Elasticity of Demand & Supply

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PRICE ELASTICITY OF DEMAND

Think About It...

THE LAW OF DEMAND SAYS...

Consumers will buy more when prices go down and less when prices go up

HOW MUCH MORE OR LESS?

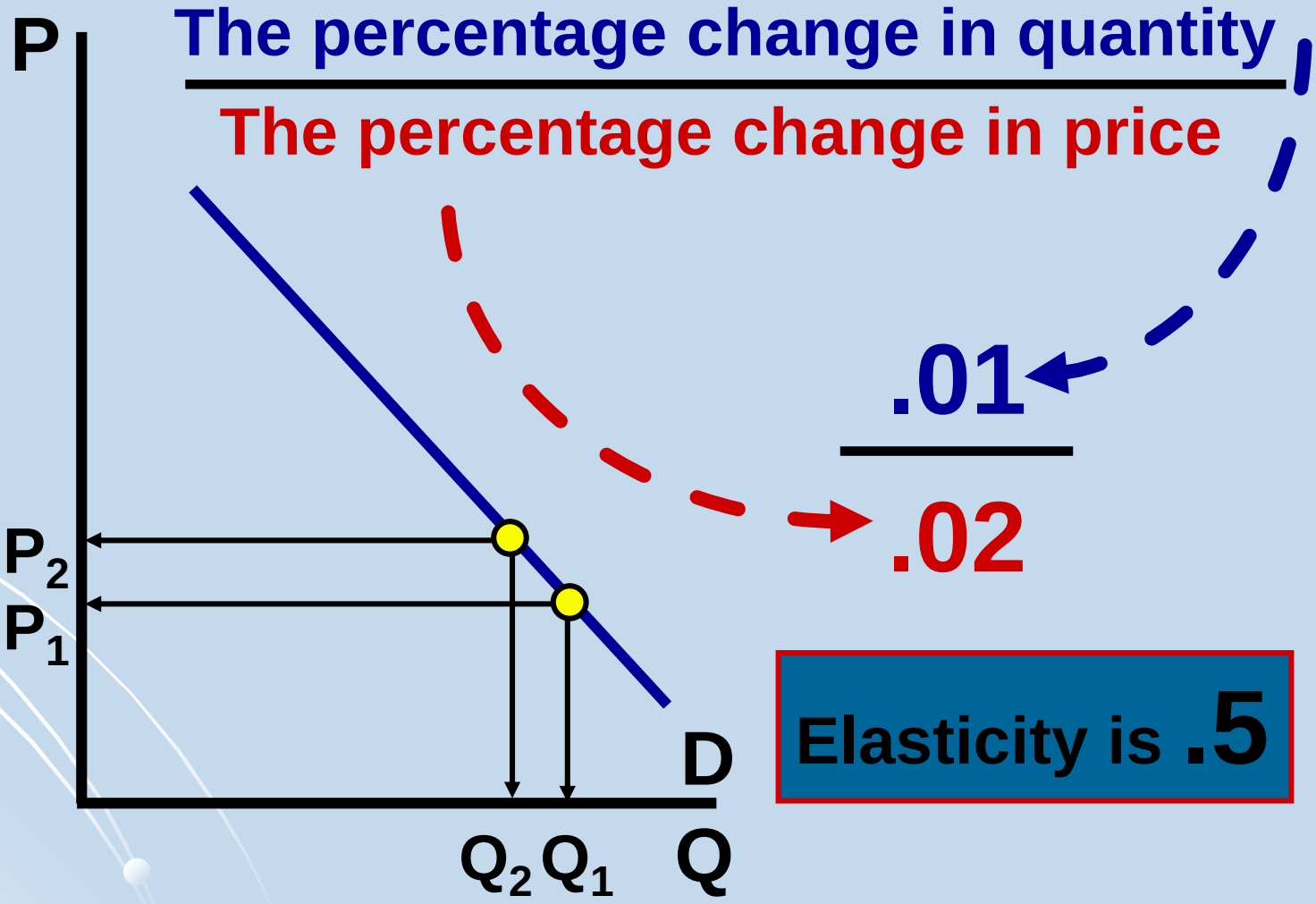
DOES IT MATTER?

to whom?

Price Elasticity Provides an Answer

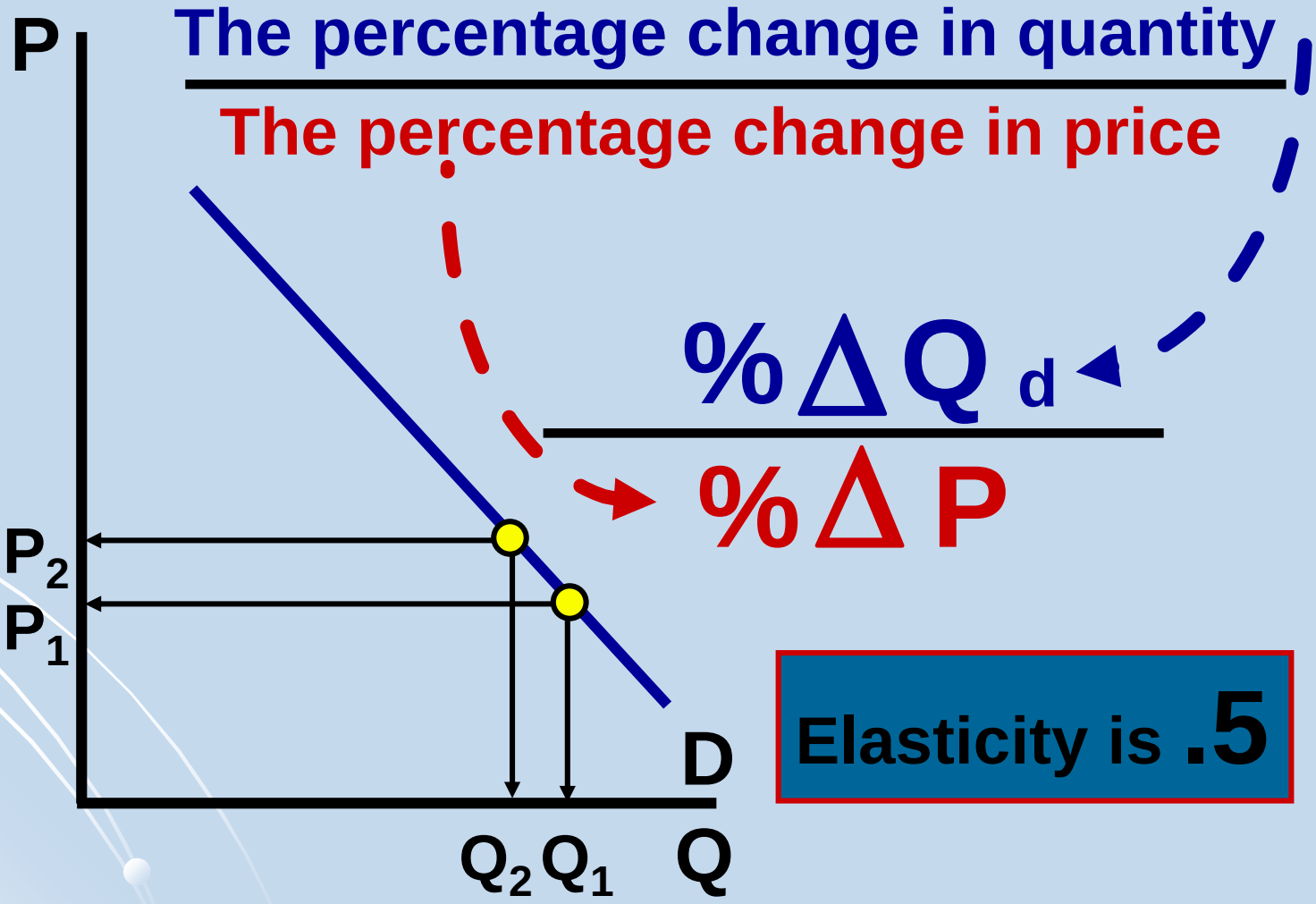
PRICE ELASTICITY OF DEMAND

Measures Responsiveness to Price Changes



PRICE ELASTICITY OF DEMAND

Commonly Expressed as…



PRICE ELASTICITY OF DEMAND

The Price-Elasticity Coefficient and Formula

$$E_d = \frac{\text{Percentage change in quantity demanded of product X}}{\text{Percentage change in price of product X}}$$

* *Elimination of the Minus Sign*

PRICE ELASTICITY OF DEMAND

Refinement –

The Midpoint Formula

$$E_d = \frac{\text{Change in quantity}}{\text{Sum of Quantities/2}} \div \frac{\text{Change in price}}{\text{Sum of prices/2}}$$

Why Use Percentages?

- Because, using absolute changes, our choice of units would arbitrarily affect our impression of buyer responsiveness:
  - With a $1 reduction in the price of a bag of popcorn, consumers increase their consumption from 60 to 100 bags (a 1 unit price change causes a 40 unit quantity change)
  - If we change the monetary unit from dollars to pennies, now it appears that it takes a price change of 100 units to cause the 40 unit quantity change

Why Use Percentages?

- Because, using absolute changes, it would make little sense to compare the effects on quantity demanded of

A $1 increase in the price of a $20,000 car

with

A $1 increase in the price of a $1 soft drink

PRICE ELASTICITY OF DEMAND

Interpretations of E_d

Elastic Demand: larger % change in Qd

$$E_d = \frac{.04}{.02} = 2$$

Inelastic Demand: smaller % change in Qd

$$E_d = \frac{.01}{.02} = .5$$

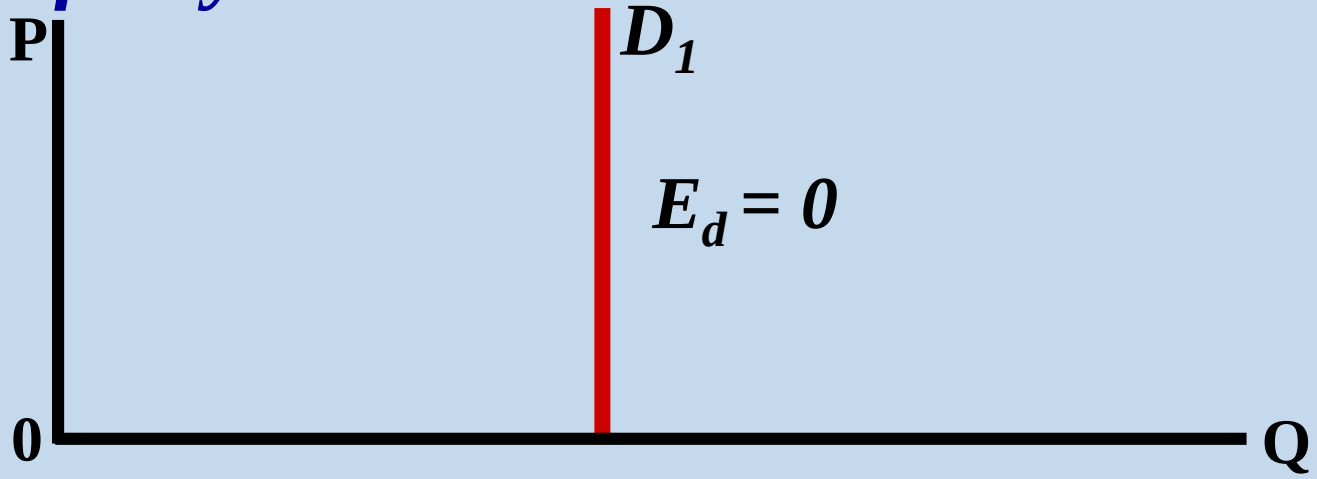
Unit Elasticity: same change in Qd

$$E_d = \frac{.02}{.02} = 1$$

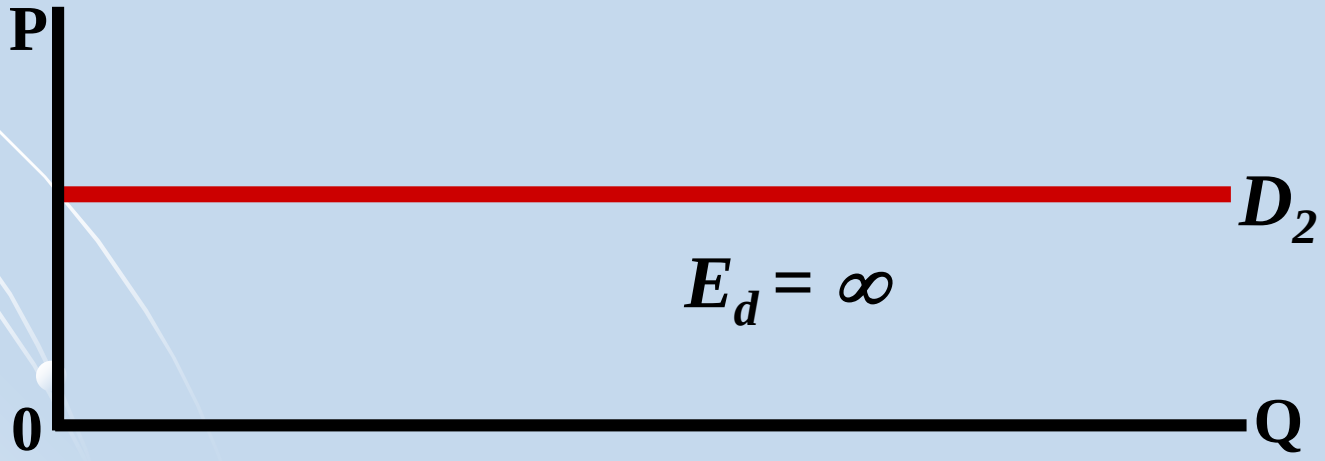
PRICE ELASTICITY OF DEMAND

Extreme Cases

Perfectly Inelastic Demand

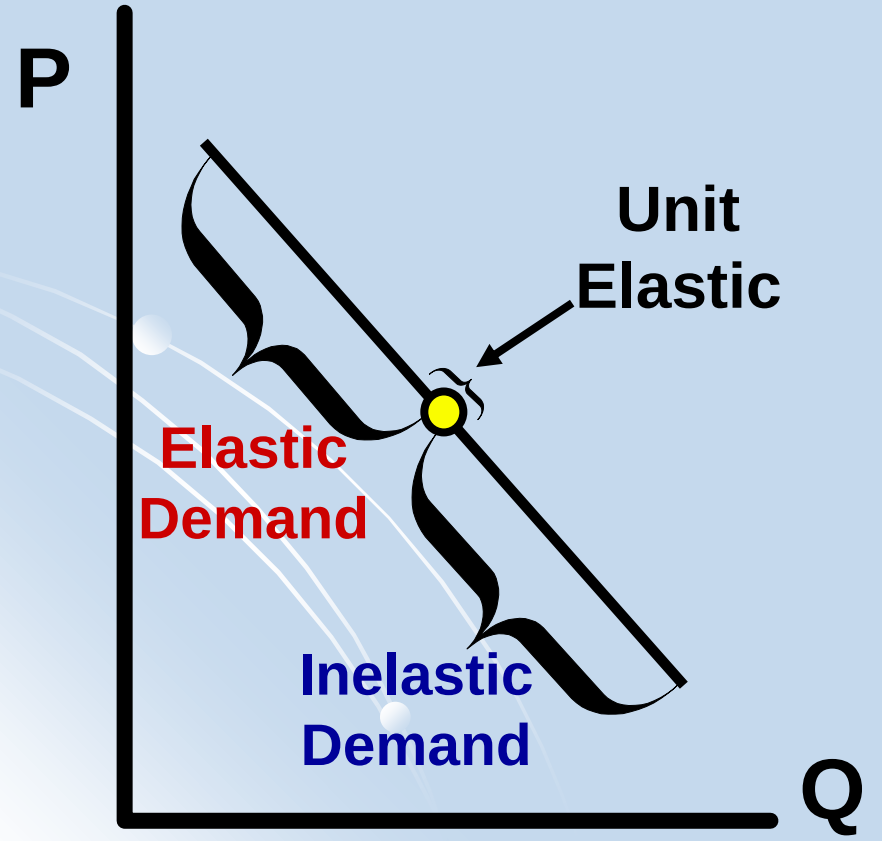


Perfectly Elastic Demand



Price Elasticity along a Linear Demand Curve

- Elasticity typically varies over different price ranges of the same demand curve.



*** For all downsloping straight-line demand curves, demand is more price-elastic toward the upper left than the lower right.**

Price Elasticity of Demand and the Shapes of Demand Curves

- The Relationship between Elasticity and Slope
  - If a demand curve has a constant slope (straight-line), the elasticity is not constant.
  - If a demand curve has a constant elasticity (unit elastic), the slope is not constant.

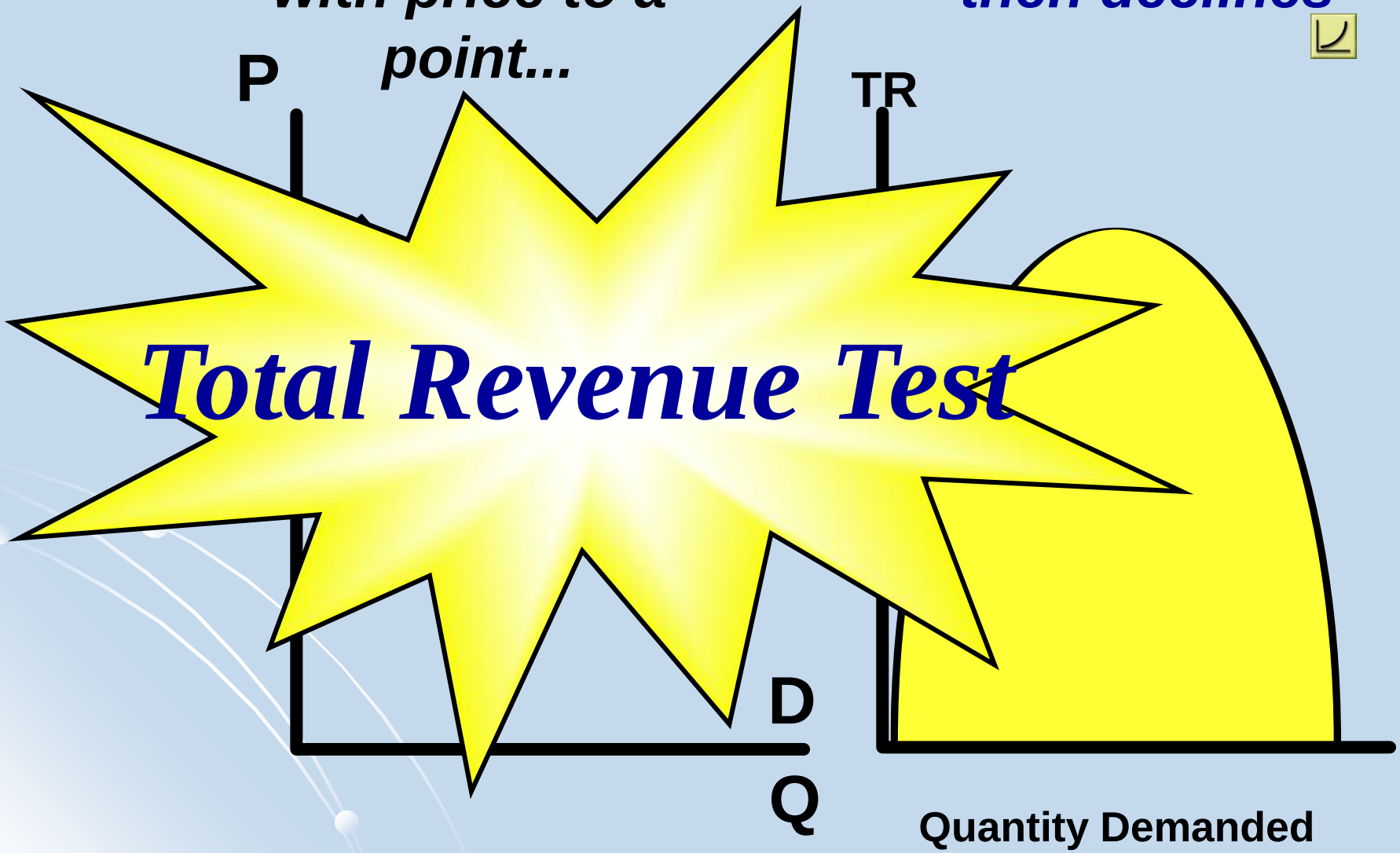
Total Revenue Test

- Total Revenue (TR) = P x Q
- Total Revenue and the price elasticity of demand are related.
- Here's the test: When price changes…
  - If TR changes in the opposite direction from price, demand is elastic.
  - If TR changes in the same direction as price, demand is inelastic.
  - If TR does not change when price changes, demand is unit-elastic.

PRICE ELASTICITY & TOTAL REVENUE

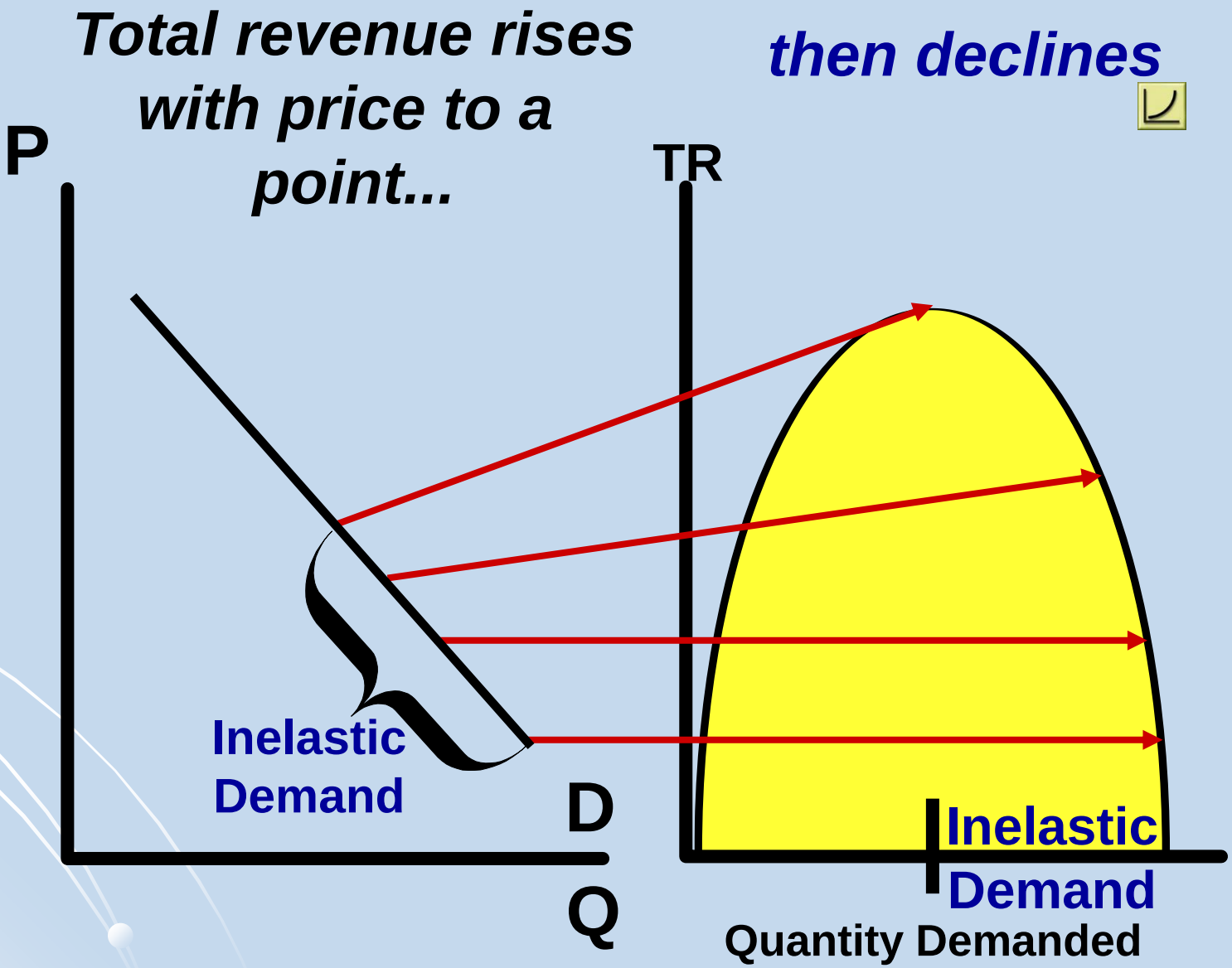
Total revenue rises with price to a point...

then declines

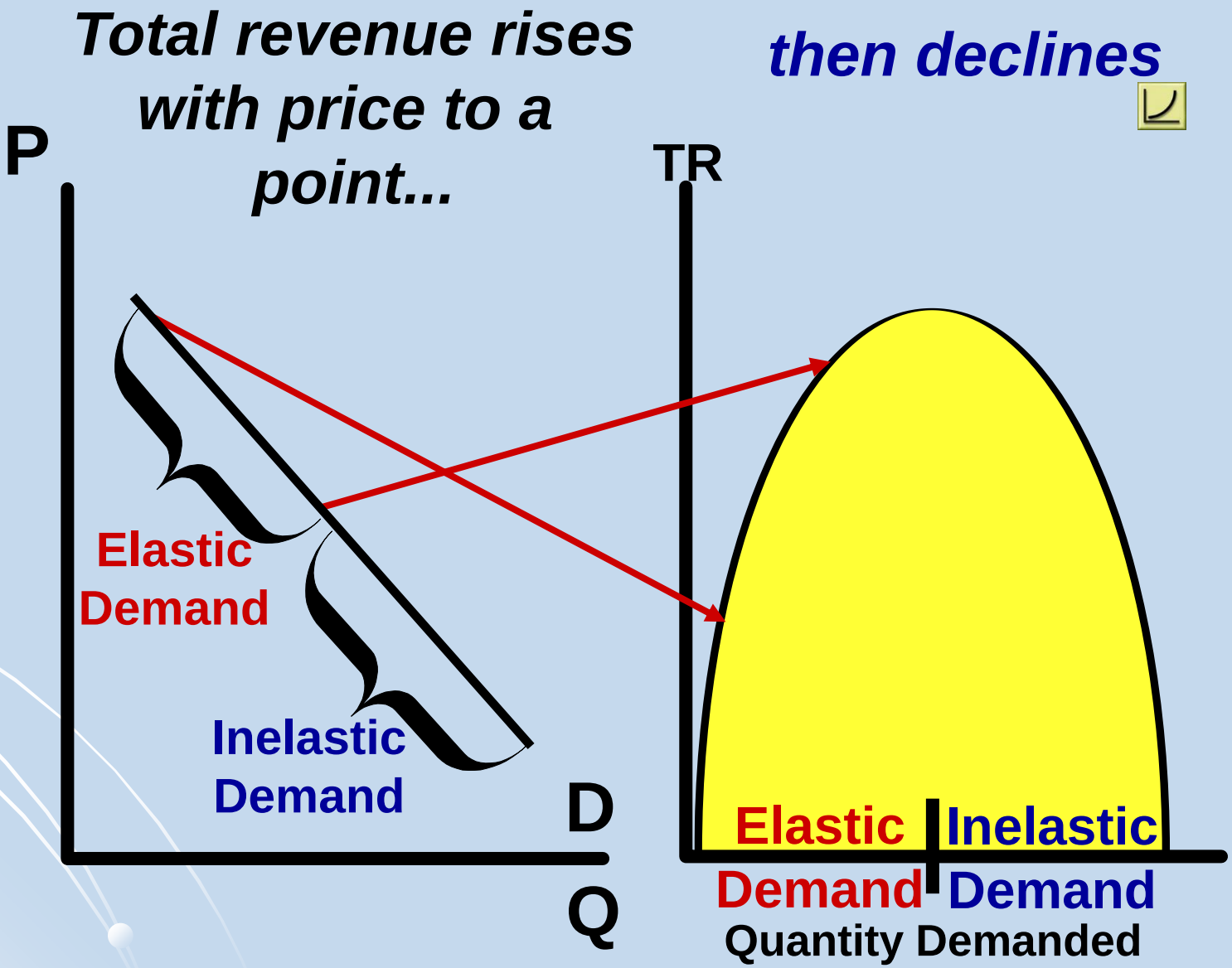


Total Revenue Test

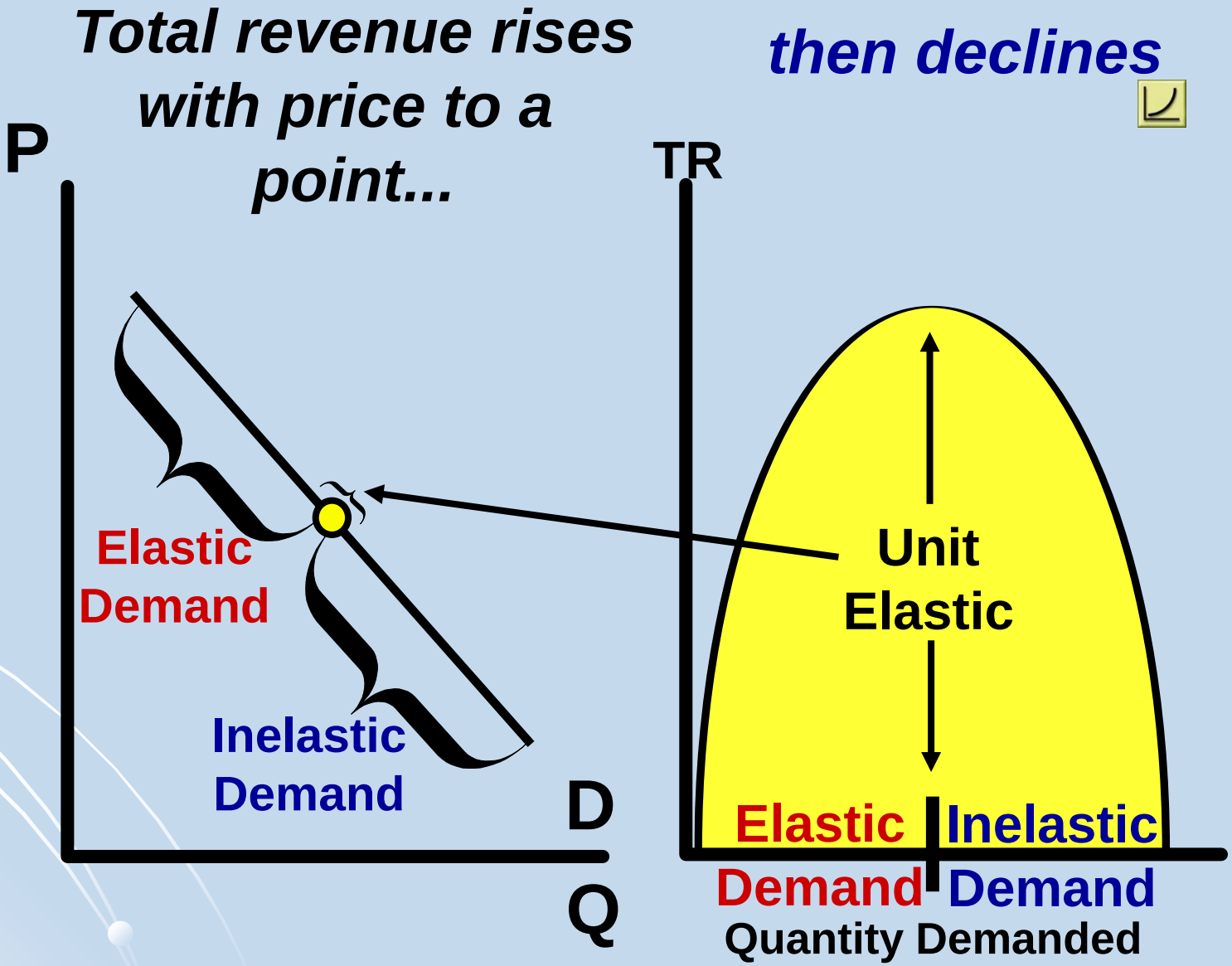
PRICE ELASTICITY & TOTAL REVENUE



PRICE ELASTICITY & TOTAL REVENUE



PRICE ELASTICITY & TOTAL REVENUE



PRICE ELASTICITY & TOTAL REVENUE

Price Elasticity is...

Inelastic when $E_d < 1$

Typical of necessities one must have

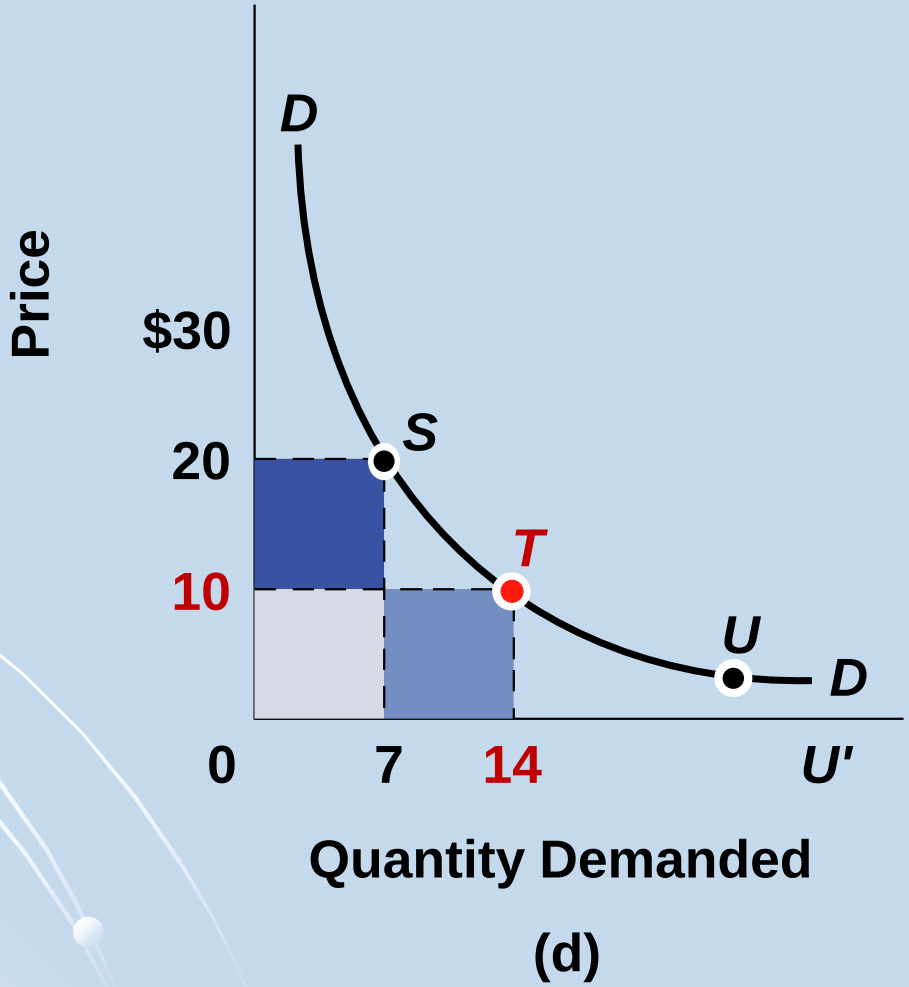
Elastic when $E_d > 1$

Typical of luxuries one wants

Unit elastic when $E_d = 1$

Price change does not change total revenue

Elastic, Inelastic, or Unit Elastic



DETERMINANTS OF PRICE ELASTICITY OF DEMAND

- **Substitutability:** Generally, the more substitute goods available, the greater the price elasticity of demand.
- **Proportion of Income:** Other things equal, the higher the price of a good relative to consumers' incomes, the greater the price elasticity of demand.
- **Luxuries versus Necessities:** In general, the more a good is considered to be a "luxury", the greater is the price elasticity of demand.
- **Time:** Generally, product demand is more elastic the longer the time period under consideration. Consumers often need time to adjust to changes in prices.

Applications...

Large Crop Yields:

- Demand for most farm products is inelastic.
- Consequently, increases in the supply of farm products tend to lower both prices and the total revenues farmers receive.
- So, are large crop yields necessarily desirable for farmers?

Excise Taxes:

- A government is looking to raise the amount of tax levied on each unit of a specific product sold.
- If the government is concerned about the amount of tax revenue it will generate, should it levy the tax on a product with elastic or inelastic demand?

Elastic, Inelastic, or Unit Elastic

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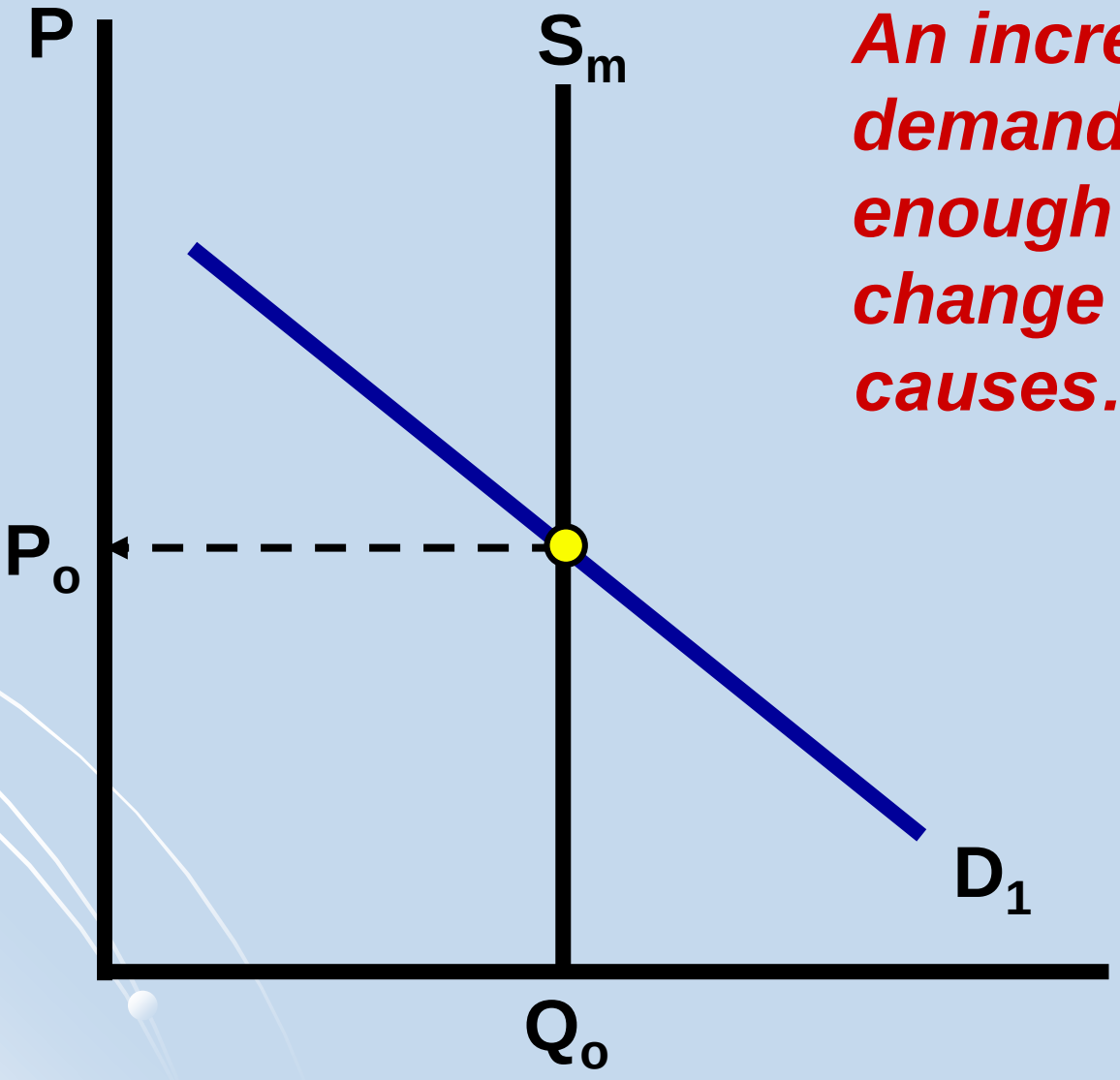
PRICE ELASTICITY OF SUPPLY

$$E_s = \frac{\text{Percentage change in quantity supplied of good X}}{\text{Percentage change in the price of good X}}$$

Now, compare the immediate market period, the short-run, and long run.

PRICE ELASTICITY OF SUPPLY

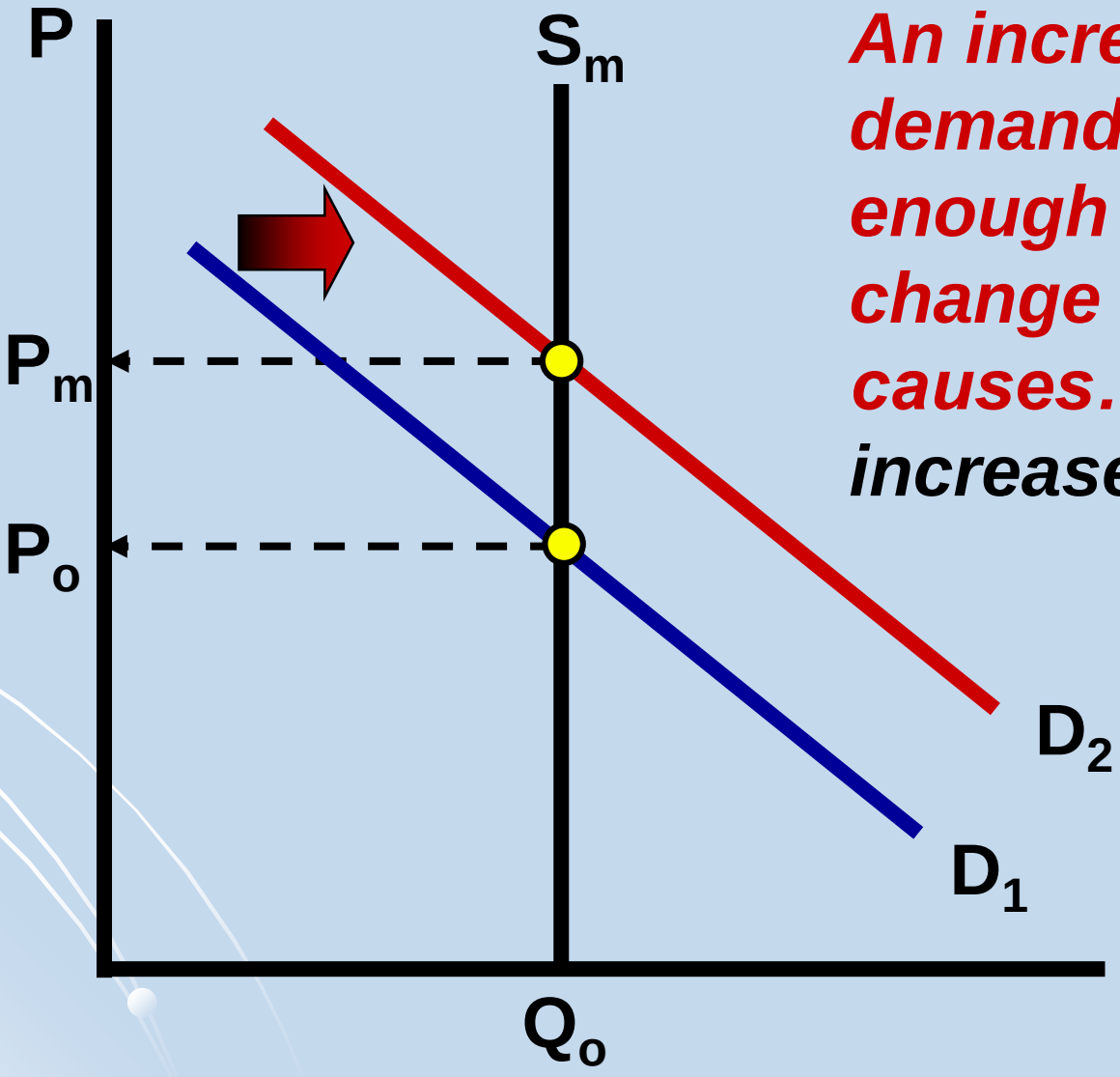
Immediate Market period



An increase in demand without enough time to change output causes…

PRICE ELASTICITY OF SUPPLY

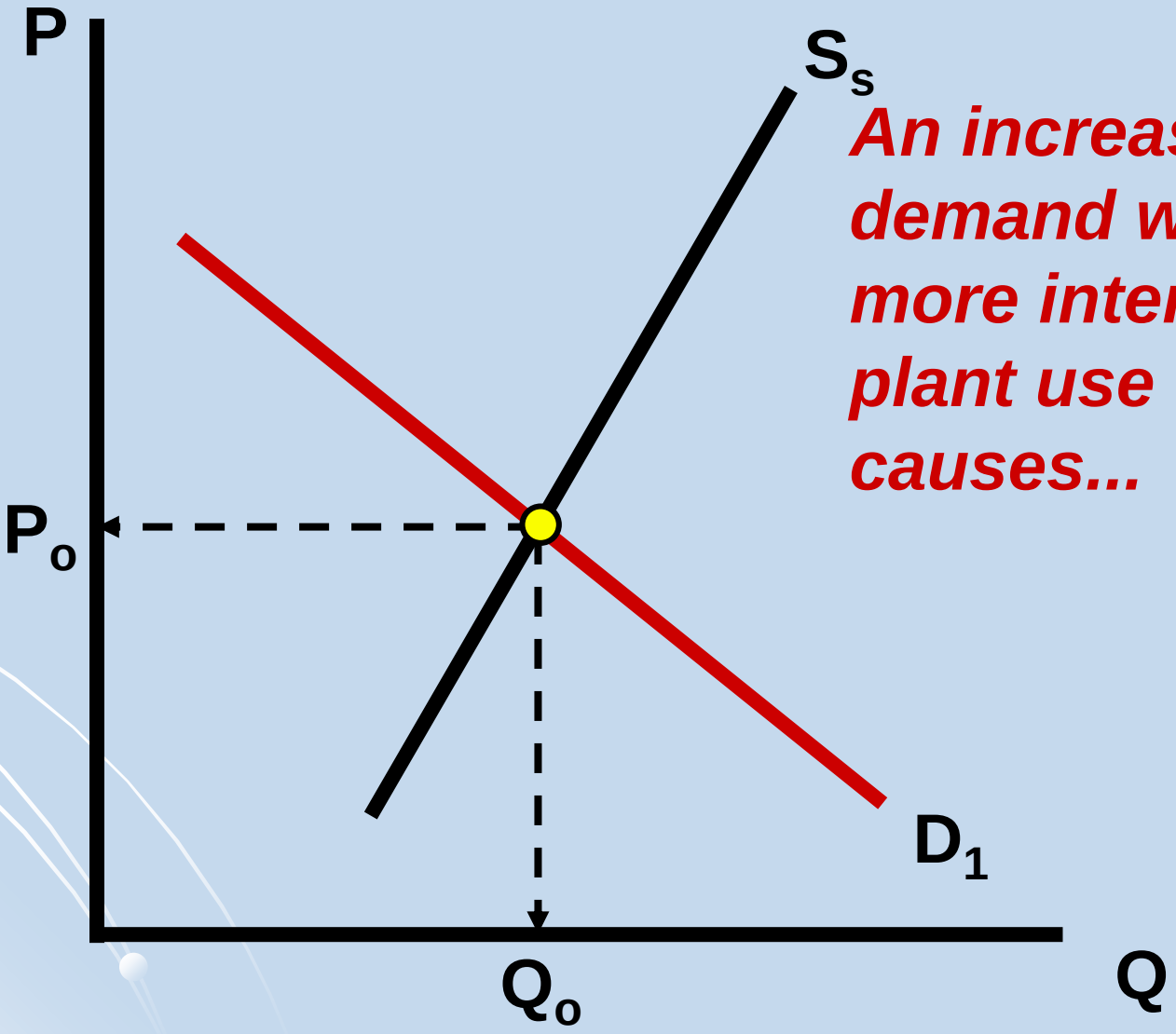
Immediate Market period



An increase in demand without enough time to change output causes… an increase in price

PRICE ELASTICITY OF SUPPLY

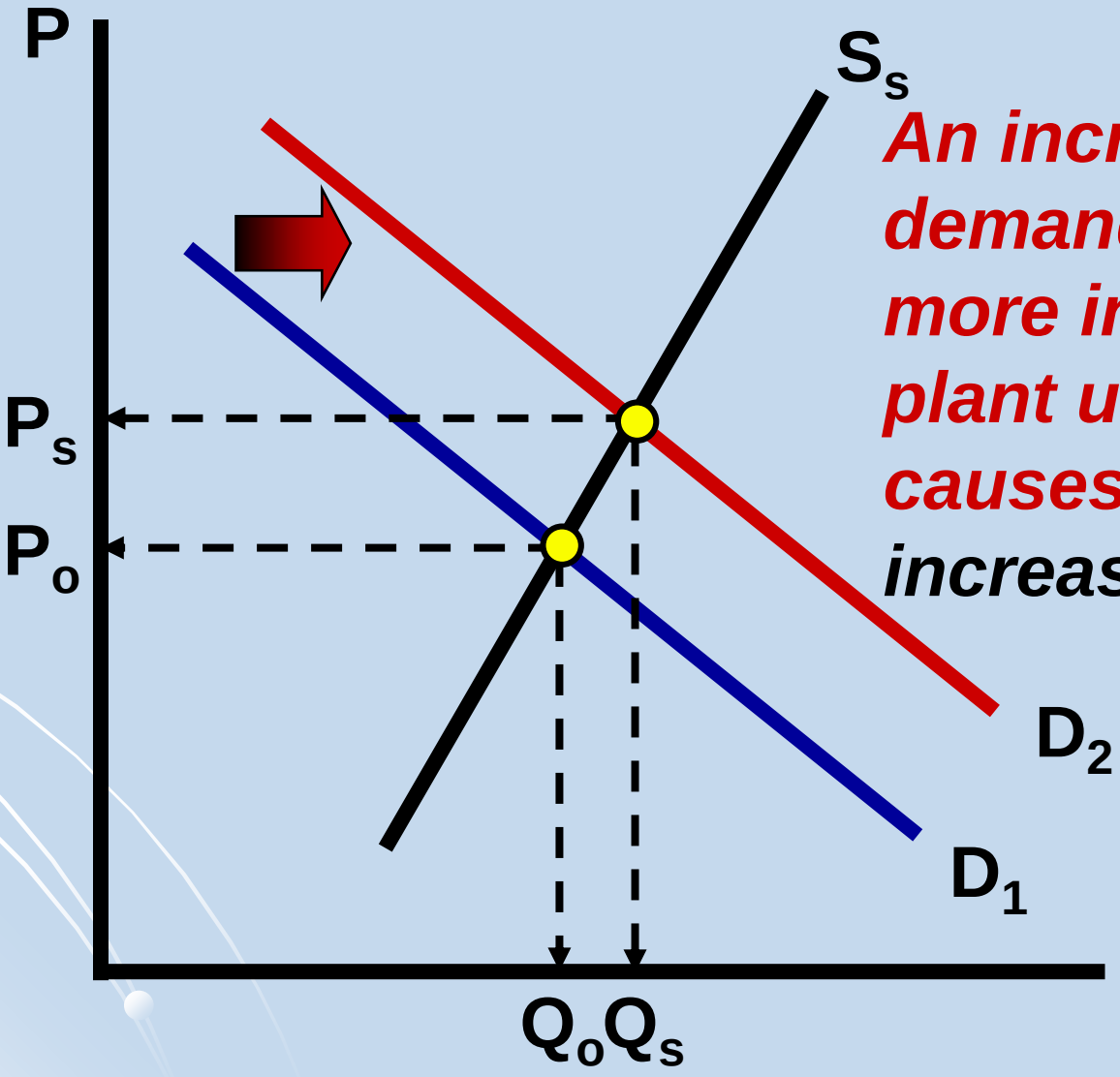
Short Run



An increase in demand with more intense plant use causes...

PRICE ELASTICITY OF SUPPLY

Short Run

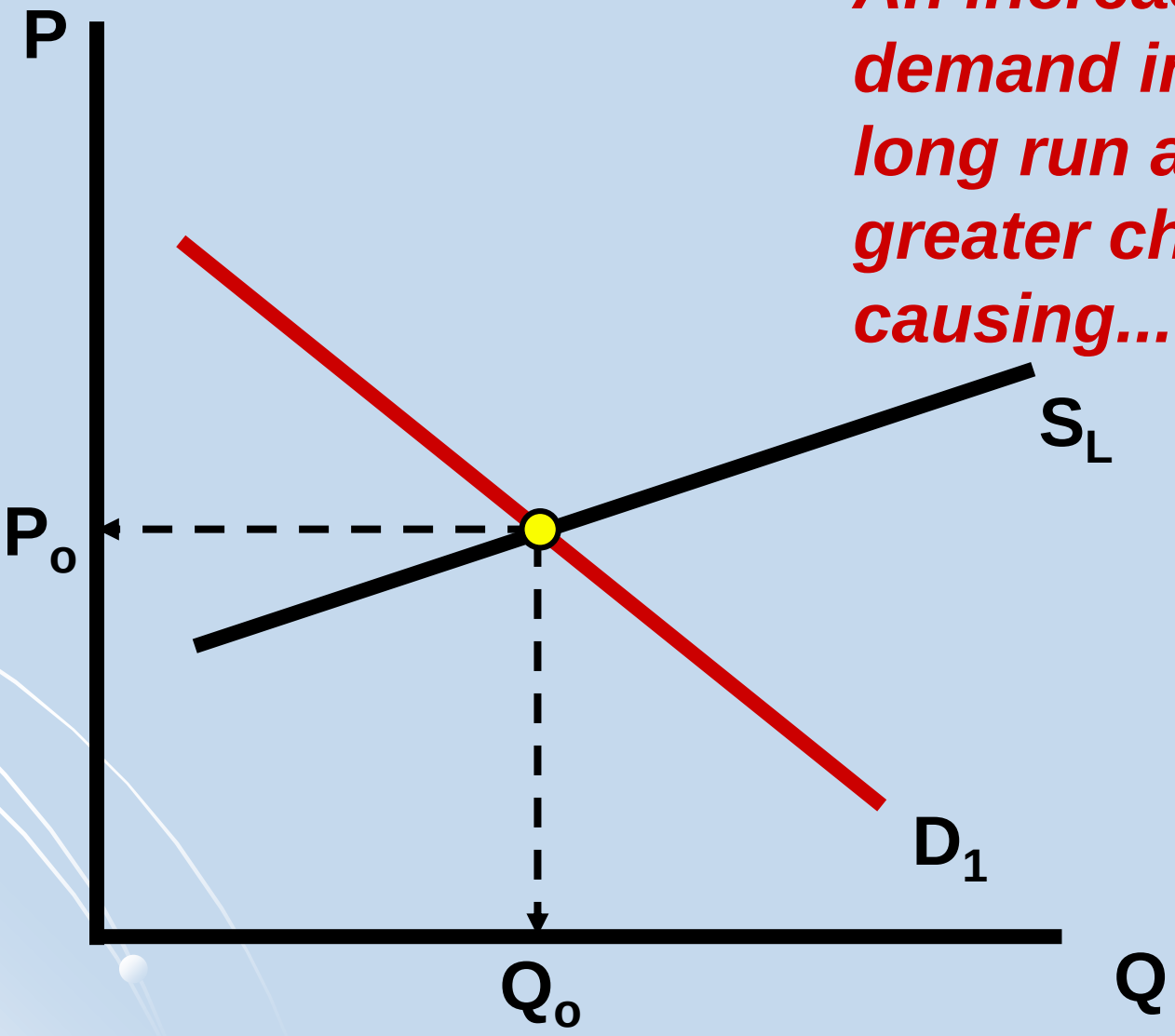


An increase in demand with more intense plant use causes...a lower increase in price

PRICE ELASTICITY OF SUPPLY

Long Run

An increase in demand in the long run allows greater change causing...



PRICE ELASTICITY OF SUPPLY

Long Run

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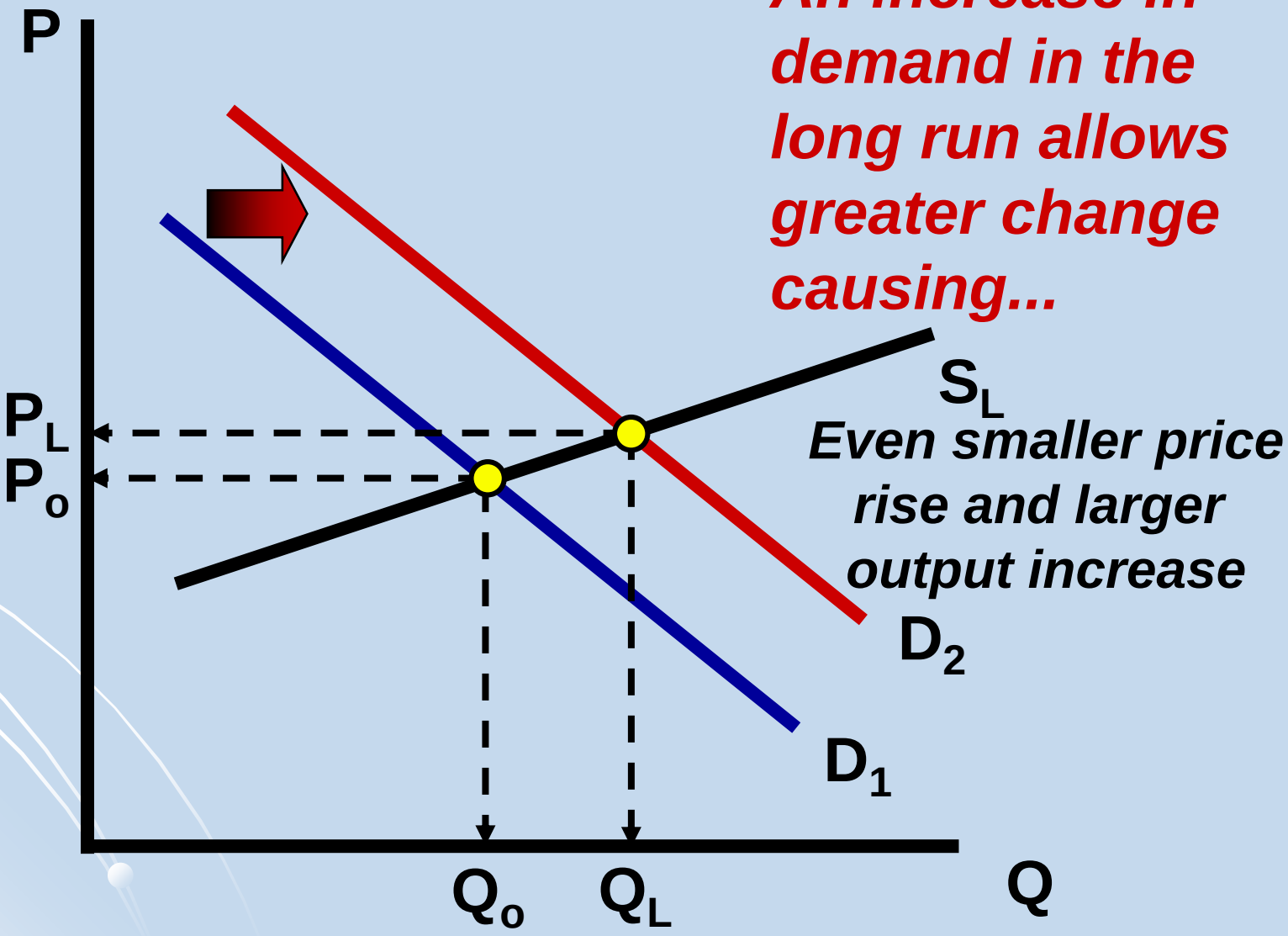

Even smaller price rise and larger output increase

PRICE ELASTICITY OF SUPPLY

Applications of Price Elasticity of Supply

Antiques vs. Reproductions:

Which has a more inelastic supply? How would this affect potential price increases due to increased demand?

Volatile Gold Prices:

Do you think the supply of gold is relatively elastic or inelastic? How would this affect the volatility of gold prices when the demand for gold changes?

CROSS ELASTICITY OF DEMAND

$$E_{xy} = \frac{\text{Percentage change in quantity demanded of } \textit{good X}}{\text{Percentage change in the price of } \textit{good y}}$$

Positive Sign

Goods are Substitutes

Negative Sign

Goods are Complementary

Zero or Near-Zero Value

Goods are Independent

INCOME ELASTICITY OF DEMAND

$$E_i = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in } \textit{income}}$$

Positive Sign

Goods are Normal or Superior

Negative Sign

Goods are Inferior

DEMAND $E_d = \dfrac{\%\ \text{change in } Q_d}{\%\ \text{change in P}}$

CROSS $E_{xy} = \dfrac{\%\ \Delta Q_d \text{ of X}}{\%\ \Delta \text{Price of Y}}$

INCOME $E_i = \dfrac{\%\ \Delta Q_d}{\%\ \Delta \text{Income}}$

Supply $E_s = \dfrac{\%\ \text{change in } Q_s}{\%\ \text{change in P}}$

KEY TERMS

price elasticity of demand

elastic demand

inelastic demand

unit elasticity

perfectly inelastic demand

perfectly elastic demand

total revenue (TR)

total-revenue test

price elasticity of supply

market period

short run

long run

cross elasticity of demand

income elasticity of demand