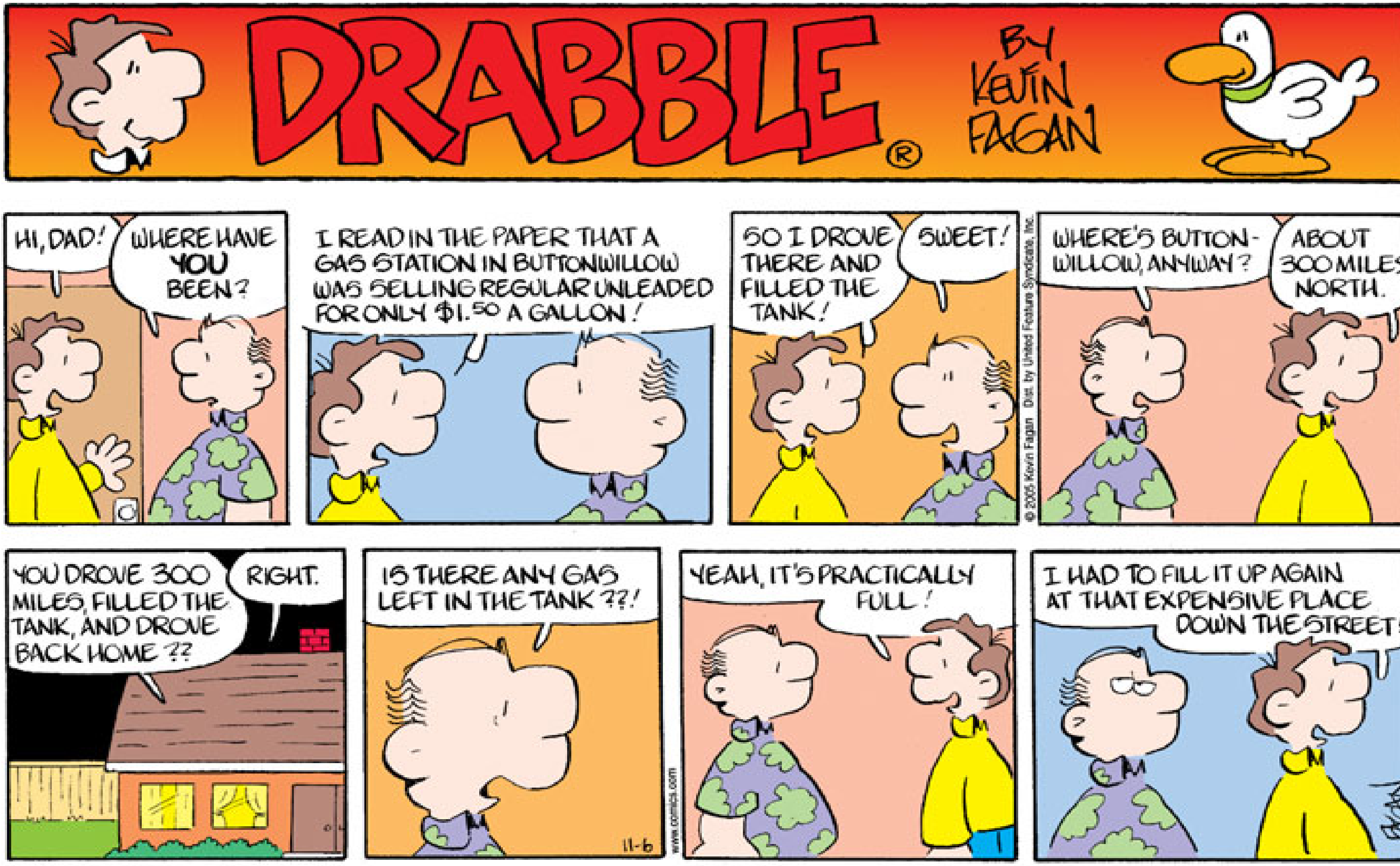
Ch 4 - Elasticity



ECON 1B

CSUS

Elasticity of Demand

- *Elasticity of Demand* (def.) - refers to the flexibility of consumer's desires for a product.
- What is your response (decrease in quantity demanded) if the price of Pepsi doubles?
- What is your response if the price of Student parking doubles?
- What is your response if the price of your life-saving medication triples?
- What is your response if the price of french fries is cut in half?

Determinants of Price Elasticity of Demand

- **Existence of substitutes**
  - The closer the substitutes and the more substitutes there are, the more elastic is demand.
- **Share of the budget**
  - The greater the share of the consumer’s total budget spent on a good, the more elastic is demand.
- **The length of time allowed for adjustment**
  - The longer any price change persists, the more elastic is demand. Price elasticity is greater in the long-run than in the short-run, and in the short-run than right now.

Time and the Adjustment Process

- The response of consumers and producers to a change in market conditions will become more pronounced as time passes. This occurs because, with time, consumers and producers are able to find substitutes.

- Consider your demand for gasoline.
  - *Immediate-run* (def.) - there is no time to adjust.
  - *Short-run* (def.) - time to adjust, but only partially.
  - *Long-run* (def.) - time to adjust fully.

Calculating Elasticity

$$E_p = \frac{\%\text{ change in Q}}{\%\text{ change in P}}$$

or using the midpoint formula

$$E_p = \frac{\text{change in } Q}{(Q_1 + Q_2)/2} \bigg/ \frac{\text{change in } P}{(P_1 + P_2)/2}$$

Elasticity Example

Price	Quantity Demanded
$12	20
$6	30

We can calculate price elasticity of demand.

Example:

The Price Elasticity of Demand

$$E_p = \frac{\Delta Q}{(Q_1 + Q_2)/2} \bigg/ \frac{\Delta P}{(P_1 + P_2)/2}$$

$$E_p = \frac{\dfrac{20-30}{(30 + 20)/2}}{\dfrac{\$12-\$6}{(\$6 + \$\ 12)/2}}$$

Example:
The Price Elasticity of Demand

$$E_p = \frac{-10}{25} \bigg/ \frac{\$6}{\$9} = -0.6$$

- **Interpretation:**
  - Since -0.6 is between 0 and -1, this tells us that buyers are relatively inelastic meaning buyers are not very responsive to the change in price

Suppose a manager raises the price of bottled water from $3.00 to $5.00 and they find that consumption drops from 1000 to 400 bottles per week. Is the price elasticity of demand for Hotel H_2O elastic or inelastic?

Example:

The Price Elasticity of Demand for Hotel Bottled Water

$$E_p = \frac{\Delta Q}{(Q_1 + Q_2)/2} \Big/ \frac{\Delta P}{(P_1 + P_2)/2}$$

$$E_p = \frac{\dfrac{400-1000}{(1000 + 400)/2}}{\dfrac{\$5-\$3}{(\$3 + \$\ 5)/2}}$$

Example:

The Price Elasticity of Demand for Hotel Bottled Water

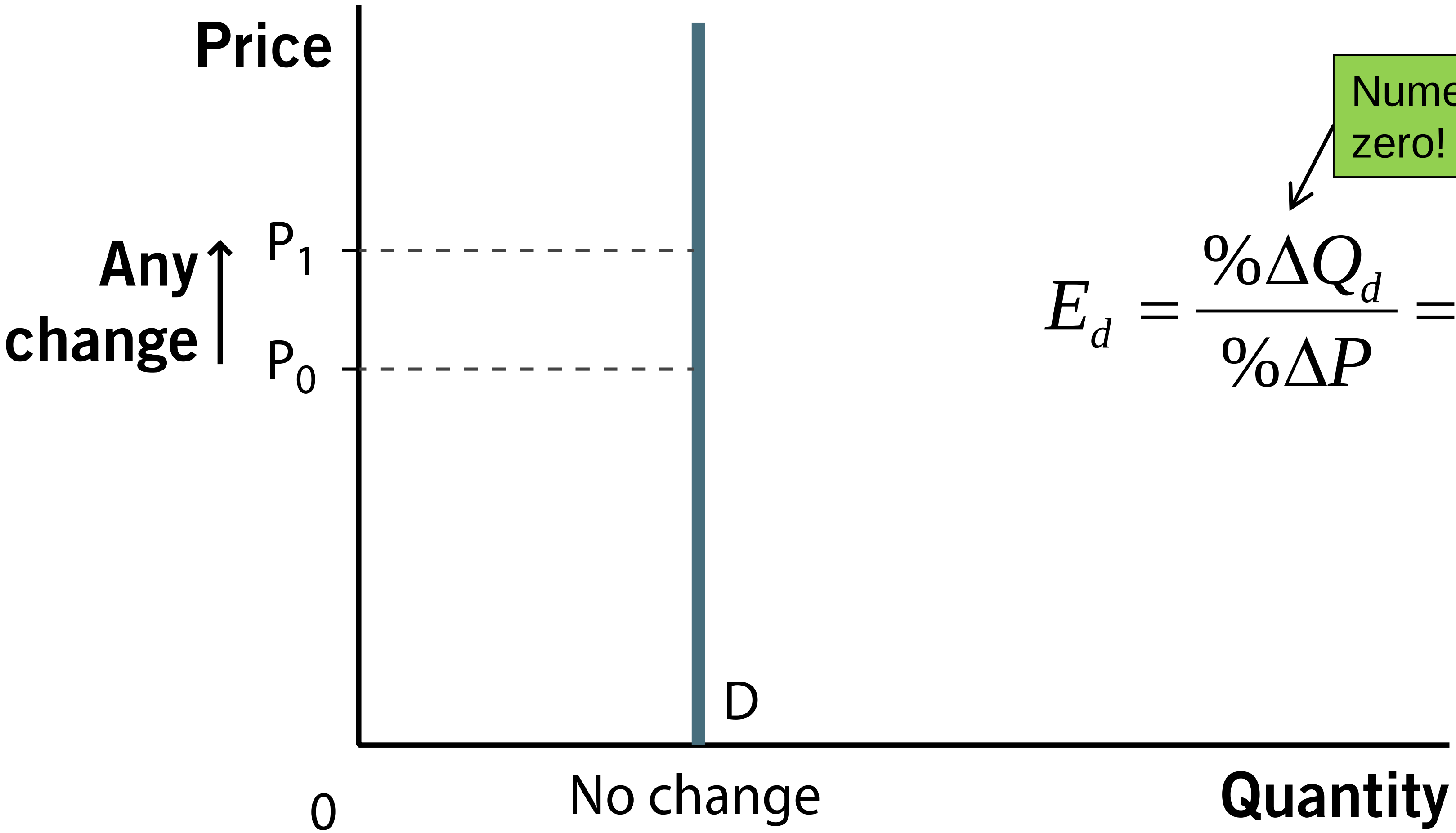
$$E_p = \frac{-600}{700} \bigg/ \frac{\$2}{\$4} = -1.71$$

- **Interpretation:**
  - Since -1.71 is less than -1, this tells us that buyers are relatively elastic meaning buyers are relatively responsive to the change in price

Graphing Price Elasticity

- If demand is relatively elastic
  - We are relatively sensitive to price changes
  - The demand curve is relatively flatter
- If demand is relatively inelastic
  - We are relatively insensitive to price changes
  - The demand curve is relatively steeper

Graphing Price Elasticity

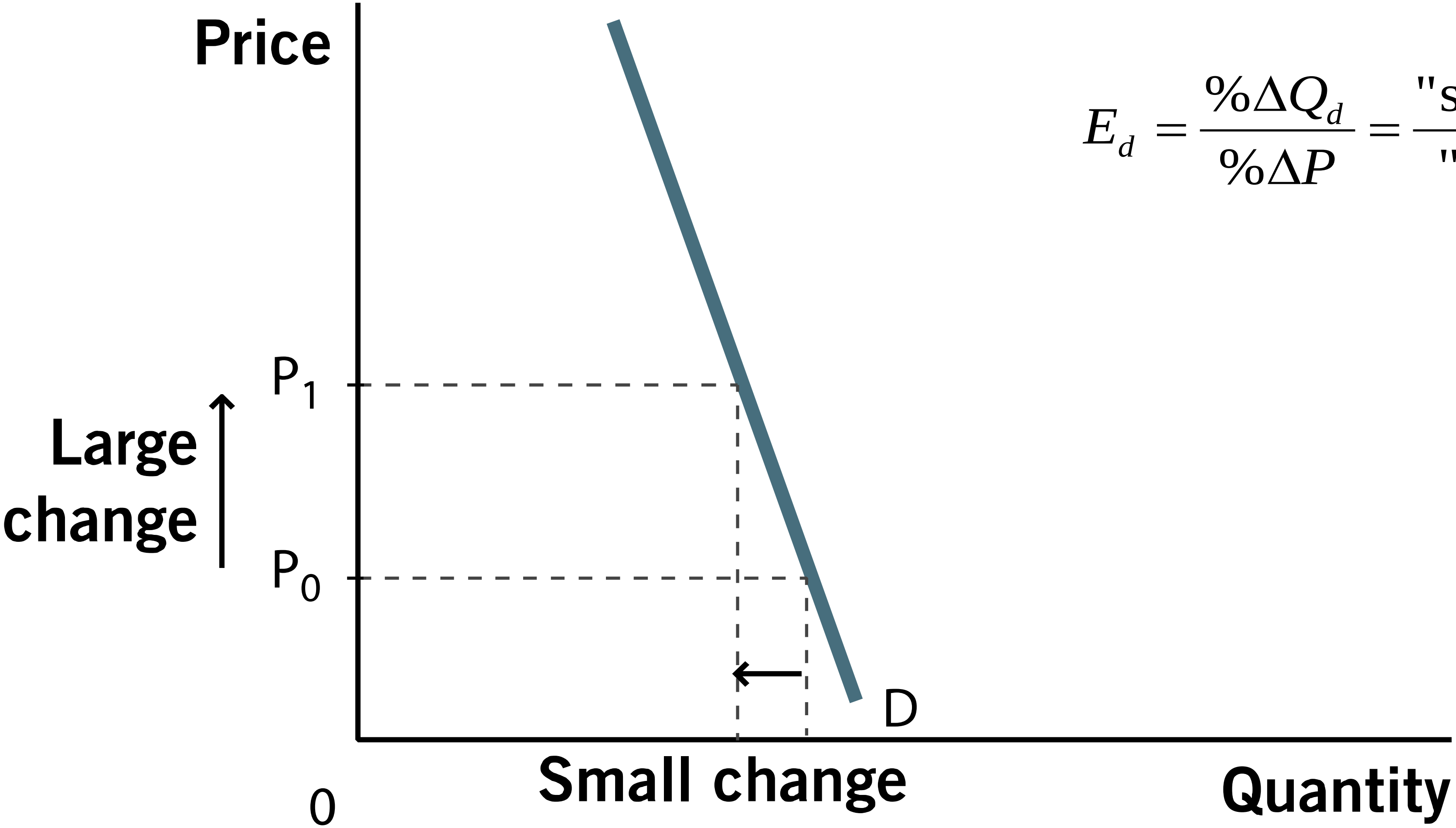


(a) Perfectly Inelastic

Numerator is zero!

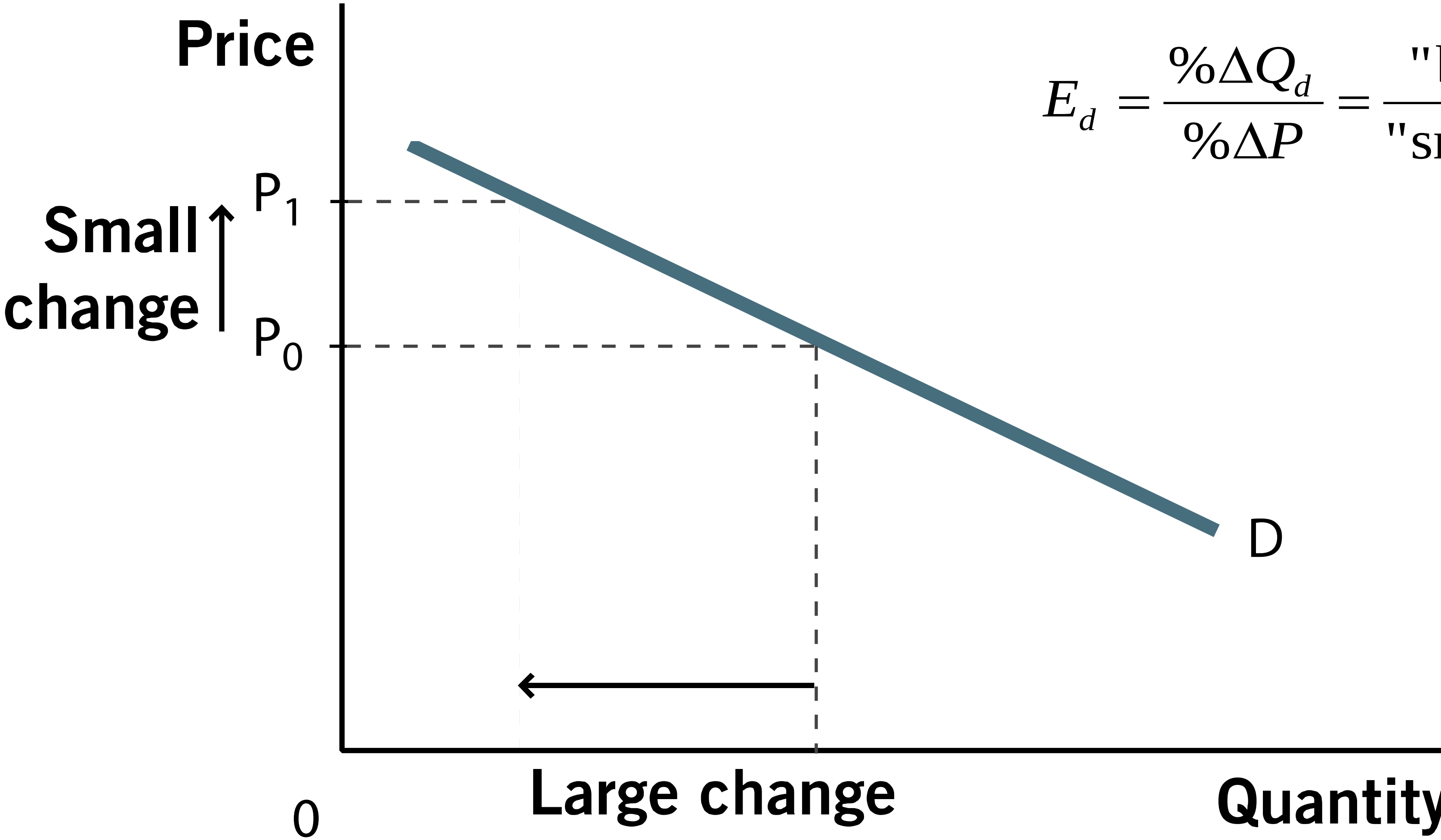
$$E_d = \frac{\%\Delta Q_d}{\%\Delta P} = 0$$

Graphing Price Elasticity



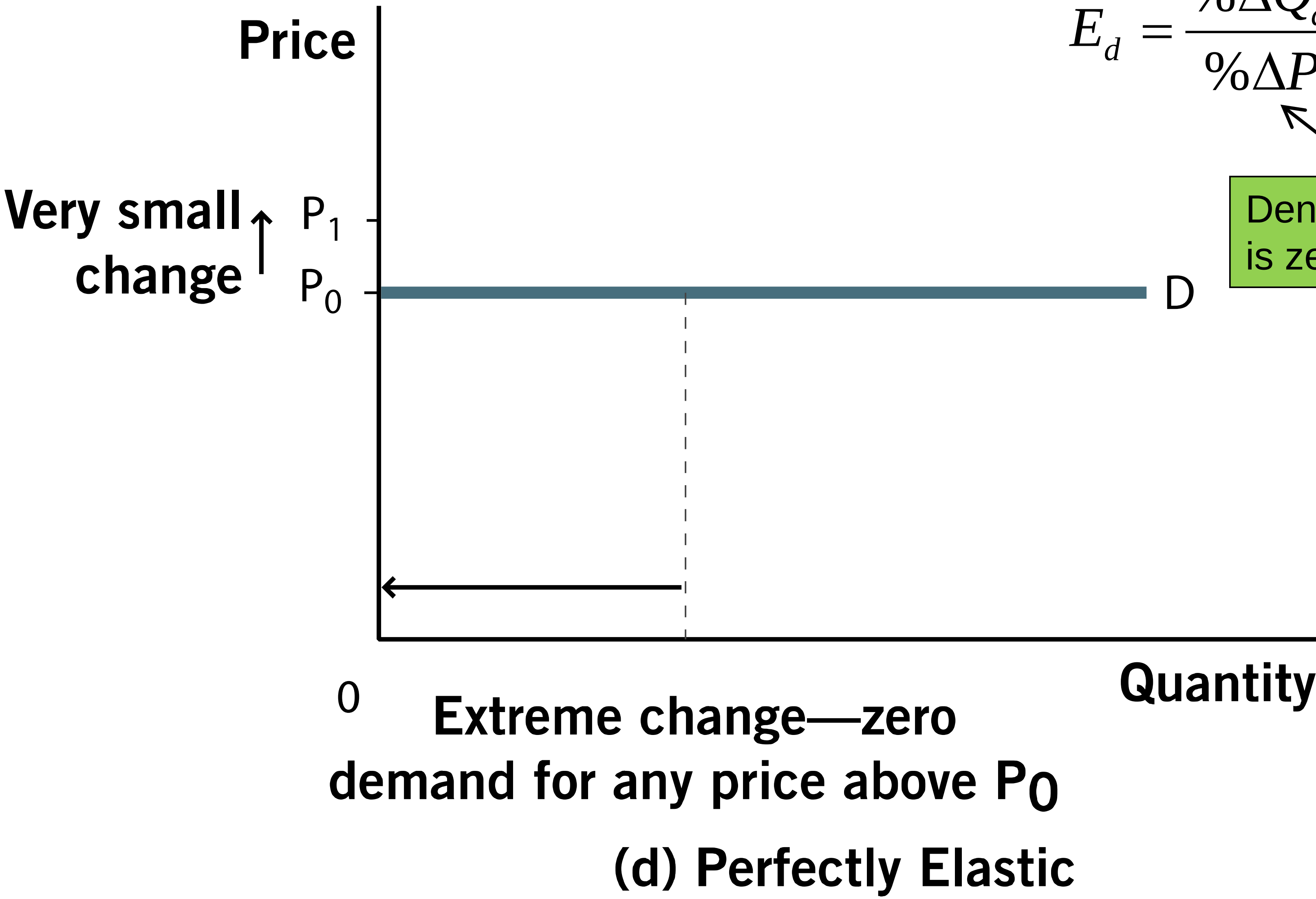
$$E_d = \frac{\%\Delta Q_d}{\%\Delta P} = \frac{\text{"small"}}{\text{"big"}}$$

Graphing Price Elasticity



$$E_d = \frac{\%\Delta Q_d}{\%\Delta P} = \frac{\text{"big"}}{\text{"small"}}$$

Graphing Price Elasticity



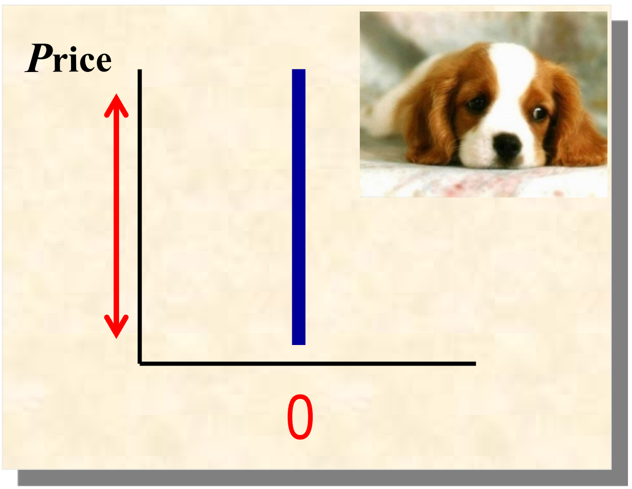
$$E_d = \frac{\%\Delta Q_d}{\%\Delta P} = -\infty$$

Denominator is zero!

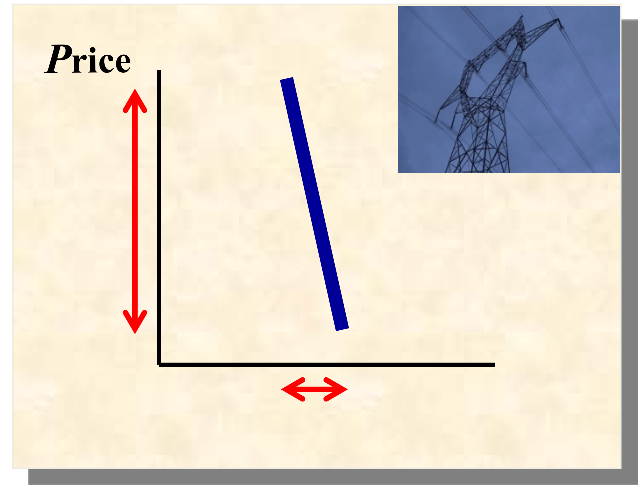
Fast Fact: 70% of pet owners would pay any amount of $$ to save their pal's life!

Elasticity of Demand

- *Perfectly inelastic*



- *Relatively inelastic*



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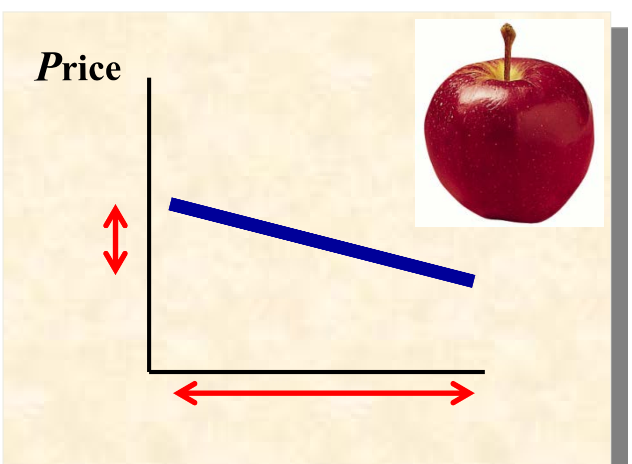
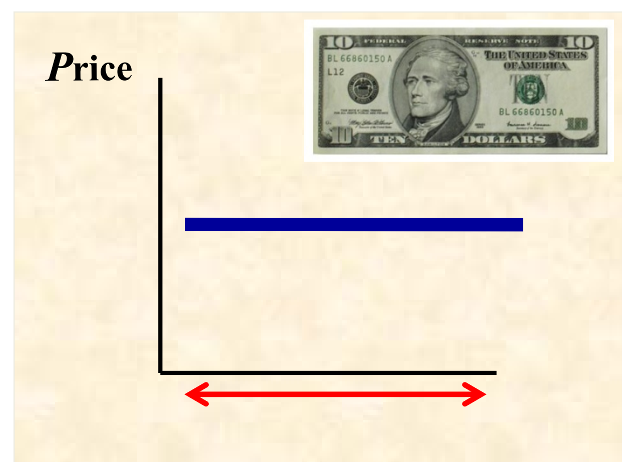
- *Relatively elastic*



- *Perfectly elastic*

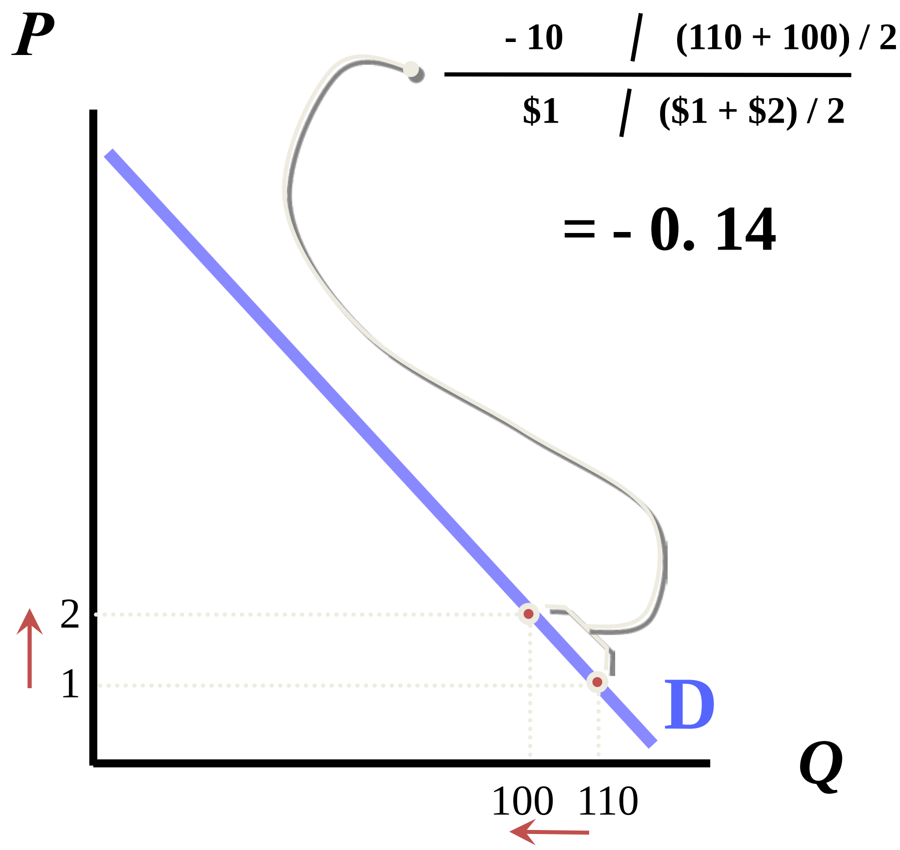


Remembering Elasticity

- Relatively shallow (flat) demand curves are relatively more elastic.
- Relatively steep demand curves are relatively more inelastic.
- Ways to remember:
  - Steep demand curve looks like the letter "I," so it is "I"nelastic.
  - Steep demand curve has an almost "I"nfinite slope, and is "I"nelastic

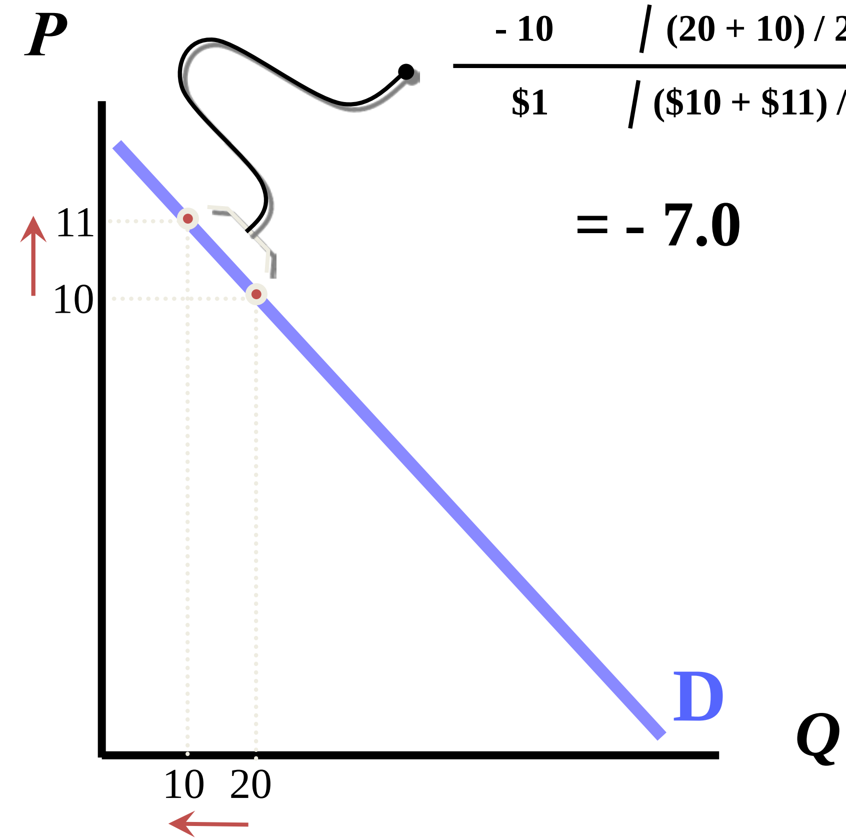
Slope is not = Elasticity

- With this straight-line (constant-slope) demand curve, demand varies across a range of prices.
- Using the equation for elasticity from before, the midpoint formula for elasticity shows that, when price rises from $1 to $2 . . . and quantity demanded falls from 110 to 100 . . . the elasticity for that region of the demand curve is (- .14) (**inelastic**)



Slope is not = Elasticity

- A price increase of the same magnitude (but a smaller %) from \$10 to \$11 . . . leads to a decline in quantity demanded from 20 to 10. Even though the change in price here was smaller than before (as a %) the same change in quantity demanded occurred.
- Using the same equation to calculate elasticity as before, the elasticity amounts to - 7.0 (greater than - .14 from before).
- Thus the price-elasticity of a straight-line demand curve increases as price rises.



$$\frac{-10 \;/\; (20 + 10)/2}{\$1 \;/\; (\$10 + \$11)/2} = -7.0$$

The elasticity coefficient becomes increasingly elastic as you move up along the demand curve!

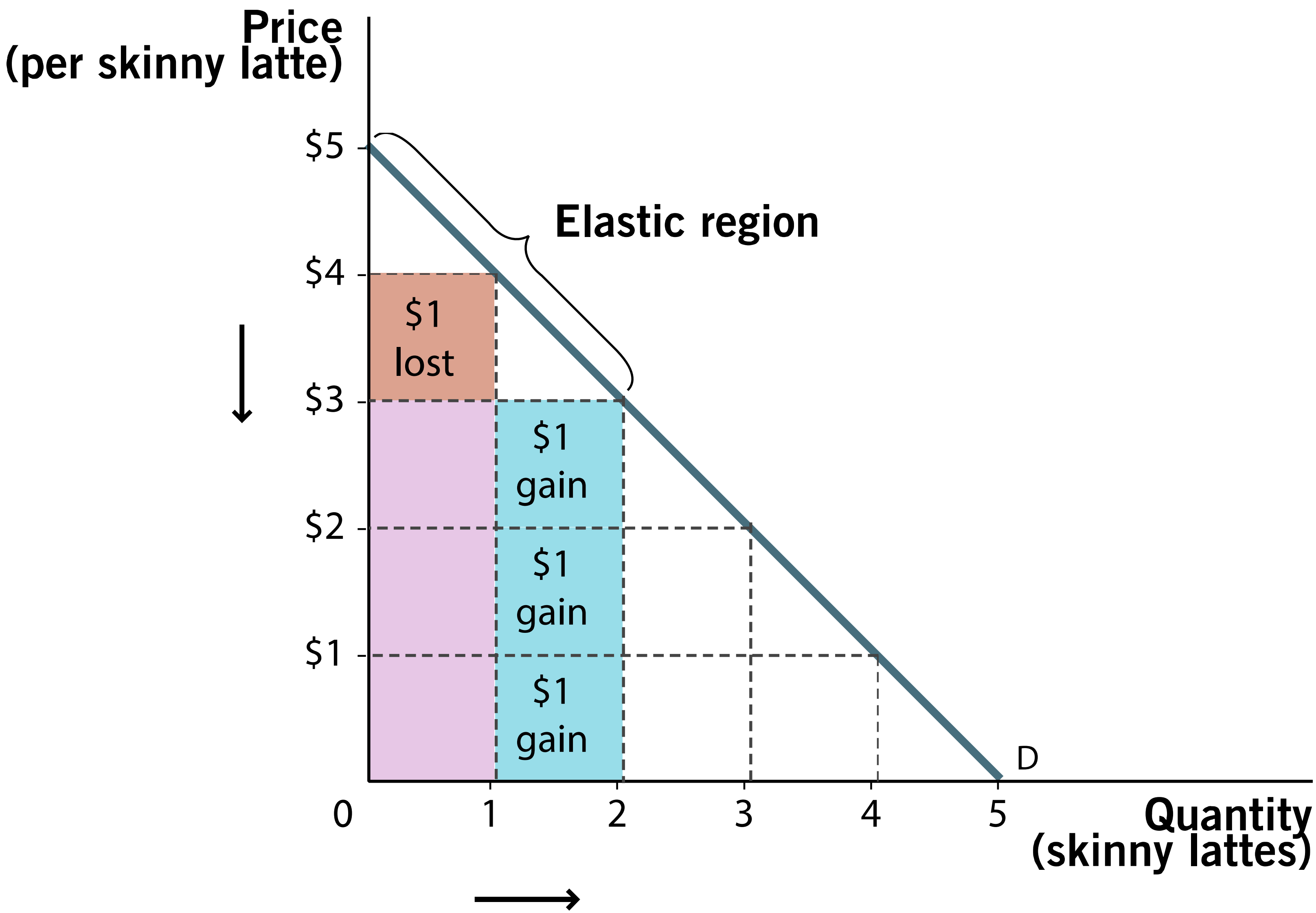
The Relationship Between Elasticity and Revenue

Price ($)	Q Lattes	% Change in Price	% Change in Q	Elasticity (Midpoint)	Interpretation
$5	0				
$4	1	-22	200	-9.1	Relatively Elastic
$3	2	-29	67	-2.3	Relatively Elastic
$2	3	-40	40	-1.0	Unitary
$1	4	-67	29	-0.4	Relatively Inelastic
$0	5	-200	22	-0.1	Relatively Inelastic

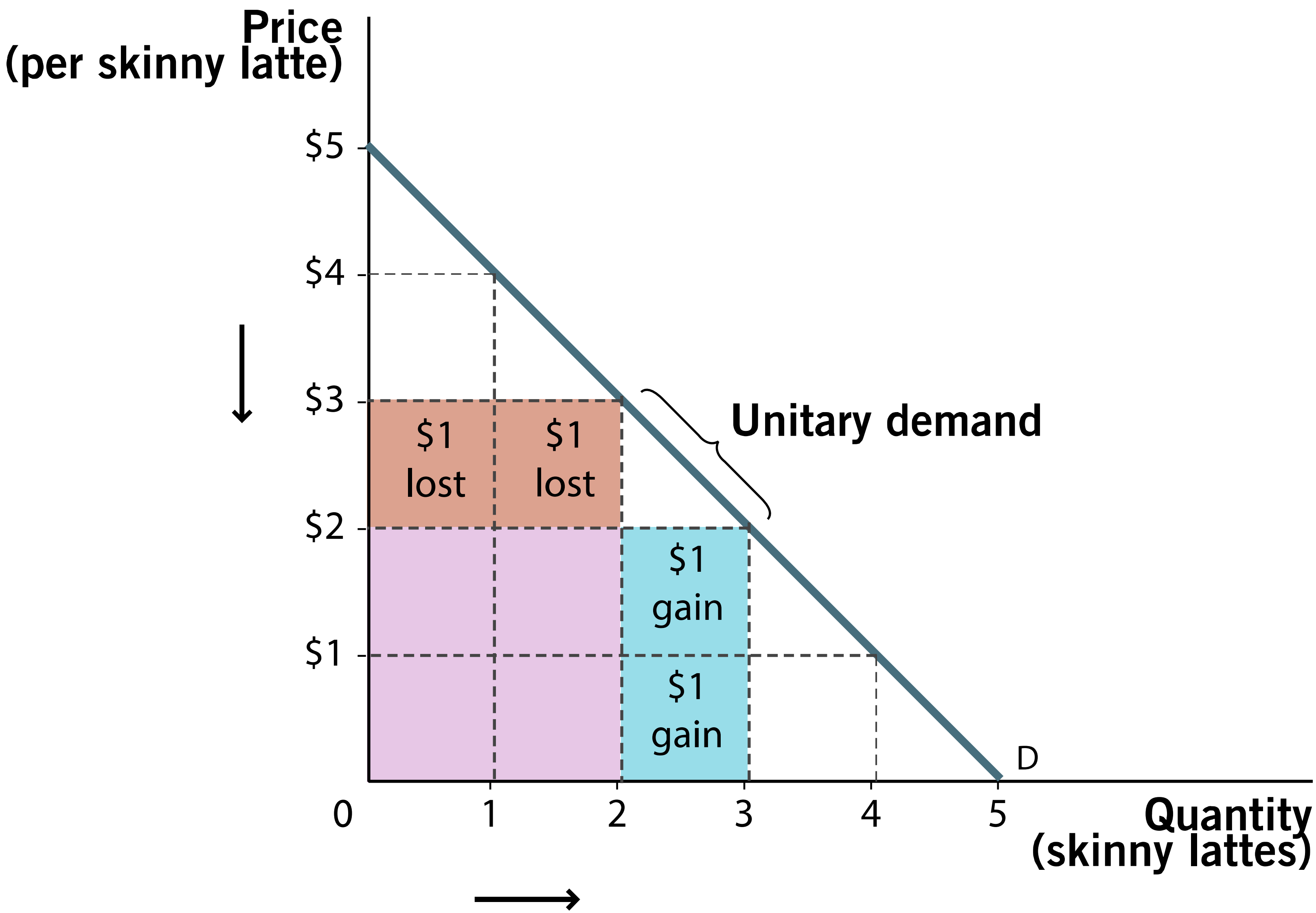
Elasticity and Revenue

- The previous table illustrated that:
  - Revenue is related to elasticity.
  - Revenue is maximized at the unit elastic point on the linear demand function.
- Graphically, we can also show trade-offs when a firm changes the price of its good.
  - Increase price
    - Higher price per unit, but sell less units
  - Lower price
    - Lower price per unit, but sell more units

Total Revenue Trade-offs



Total Revenue Trade-offs



Total Revenue Trade-offs