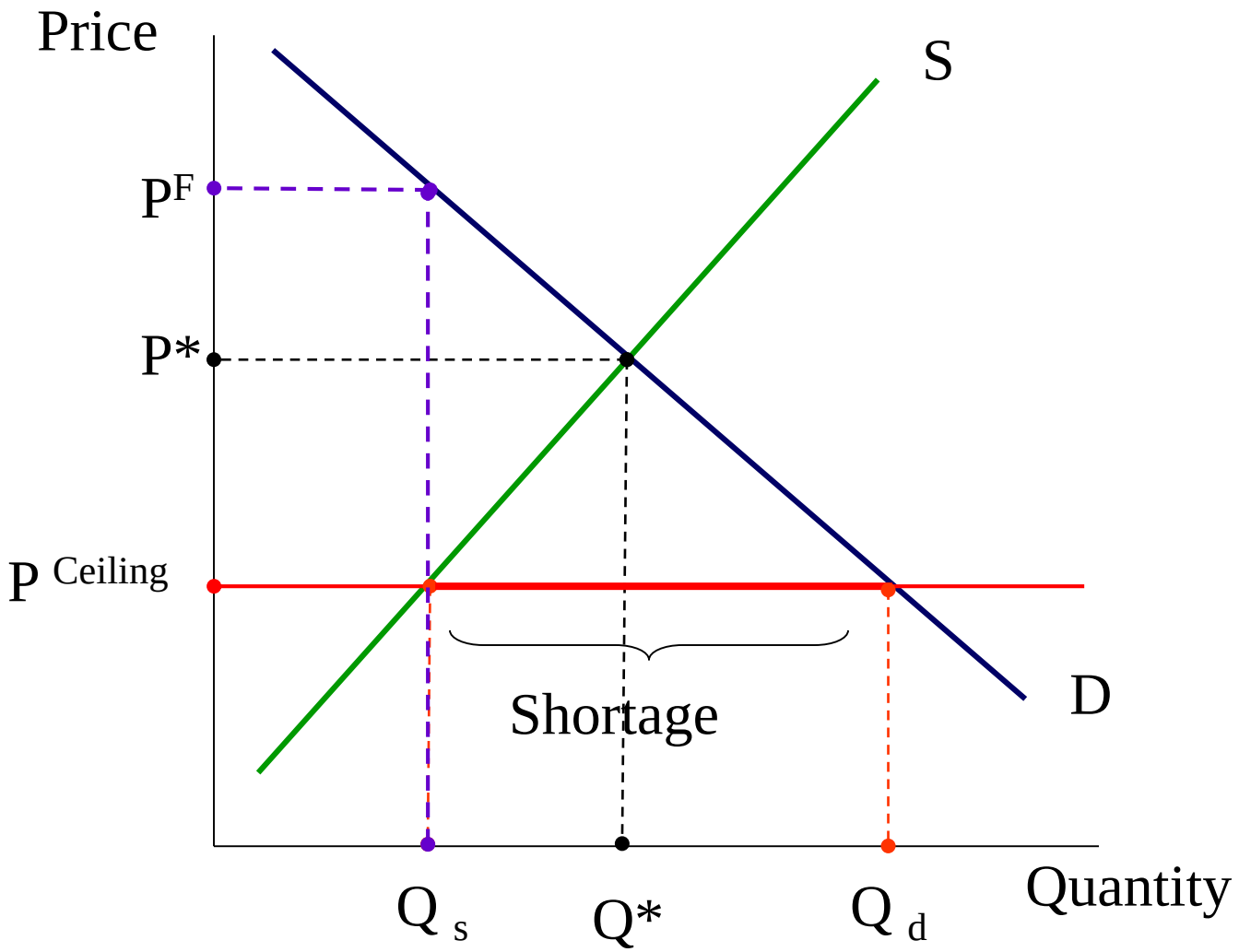
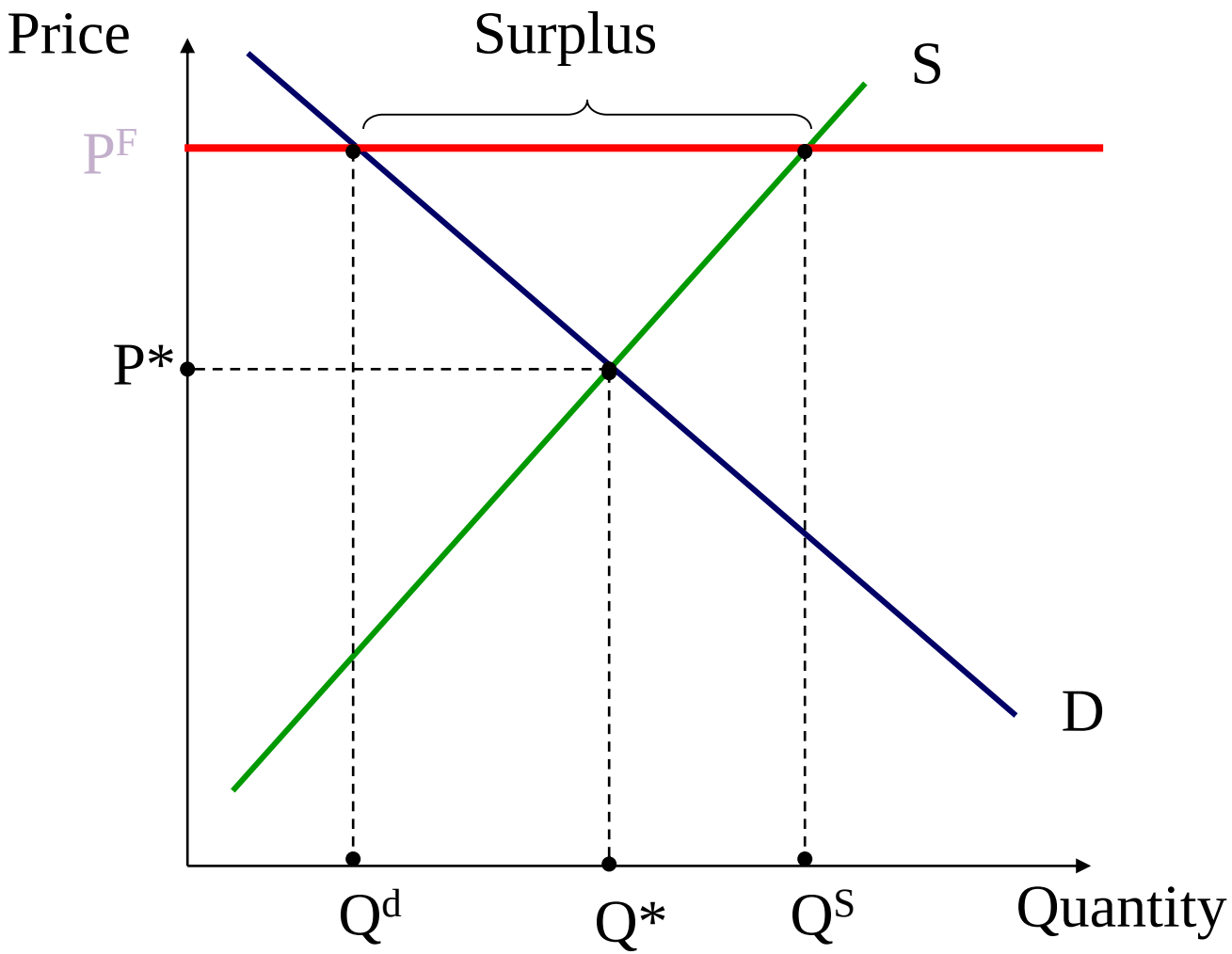
Price Restrictions

- Price Ceilings
  - The *maximum* legal price that can be charged.
  - Examples:
    - Gasoline prices in the 1970s.
    - Housing in New York City.
    - Proposed restrictions on ATM fees.
- Price Floors
  - The *minimum* legal price that can be charged.
  - Examples:
    - Minimum wage.
    - Agricultural price supports.

Impact of a Price Ceiling

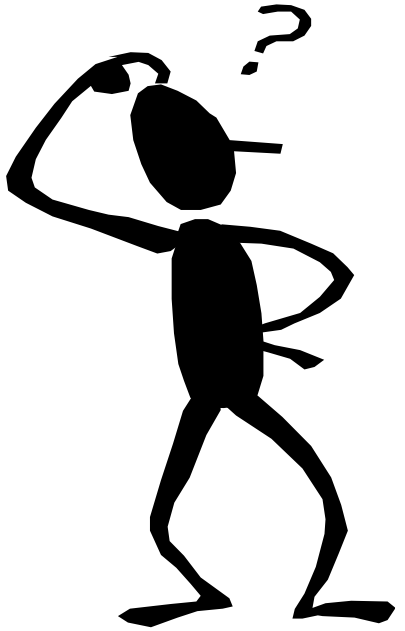


Impact of a Price Floor



Comparative Static Analysis

- How do the equilibrium price and quantity change when a determinant of supply and/or demand change?



Applications of Demand and Supply Analysis

- Event: The *WSJ* reports that the prices of PC components are expected to fall by 5-8 percent over the next six months.
- Scenario 1: You manage a small firm that manufactures PCs.
- Scenario 2: You manage a small software company.

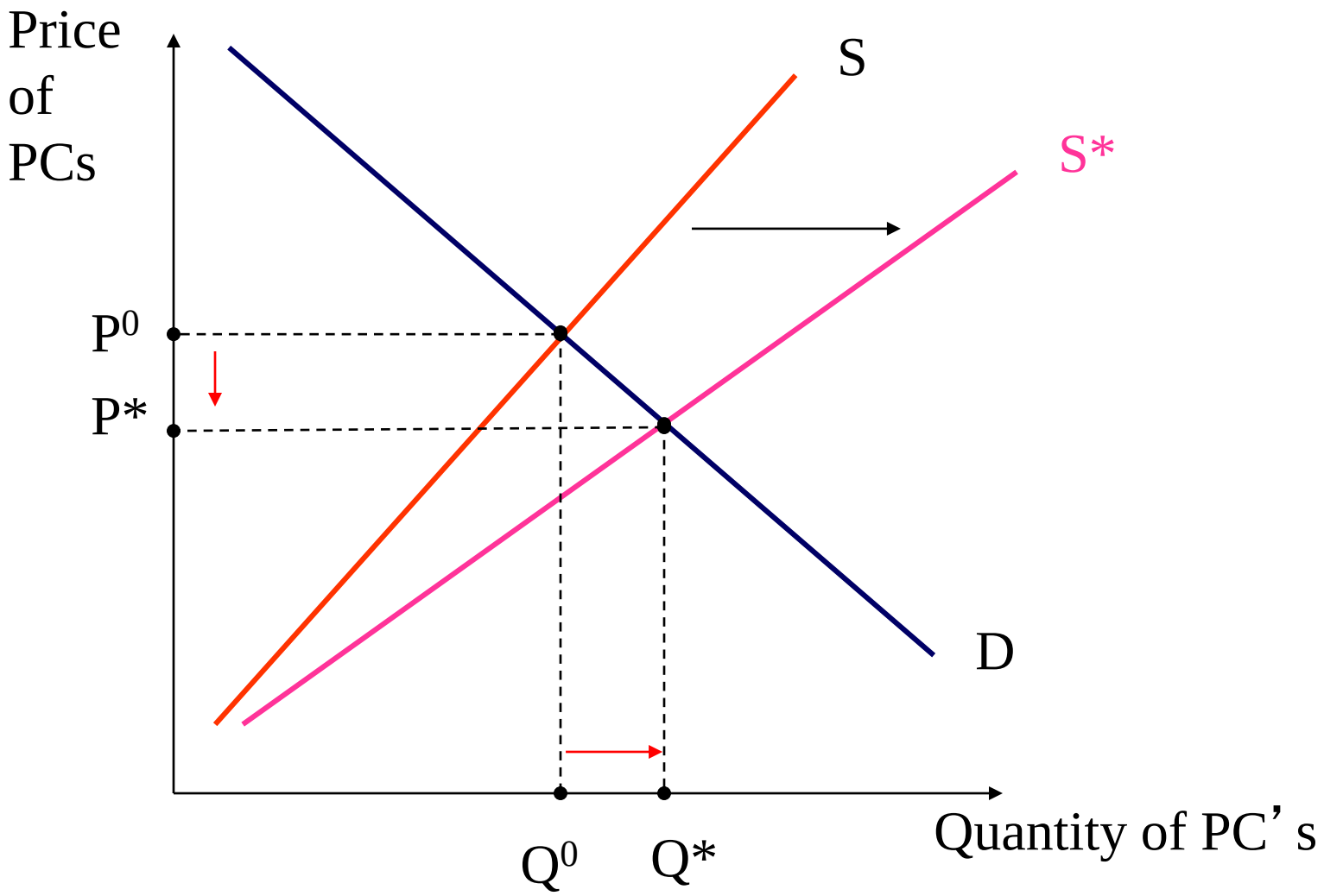
Use Comparative Static Analysis to see the Big Picture!

- *Comparative static analysis* shows how the equilibrium price and quantity will change when a determinant of supply or demand changes.

Scenario 1: Implications for a Small PC Maker

- Step 1: Look for the "Big Picture."
- Step 2: Organize an action plan (worry about details).

Big Picture: Impact of decline in component prices on PC market



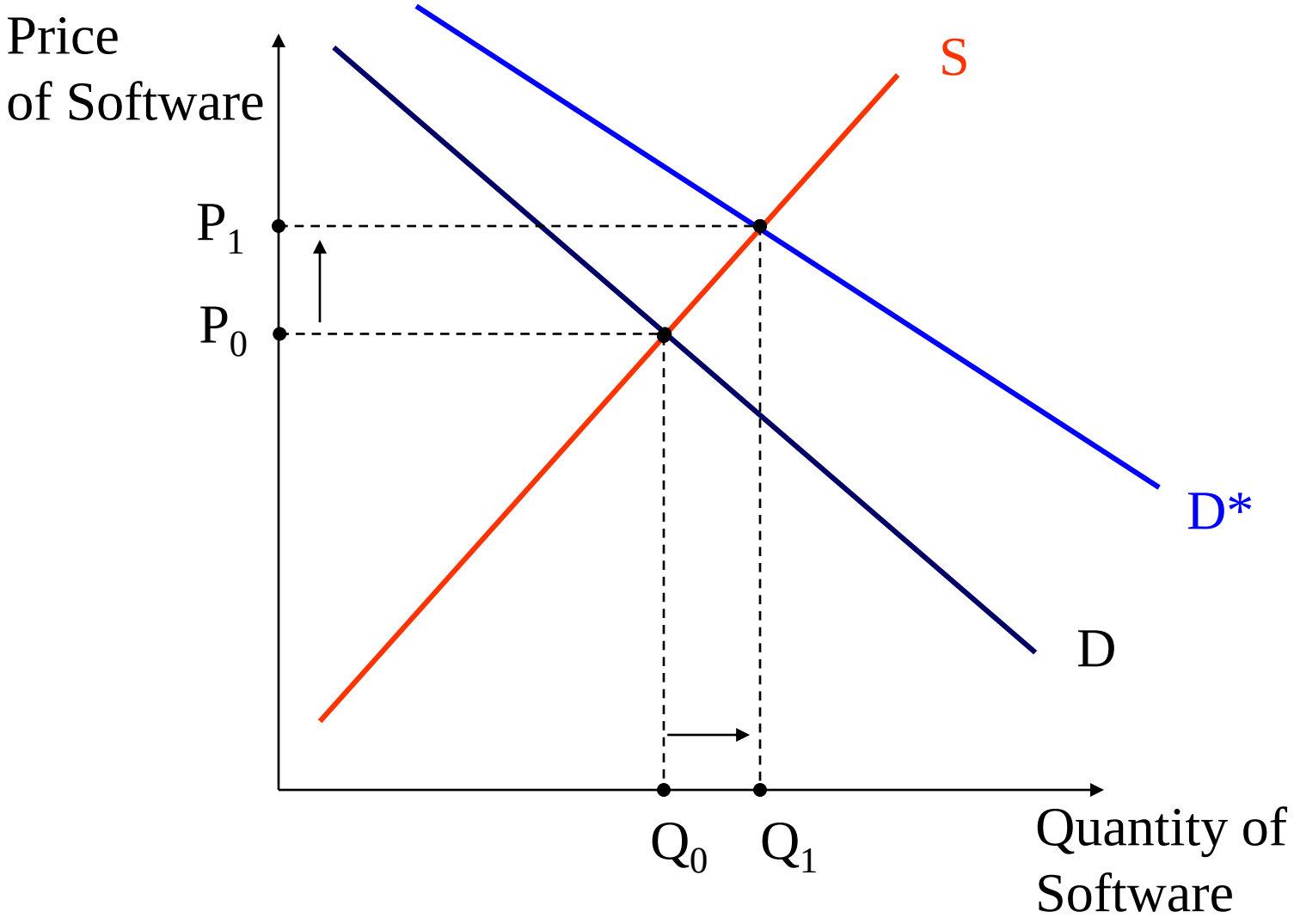
Big Picture Analysis: PC Market

- Equilibrium price of PCs will fall, and equilibrium quantity of computers sold will increase.
- Use this to organize an action plan
  - contracts/suppliers?
  - inventories?
  - human resources?
  - marketing?
  - do I need quantitative estimates?

Scenario 2: Software Maker

- More complicated chain of reasoning to arrive at the "Big Picture."
- Step 1: Use analysis like that in Scenario 1 to deduce that lower component prices will lead to
  - a lower equilibrium price for computers.
  - a greater number of computers sold.
- Step 2: How will these changes affect the "Big Picture" in the software market?

Big Picture: Impact of lower PC prices on the software market



Big Picture Analysis: Software Market

- Software prices are likely to rise, and more software will be sold.
- Use this to organize an action plan.

& Business Strategy

Chapter 3
Quantitative Demand Analysis

McGraw-Hill/Irwin
Michael R. Baye, Managerial Economics and Business Strategy

Overview

The Elasticity Concept

- Own Price Elasticity
- Elasticity and Total Revenue
- Cross-Price Elasticity
- Income Elasticity

The Elasticity Concept

- How responsive is variable "G" to a change in variable "S"

$$E_{G,S} = \frac{\%\Delta G}{\%\Delta S}$$

If $E_{G,S} > 0$, then S and G are directly related.

If $E_{G,S} < 0$, then S and G are inversely related.

If $E_{G,S} = 0$, then S and G are unrelated.

The Elasticity Concept Using Calculus

- An alternative way to measure the elasticity of a function G = f(S) is

$$E_{G,S} = \frac{dG}{dS}\frac{S}{G}$$

If $E_{G,S} > 0$, then S and G are directly related.

If $E_{G,S} < 0$, then S and G are inversely related.

If $E_{G,S} = 0$, then S and G are unrelated.

Cross Price Elasticity of Demand

$$E_{Q_X, P_Y} = \frac{\%\Delta Q_X{}^{d}}{\%\Delta P_Y}$$

If $E_{Q_X,P_Y} > 0$, then X and Y are substitutes.

If $E_{Q_X,P_Y} < 0$, then X and Y are complements.

Income Elasticity

$$E_{Q_X,M} = \frac{\%\Delta Q_X{}^{d}}{\%\Delta M}$$

If $E_{Q_X,M} > 0$, then X is a normal good.

If $E_{Q_X,M} < 0$, then X is a inferior good.

Own Price Elasticity of Demand

$$E_{Q_X, P_X} = \frac{\%\Delta Q_X{}^d}{\%\Delta P_X}$$

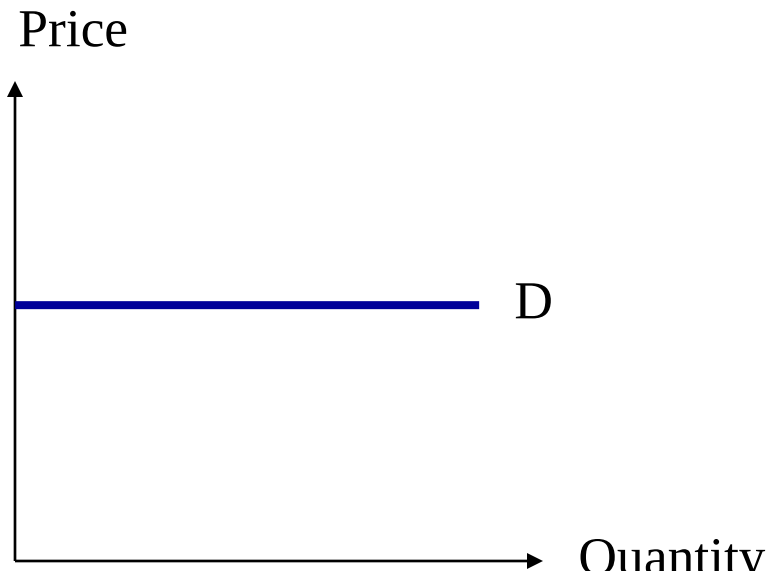
- Negative according to the "law of demand."

Elastic: $\left|E_{Q_X, P_X}\right| > 1$

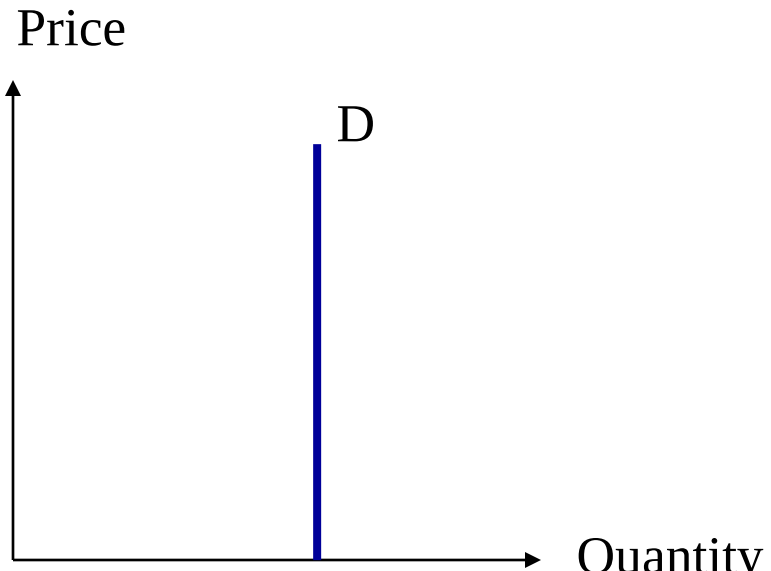
Inelastic: $\left|E_{Q_X, P_X}\right| < 1$

Unitary: $\left|E_{Q_X, P_X}\right| = 1$

Perfectly Elastic & Inelastic Demand



Perfectly Elastic ($E_{Q_X,P_X} = -\infty$)

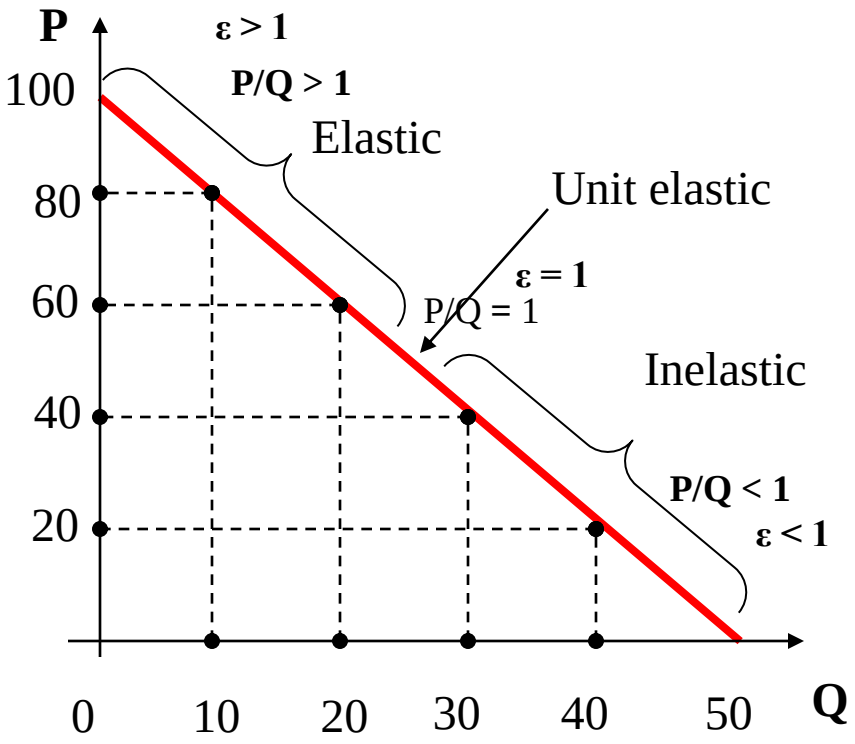


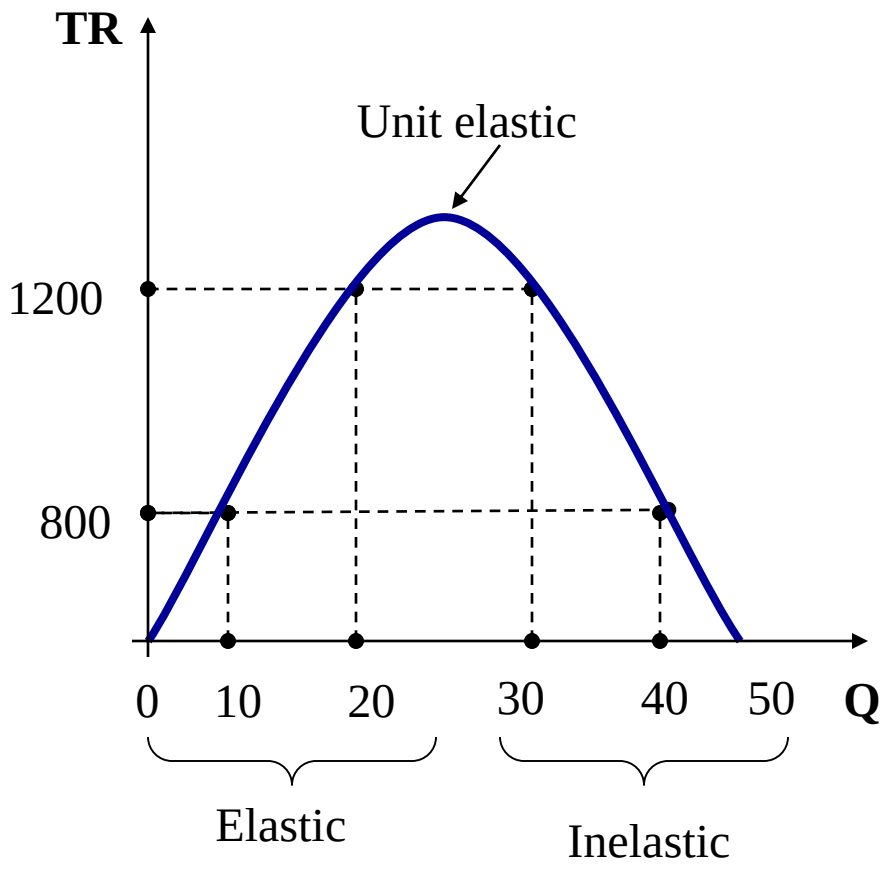
Perfectly Inelastic ($E_{Q_X,P_X} = 0$)

Own-Price Elasticity and Total Revenue

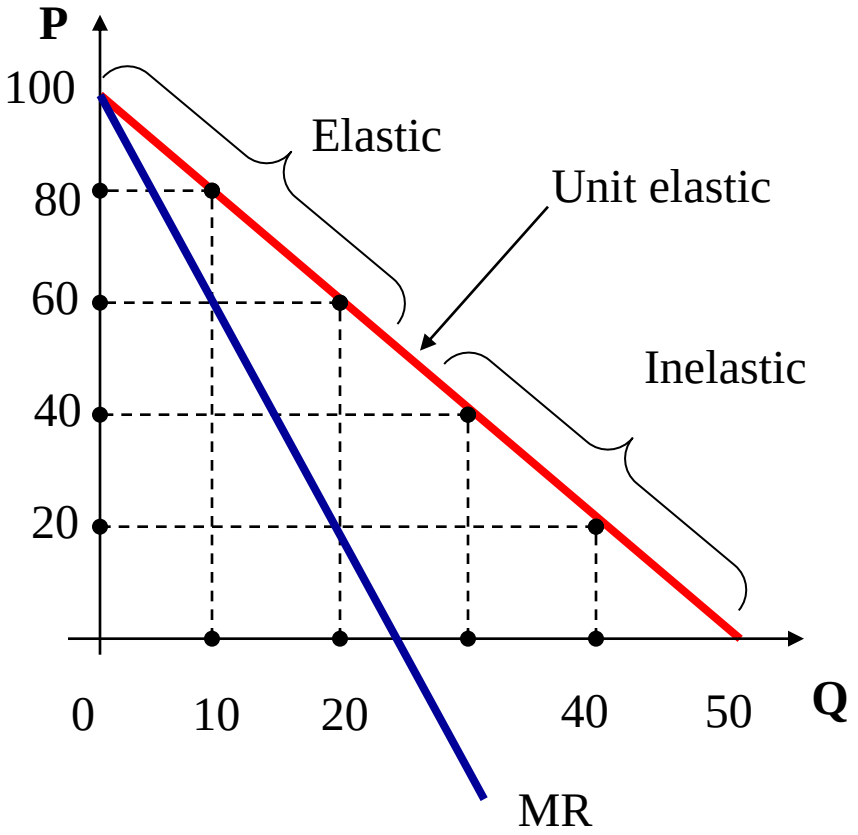
- Elastic
  - Increase (a decrease) in price leads to a decrease (an increase) in total revenue.
- Inelastic
  - Increase (a decrease) in price leads to an increase (a decrease) in total revenue.
- Unitary
  - Total revenue is maximized at the point where demand is unitary elastic.

Elasticity, Total Revenue and Linear Demand





Demand, Marginal Revenue (MR) and Elasticity



- For a linear inverse demand function, MR(Q) = a + 2bQ, where b < 0.
- When
  - MR > 0, demand is elastic;
  - MR = 0, demand is unit elastic;
  - MR < 0, demand is inelastic.

Factors Affecting Own Price Elasticity

- Available Substitutes
  - The more substitutes available for the good, the more elastic the demand.
- Time
  - Demand tends to be more inelastic in the short term than in the long term.
  - Time allows consumers to seek out available substitutes.
- Expenditure Share
  - Goods that comprise a small share of consumer’ s budgets tend to be more inelastic than goods for which consumers spend a large portion of their incomes.

Uses of Elasticities

- Pricing.
- Managing cash flows.
- Impact of changes in competitors' prices.
- Impact of economic booms and recessions.
- Impact of advertising campaigns.
- And lots more!

Example 1: Pricing and Cash Flows

- According to an FTC Report by Michael Ward, AT&T's own price elasticity of demand for long distance services is -8.64.
- AT&T needs to boost revenues in order to meet it's marketing goals.
- To accomplish this goal, should AT&T raise or lower it's price?

Answer: Lower price!

- Since demand is elastic, a reduction in price will increase quantity demanded by a greater percentage than the price decline, resulting in more revenues for AT&T.

Example 2: Quantifying the Change

- If AT&T lowered price by 3 percent, what would happen to the volume of long distance telephone calls routed through AT&T?

Answer

- Calls would increase by 25.92 percent!

$$E_{Q_X, P_X} = -8.64 = \frac{\%\Delta Q_X{}^d}{\%\Delta P_X}$$

$$-8.64 = \frac{\%\Delta Q_X{}^d}{-3\%}$$

$$-3\% \times (-8.64) = \%\Delta Q_X{}^d$$

$$\%\Delta Q_X{}^d = 25.92\%$$

Example 3: Impact of a change in a competitor's price

- According to an FTC Report by Michael Ward, AT&T's cross price elasticity of demand for long distance services is 9.06.
- If competitors reduced their prices by 4 percent, what would happen to the demand for AT&T services?

Answer

- AT&T's demand would fall by 36.24 percent!

$$E_{Q_X, P_Y} = 9.06 = \frac{\%\Delta Q_X{}^d}{\%\Delta P_Y}$$

$$9.06 = \frac{\%\Delta Q_X{}^d}{-4\%}$$

$$-4\% \times 9.06 = \%\Delta Q_X{}^d$$

$$\%\Delta Q_X{}^d = -36.24\%$$

Interpreting Demand Functions

- Mathematical representations of demand curves.
- Example:

$$Q_X^{\,d} = 10 - 2P_X + 3P_Y - 2M$$

  - Law of demand holds (coefficient of P_X is negative).
  - X and Y are substitutes (coefficient of P_Y is positive).
  - X is an inferior good (coefficient of M is negative).