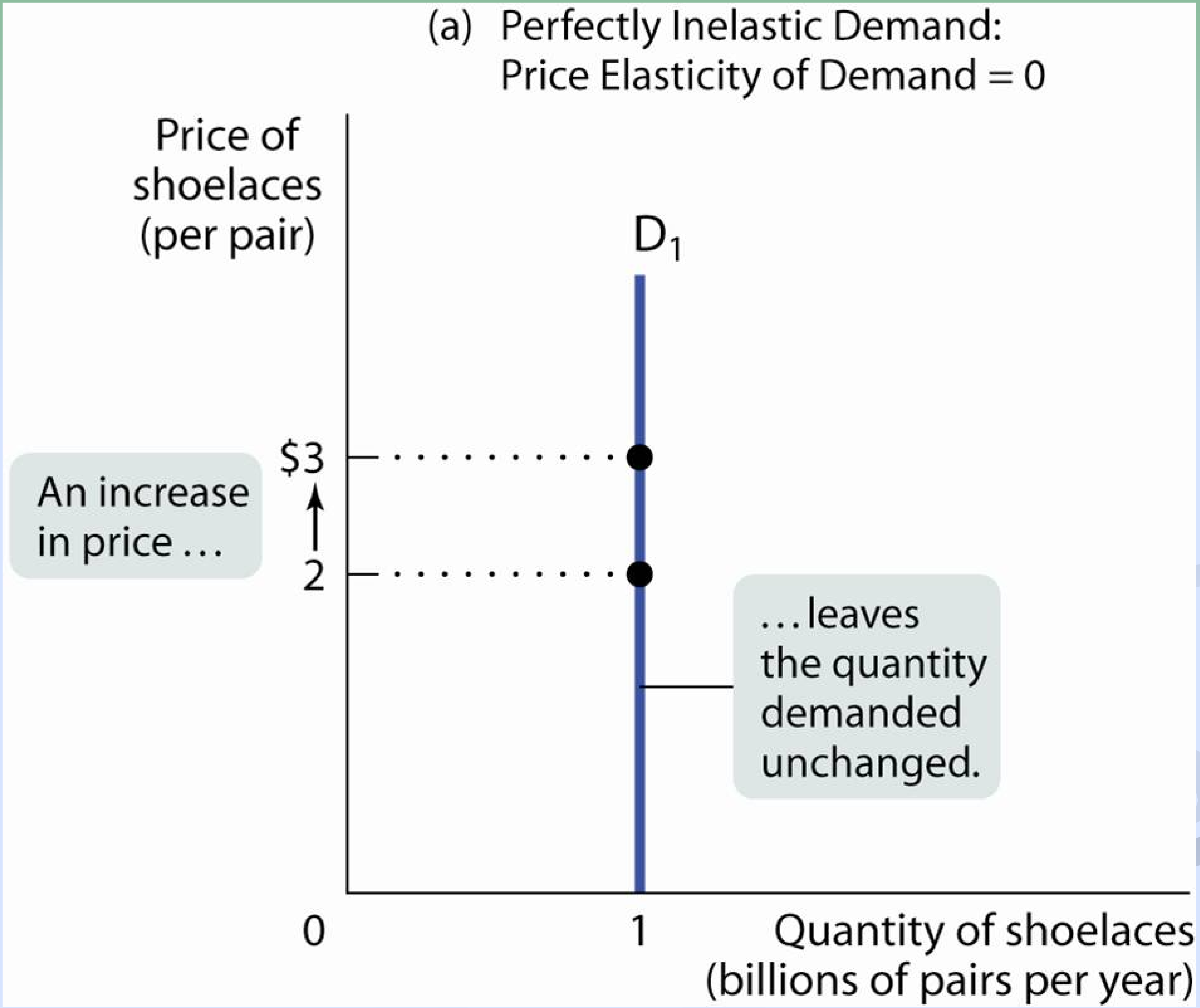
Price elasticity of demand < 1

Price elasticity of demand > 1

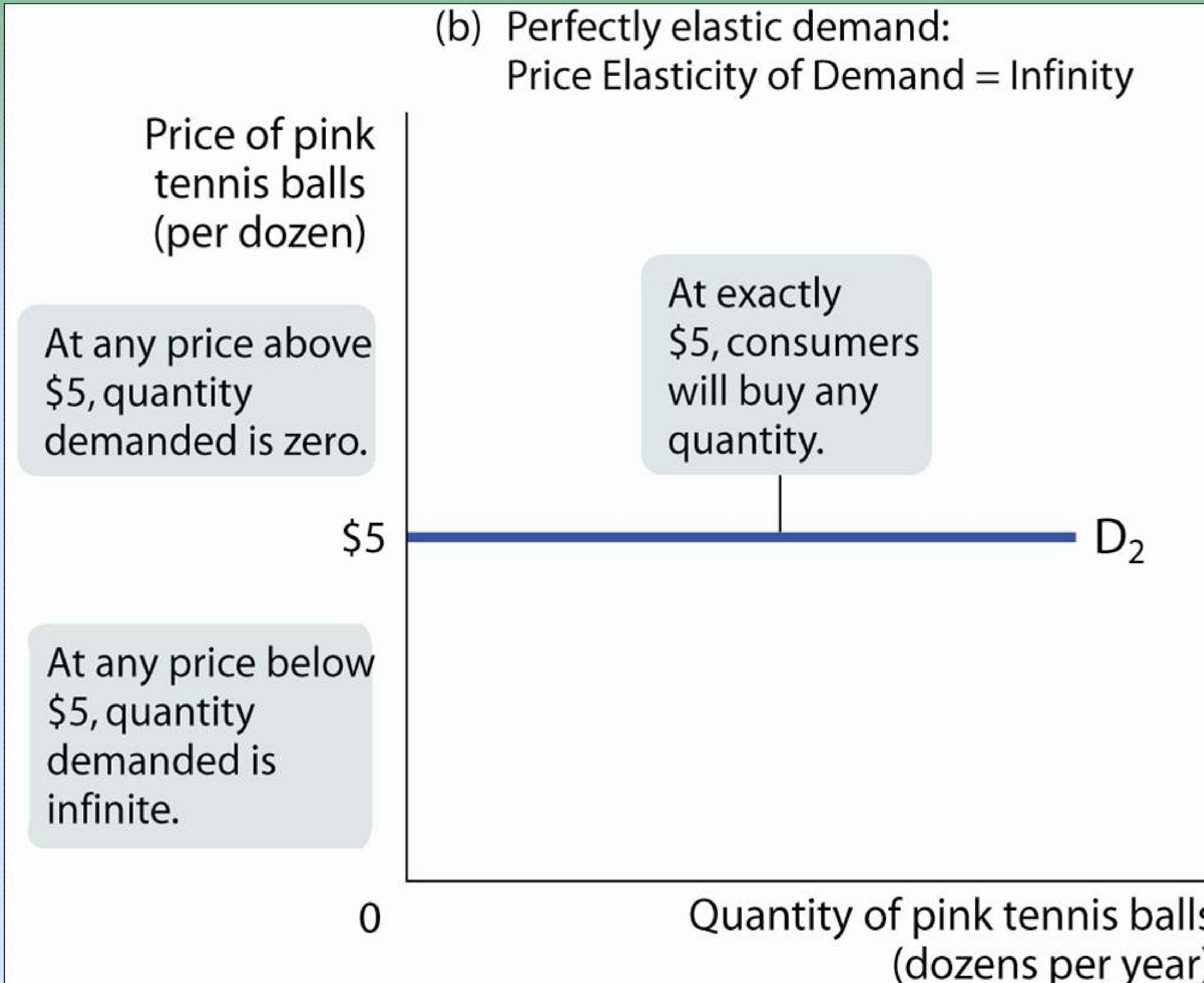
Interpreting the Price Elasticity of Demand: How Elastic Is Elastic?

Two Extreme Cases of Price Elasticity of Demand

- perfectly inelastic
- perfectly elastic



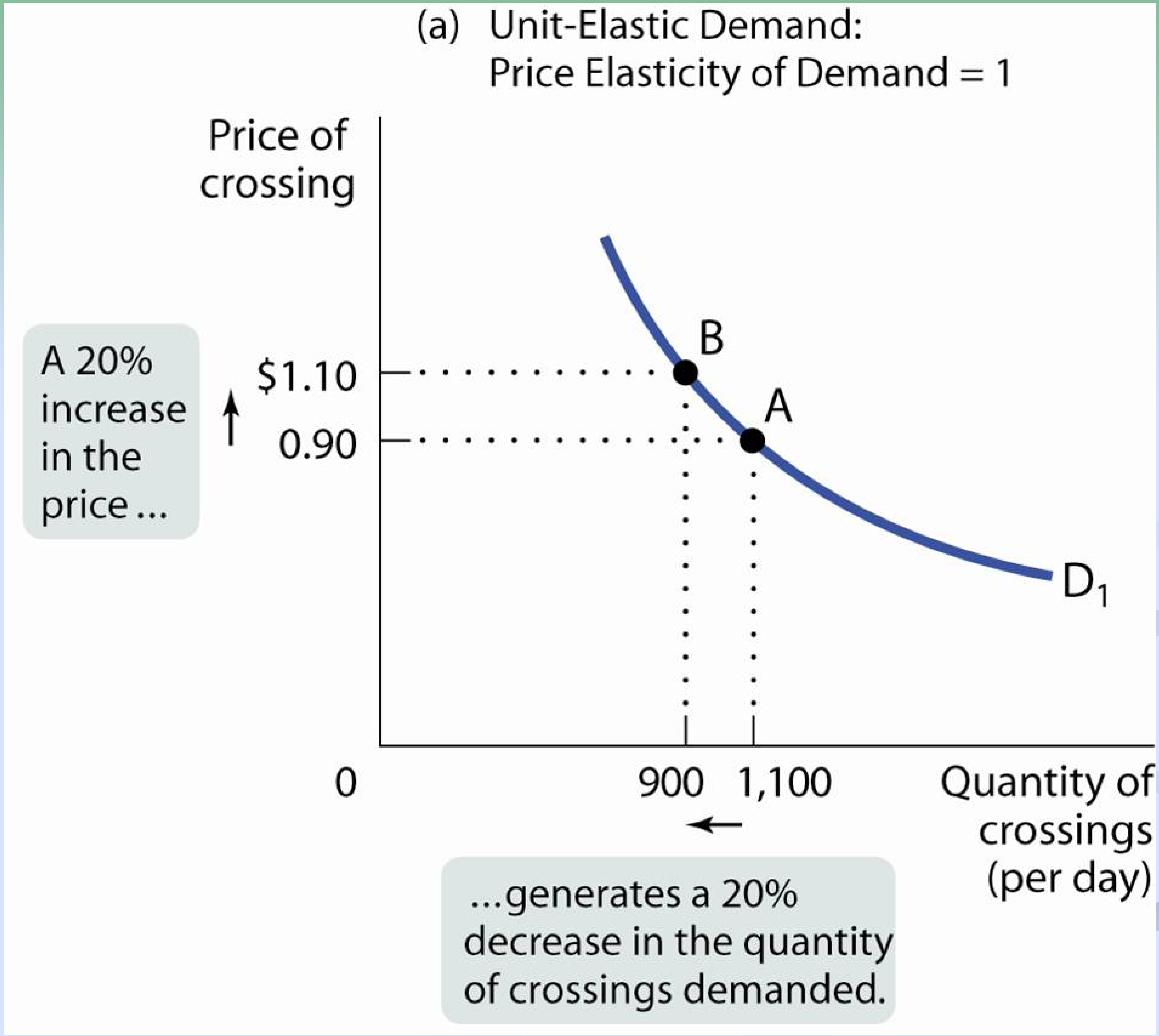
(a) Perfectly Inelastic Demand:
Price Elasticity of Demand = 0
Price of shoelaces (per pair)
D1
$3
An increase in price …
2
… leaves the quantity demanded unchanged.
0
1
Quantity of shoelaces (billions of pairs per year)

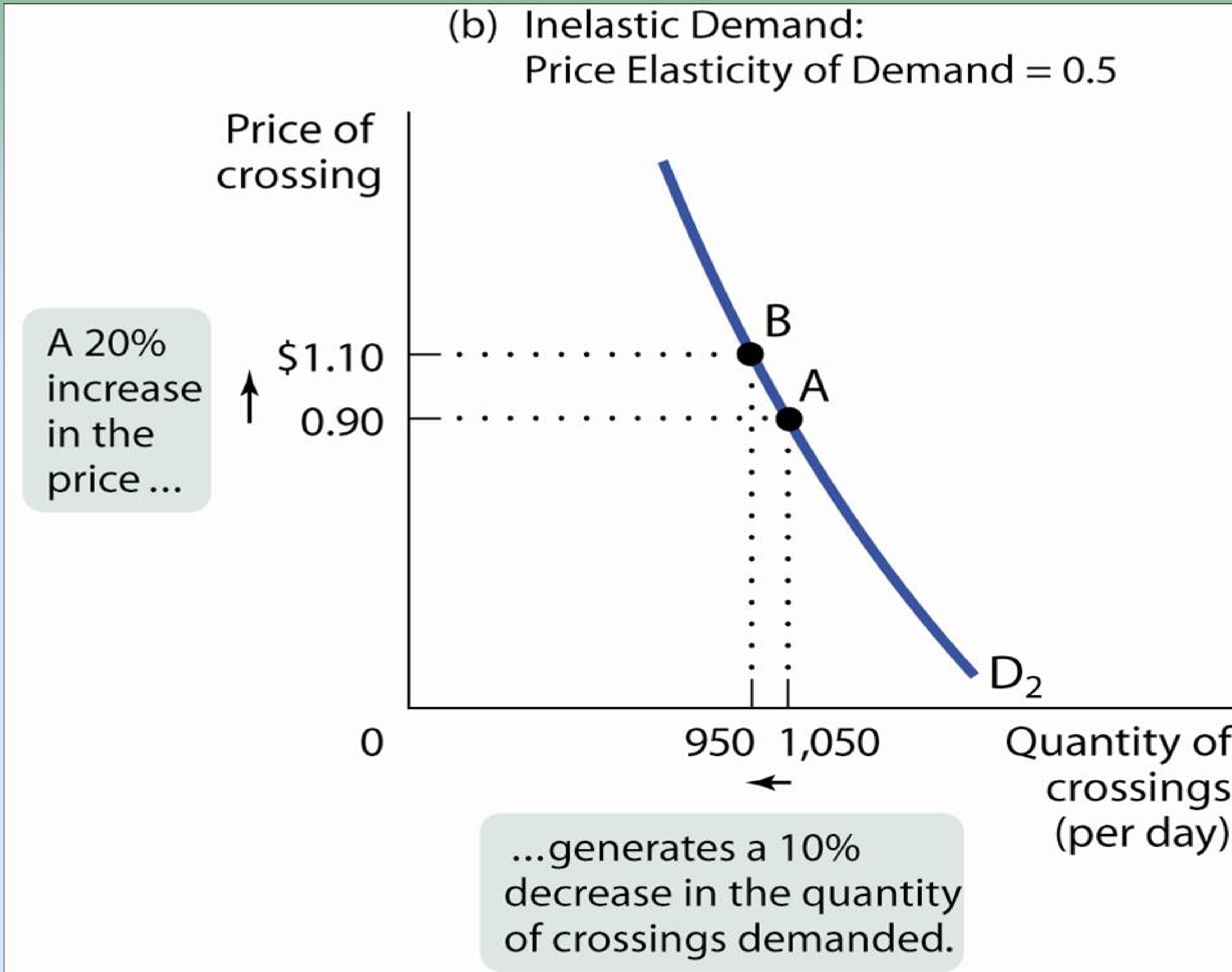

(b) Perfectly elastic demand:
Price Elasticity of Demand = Infinity
Price of pink tennis balls (per dozen)
At any price above $5, quantity demanded is zero.
At exactly $5, consumers will buy any quantity.
$5
D2
At any price below $5, quantity demanded is infinite.
0
Quantity of pink tennis balls (dozens per year)

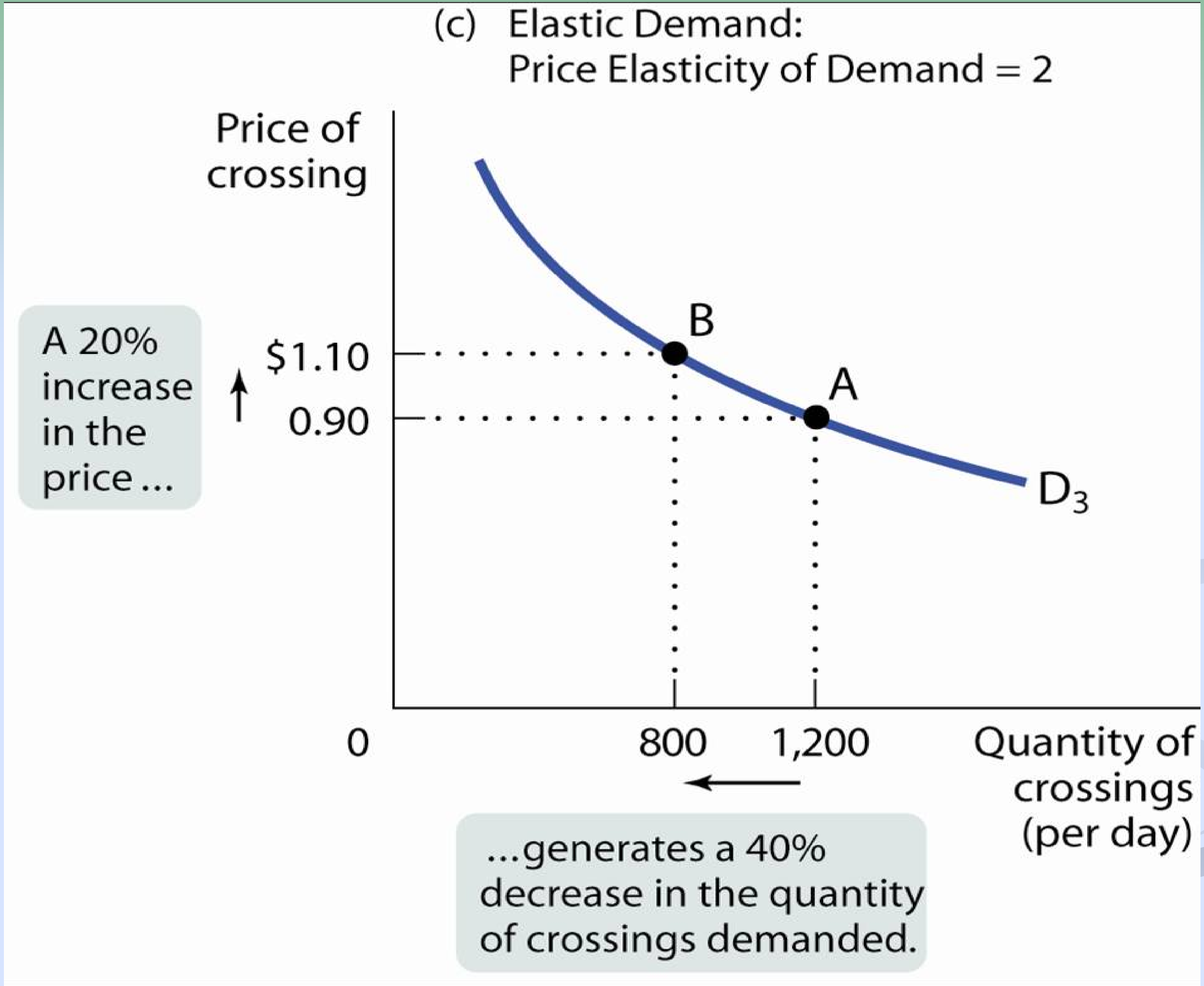
Interpreting the Price Elasticity of Demand: How Elastic Is Elastic?

Demand is:

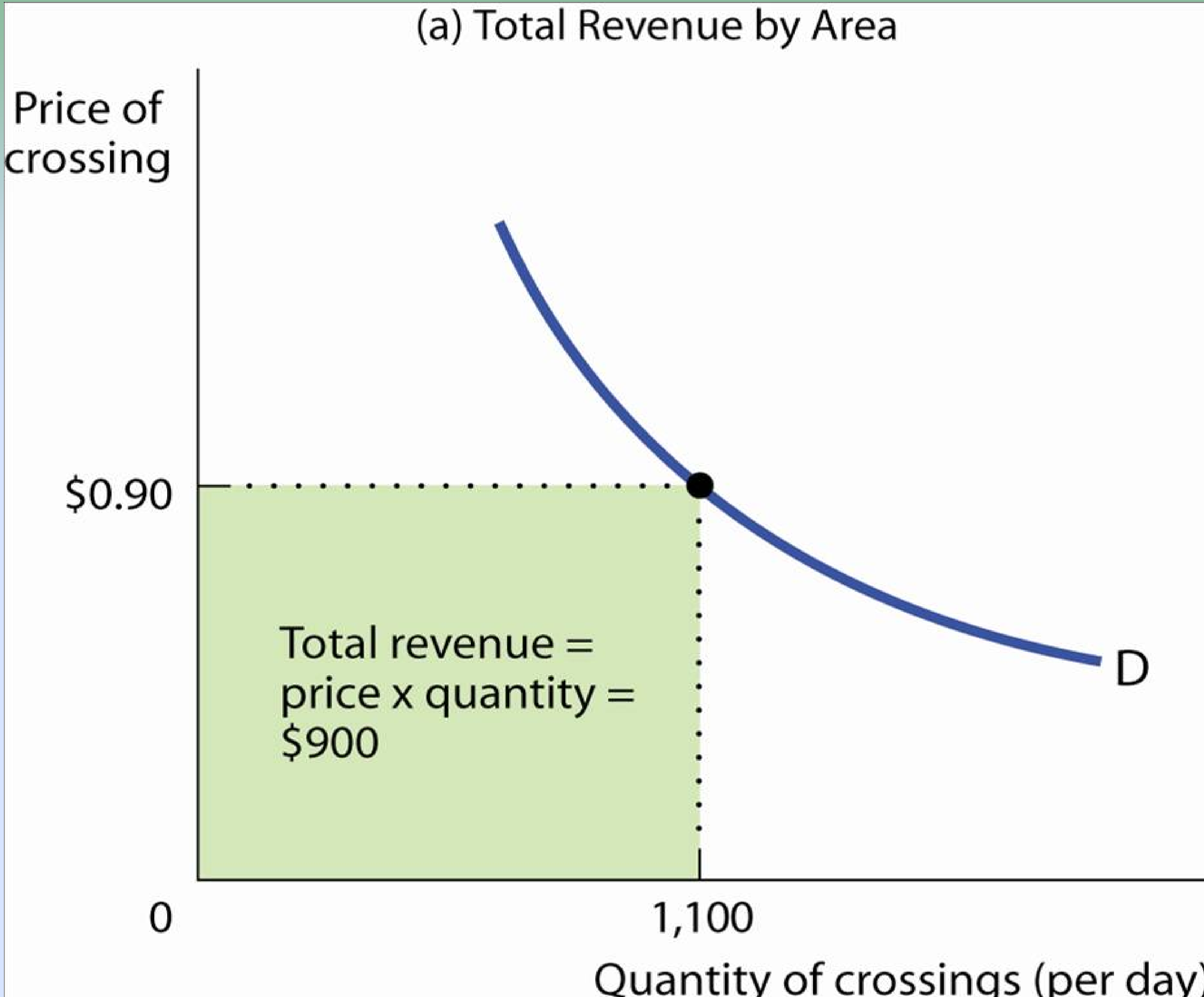
- **elastic** if the price elasticity of demand is greater than 1,
- **inelastic** if the price elasticity of demand is less than 1, and
- **unit-elastic** if the price elasticity of demand is exactly 1.


(a) Unit-Elastic Demand:
Price Elasticity of Demand = 1
Price of crossing
A 20% increase in the price ...
$1.10
0.90
B
A
D1
0
900
1,100
Quantity of crossings (per day)
...generates a 20% decrease in the quantity of crossings demanded.


(b) Inelastic Demand:
Price Elasticity of Demand = 0.5
Price of crossing
A 20% increase in the price ...
$1.10
0.90
B
A
D2
0
950
1,050
Quantity of crossings (per day)
...generates a 10% decrease in the quantity of crossings demanded.

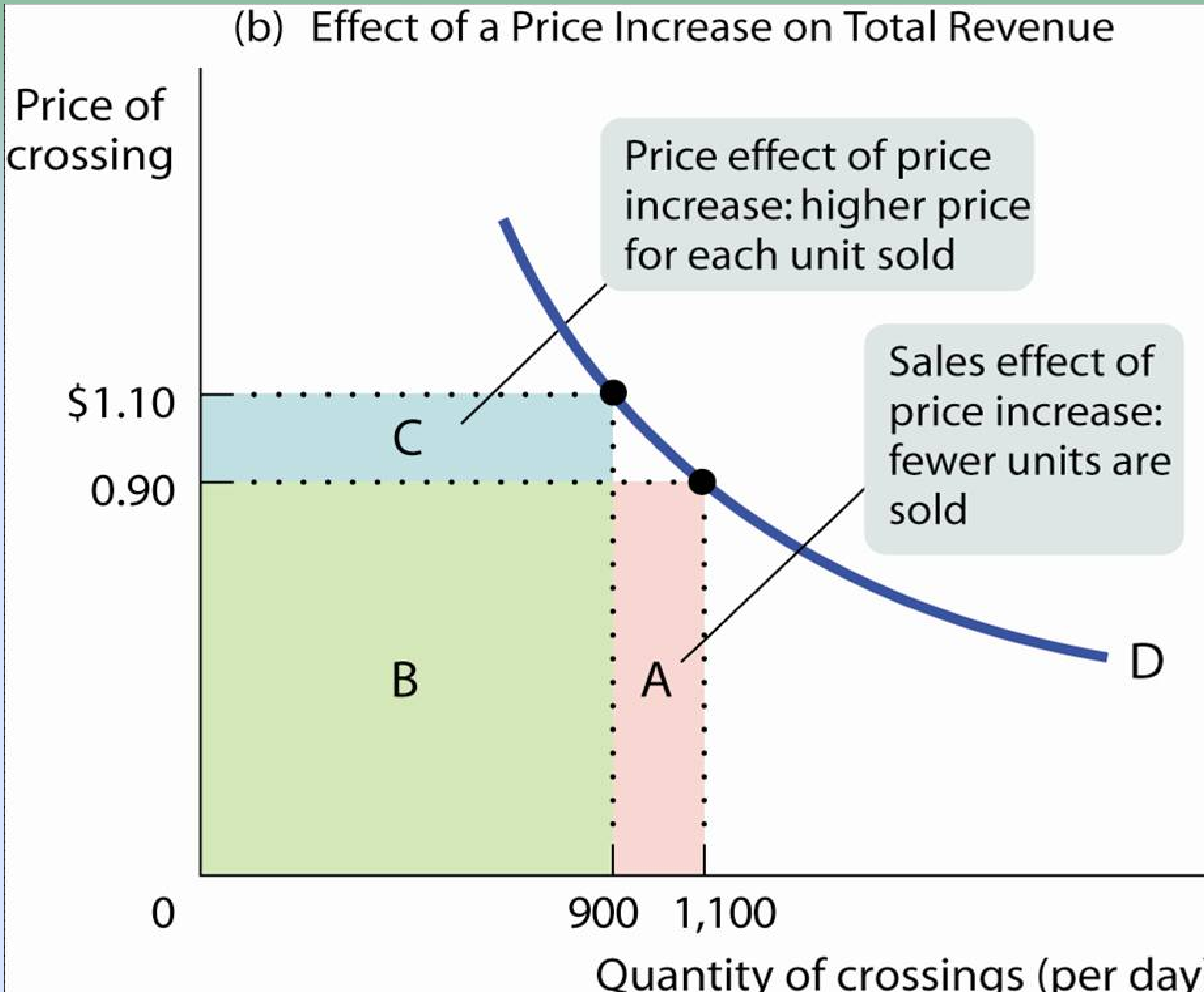


(c) Elastic Demand:
Price Elasticity of Demand = 2
Price of crossing
A 20% increase in the price ...
$1.10
0.90
B
A
D3
0
800
1,200
Quantity of crossings (per day)
...generates a 40% decrease in the quantity of crossings demanded.


(a) Total Revenue by Area
Price of crossing
$0.90
Total revenue =
price x quantity =
$900
D
0
1,100
Quantity of crossings (per day)

Elasticity and Total Revenue

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


(b) Effect of a Price Increase on Total Revenue
Price of crossing
Price effect of price increase: higher price for each unit sold
Sales effect of price increase: fewer units are sold
$1.10
0.90
C
B
A
D
0
900
1,100
Quantity of crossings (per day)

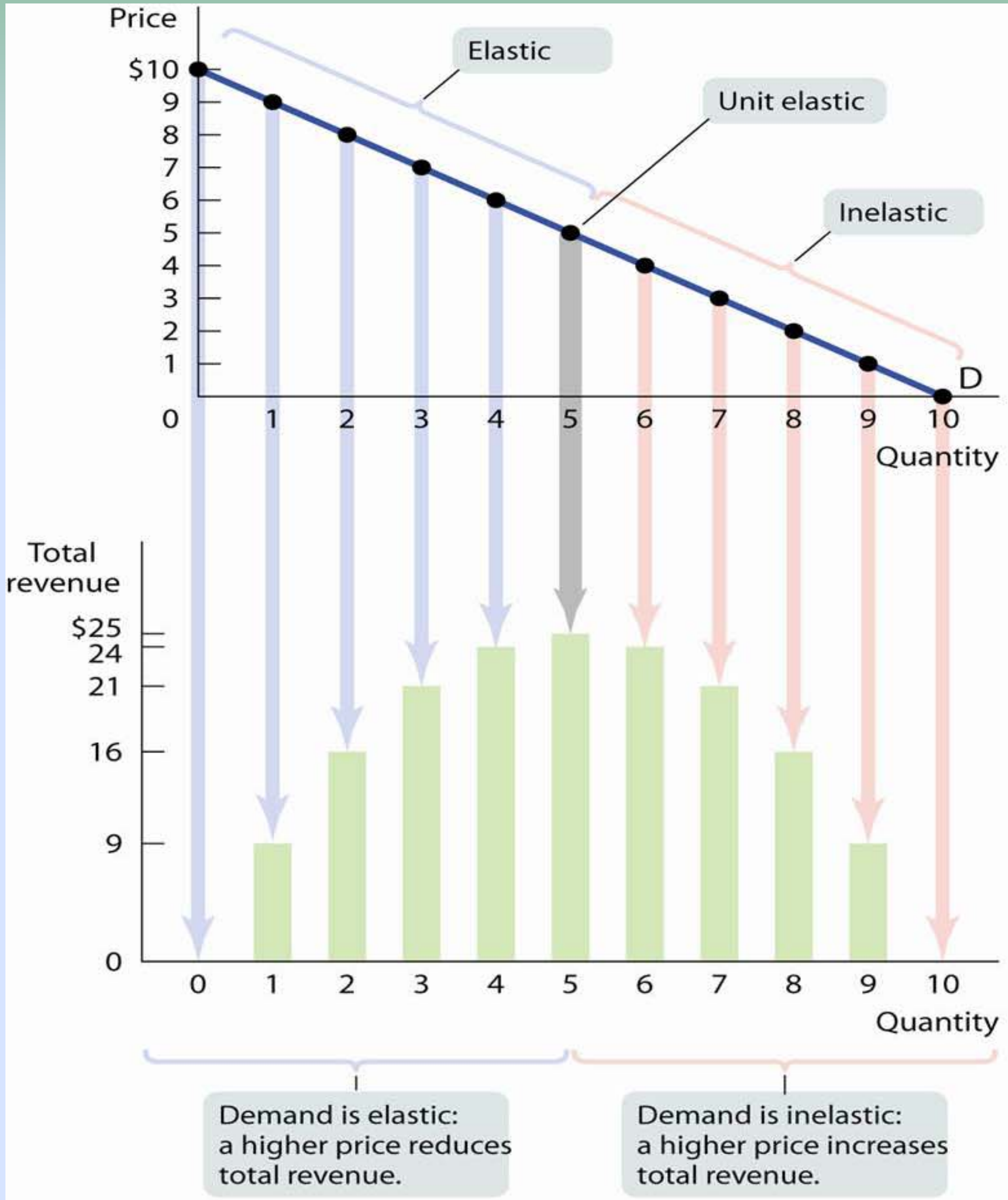
Elasticity and Total Revenue

- If demand for a good is ***elastic***, an increase in price reduces total revenue. (Sales effect > Price effect).

- If demand for a good is ***inelastic***, a higher price increases total revenue. (Price effect > Sales effect).

- If demand for a good is ***unit-elastic***, an increase in price does not change total revenue. (Sales effect = Price effect).

The Price Elasticity of Demand Changes Along the Demand Curve



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

What Factors Determine the Price Elasticity of Demand?

- Whether Close Substitutes Are Available
- Whether the Good Is a Necessity or a Luxury
- Time

Other Demand Elasticities

Cross-Price Elasticity

- Substitutes
- Complements

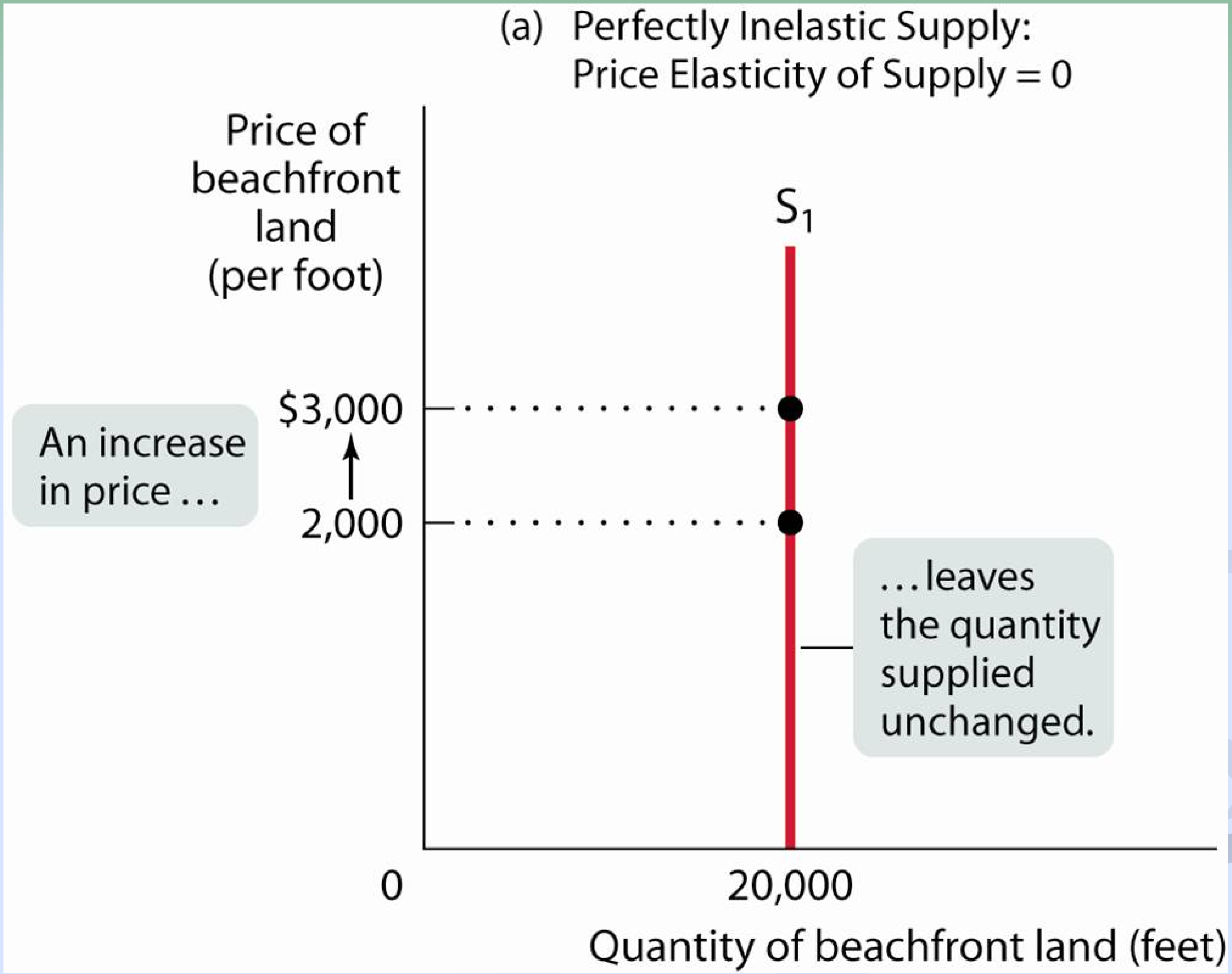
Income elasticity of demand

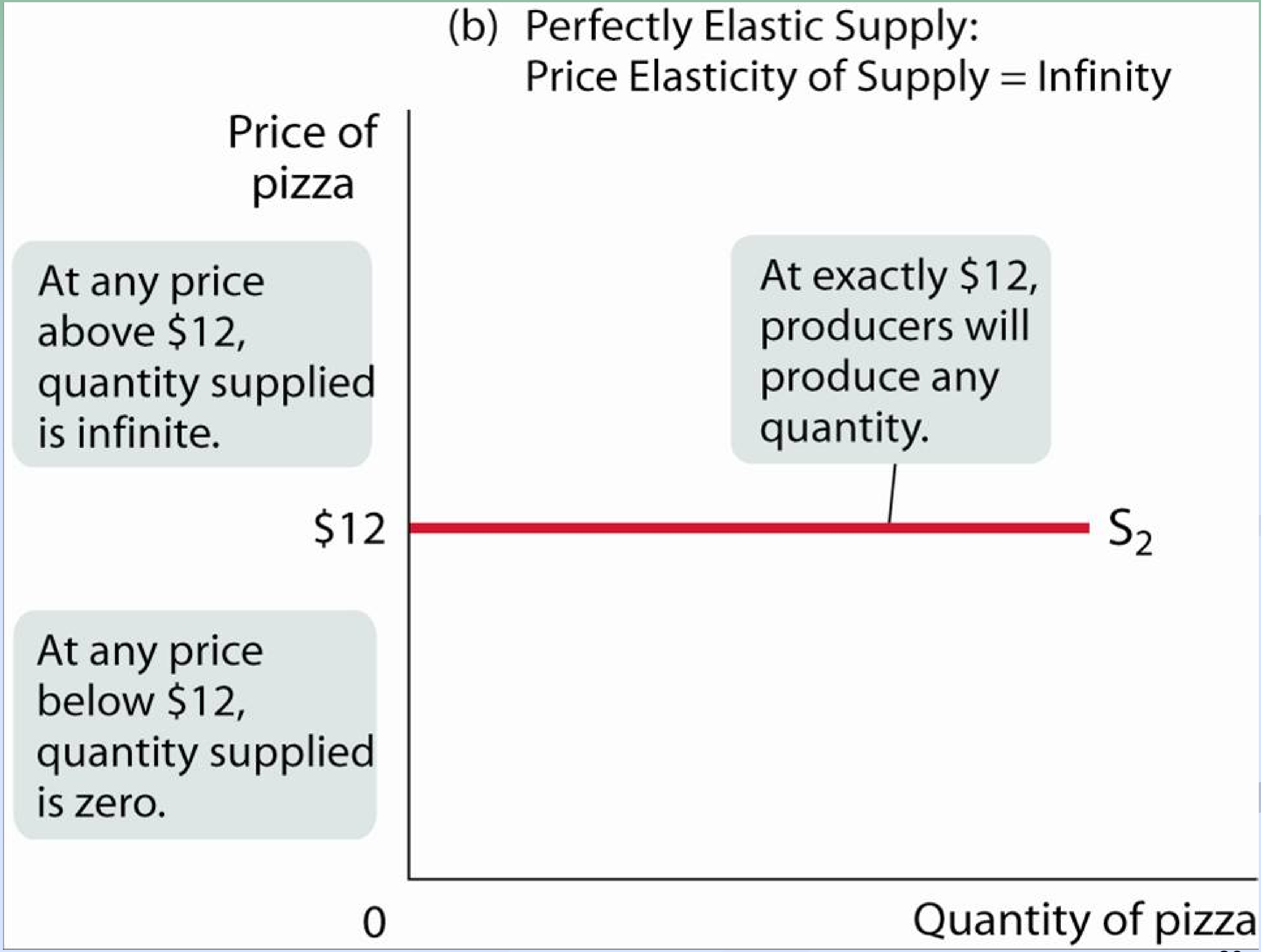
- Normal Goods
- Inferior Goods

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.

$$\text{Price elasticity of supply} = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$


(a) Perfectly Inelastic Supply:
Price Elasticity of Supply = 0
Price of beachfront land (per foot)
S_1
$3,000
2,000
An increase in price . . .
. . . leaves the quantity supplied unchanged.
0
20,000
Quantity of beachfront land (feet)

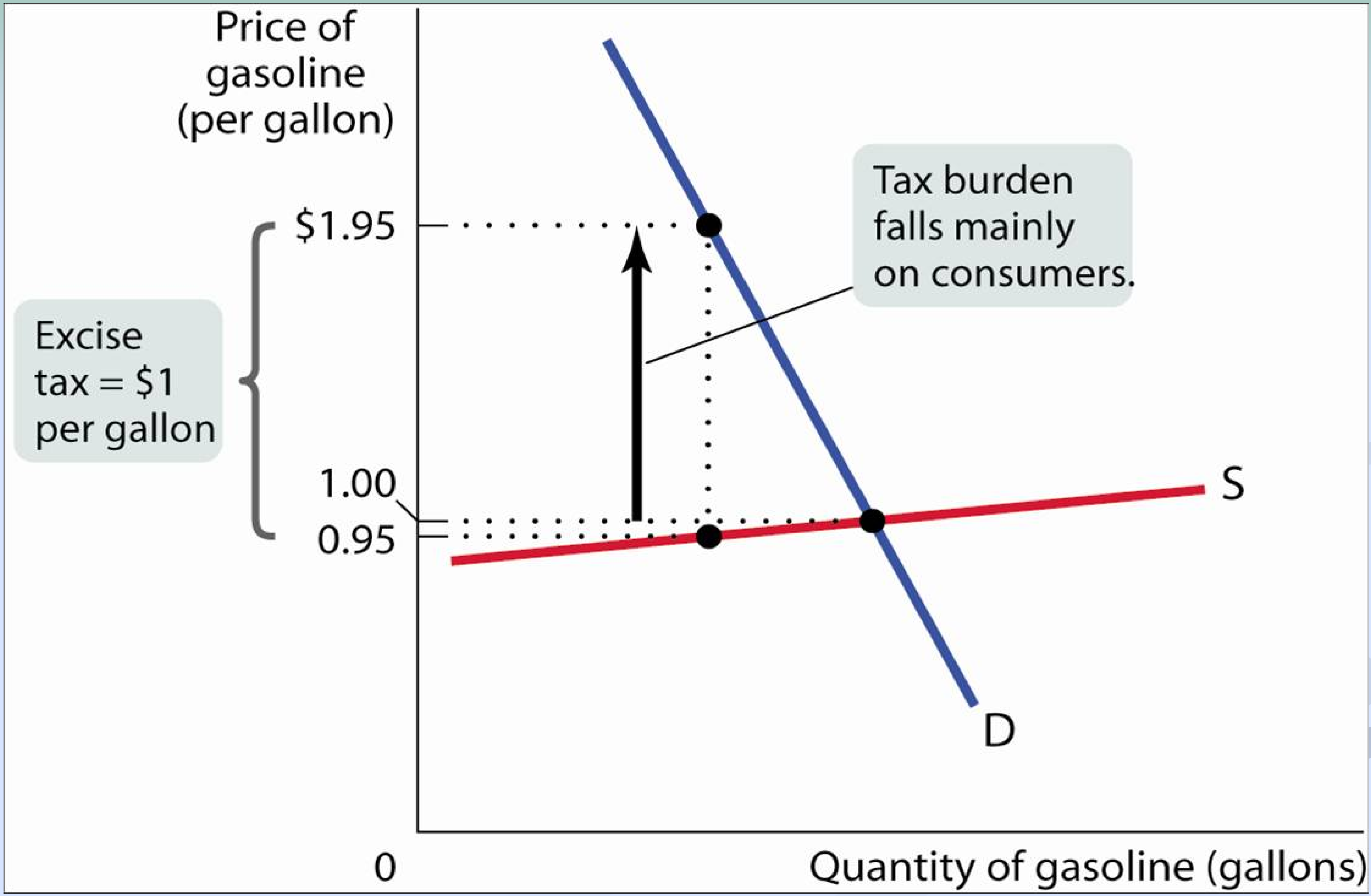

(b) Perfectly Elastic Supply:
Price Elasticity of Supply = Infinity
Price of pizza
At any price above $12, quantity supplied is infinite.
At exactly $12, producers will produce any quantity.
$12
S_2
At any price below $12, quantity supplied is zero.
0
Quantity of pizza

Factors that Determine the Price Elasticity of Supply

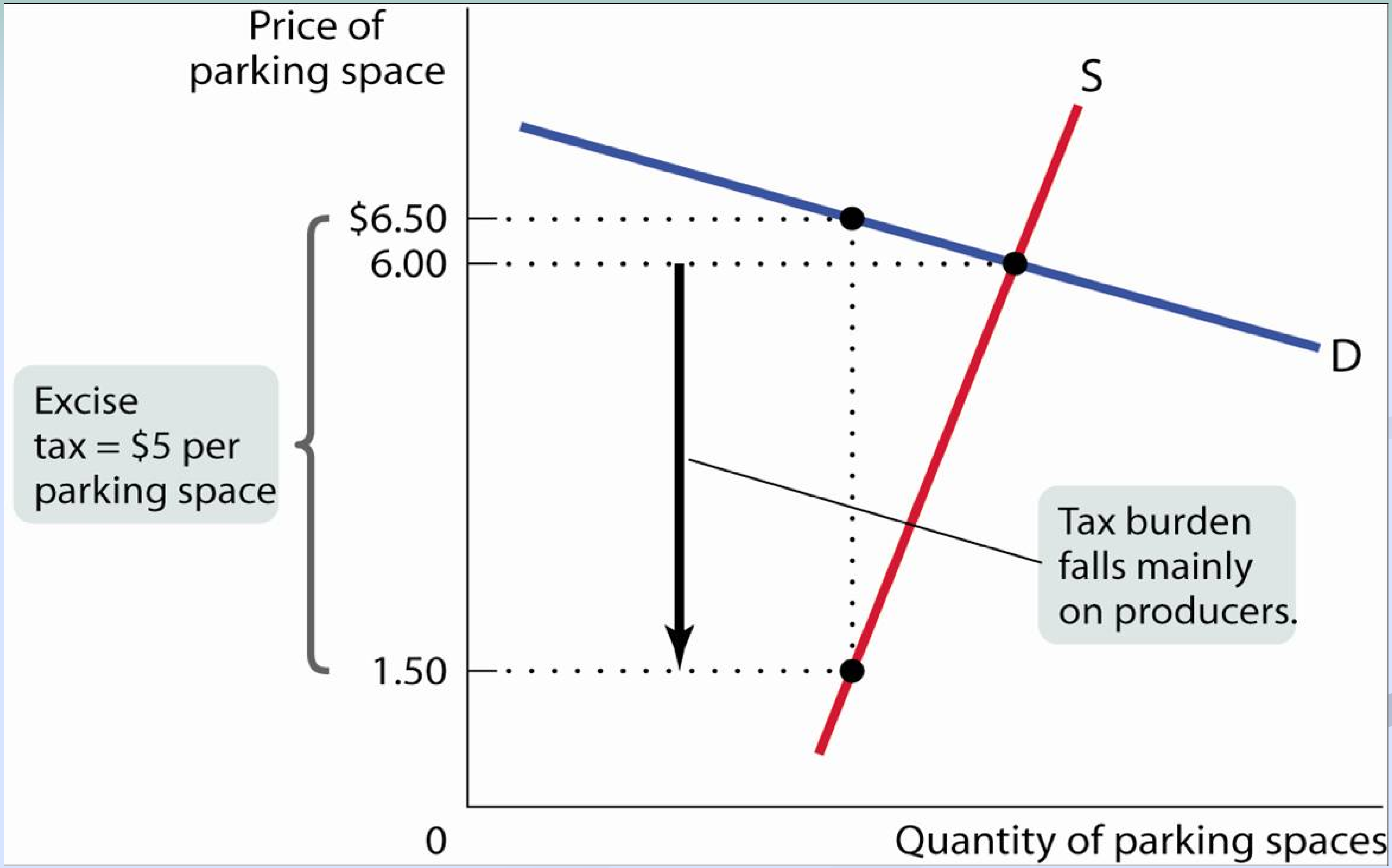
- **The Availability of Inputs**

- **Time**

Elasticity determines tax incidence:
An Excise Tax Paid Mainly by Consumers



Elasticity determines tax incidence:
An Excise Tax Paid Mainly by Producers



The End of Chapter 5

Coming attraction:

Chapter 6:
Consumer and Producer Surplus