Module 4a: Market Elasticity

Marco Acosta
Indiana University

27/01/2023

Price Elasticity

Price Elasticity of Demand

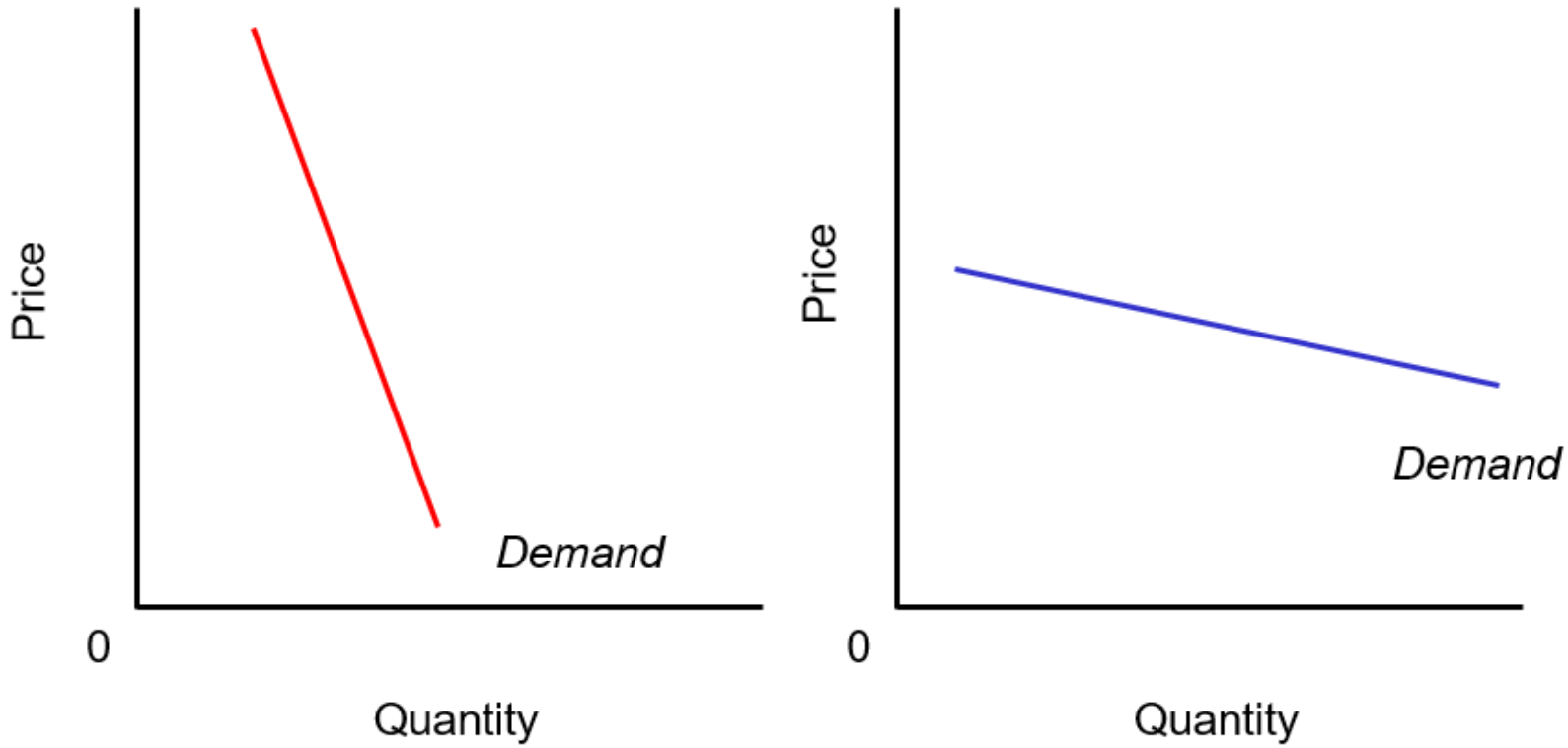

Figure 1: Elasticity of Demand

What the difference between the two curves?

Even though both curves follow the **law of demand** they are different due to how much quantity demanded changes due to price.

Price Elasticity

Price Elasticity of Demand E_d measures the responsiveness of quantity demanded to changes in price

Highly responsive = "elastic"

Highly unresponsive = "inelastic"

Definition: The percentage change in the quantity supplied/demanded that results from a one percent change in price.

Price Elasticity Supply and Demand

Demand elasticity: the percentage reduction in quantity demanded from a one percent increase in price.

Supply elasticity: the percentage increase in quantity supplied from a one percent increase in price.

Calculating Elasticity

Elasticity Formula

From the definition, elasticity equals:

$$\frac{\%\Delta Q}{\%\Delta P}$$

We have that $\%\Delta Q = \Delta Q/Q$ and $\%\Delta P = \Delta P/P$

$$\frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q}{\Delta P}\frac{P}{Q} = \frac{1}{slope}\frac{P}{Q}$$

The two definitions are useful in different situations:

- If you are given a pair of P/Q combos, use the first formula
- If you are given a straight-line demand curve, you can use the second formula instead.

Formulas Interpretation

Relative quantities only elasticity is measuring the change in quantity relative to the change in price.

The explicit calculation of the demand elasticity **always negative (or 0)**, however, we use **absolute value**.

The elasticity of demand and supply is **unit-free**.

Example of Demands with Different Elasticities

Two demand curves with different elasticities.

As we move along the demand curve, the same change in price leads to different changes in quantity demanded.

Figure 2: Elasticity of Demand Comparison

Three Types of Price Elasticity

1. Elastic Demand

The demand is considered **elastic** if the percentage change in quantity demanded is **larger** than the percentage change in price. All we are saying is that the numerator is **bigger** than the denominator.

$$\%\Delta Q > \%\Delta P$$

Then,

$$\infty \geq E_d > 1$$

If the elasticity of demand $E_d = \infty$ is perfectly elastic (horizontal demand curve).

1. Elastic Demand (Perfectly Elastic)

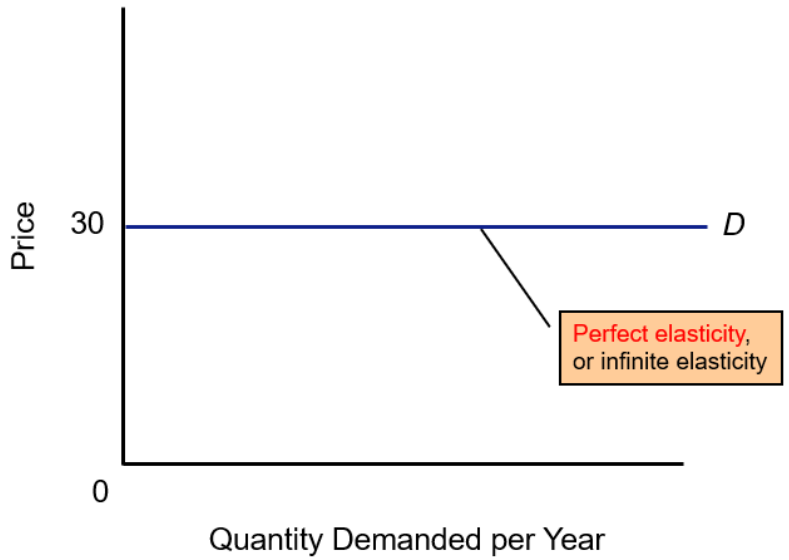

Figure 3: Perfectly Elastic Demand

2. Unit Elasticity of Demand

The demand is considered **unit elastic** if the percentage change in quantity demanded is **equal** than the percentage change in price. All we are saying is that the numerator is **equal** to the denominator.

$$\%\Delta Q = \%\Delta P$$

Then,

$$E_d = 1$$

3. Inelastic Demand

The demand is considered **elastic** if the percentage change in quantity demanded is **smaller** than the percentage change in price. All we are saying is that the numerator is **smaller** than the denominator.

$$\%\Delta Q < \%\Delta P$$

Then,

$$0 \leq E_d < 1$$

If the elasticity of demand $E_d = 0$ is perfectly inelastic (vertical demand curve).

3. Inelastic Demand (Perfectly Inelastic)

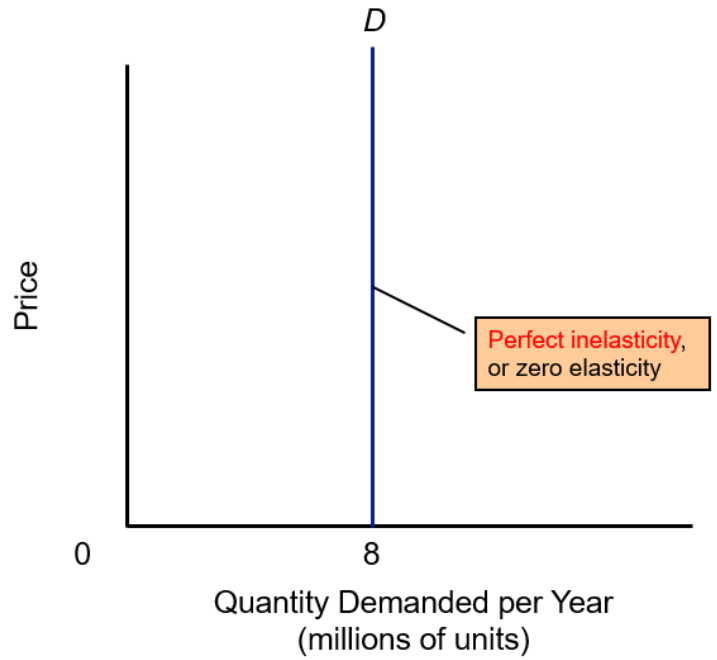

Figure 4: Perfectly Inelastic Demand

Elasticity and Total Revenue

Elasticity and Total Revenue

What happens to total revenue if price increases?

The total revenue from the sale of good or service equals the price of the good multiplied by the quantity sold.

$$Total \quad Revenue = Price * Quantity$$

If the *Price* increases, *Quantity* falls, so it's not clear what happens to total revenue.

When the price changes, total revenue also changes, but a rise in price doesn't always increase total revenue.

Elasticity and Total Revenue (Example)

Suppose your marginal cost is equal to zero, and you are the owner of a streaming platform.

Marketing suggests reducing price from \$10/mo to \$9/mo *10%* price cut.

You also know that at \$10/mo you will have 30 million subscribers, and at \$9/mo, subscriptions will go up by 900,000.

What happens to your revenue?

Revenue added 900,000s x \$9/s = \$8,100,000 in new subscriptions.

Lost 30,0000s x \$1/s = \$30,000,000 in revenue from current subscribers.

$$\Delta TR = -\$21,900,000$$

Elasticity and Total Revenue

What is the relation between elasticity and Total Revenue?

From the previous example we have a price cut from \$10 to \$9 or $\%\Delta P = 10\%$

And a change in quantity from 30 million to 30.9 million or $\%\Delta Q = 3\%$

How price-sensitive is their demand?

Demand increased by 3% (to 30.9m)

$$E_d = \frac{\%\Delta Q}{\%\Delta P} = \frac{3}{10} = 0.3$$

We can infer that if we are in the **inelastic part** of the demand and there is a price decrease **total revenue** will decrease.

Elasticity and Total Revenue Relation

The **total revenue test** is a way to estimate the price elasticity of demand by observing the change in total revenue that results from a price change respect to a price cut.

- If a price cut increases total revenue, demand is elastic.
- If a price cut decreases total revenue, demand is inelastic.
- If a price cut leaves total revenue unchanged, demand is unit elastic.

Now let's look at the causes of elasticity

Elasticity Determinants

Determinants of Price Elasticity of Demand

1. Existence of substitutes

The closer the substitutes and the more substitutes there are, the more elastic is demand.

- Necessities vs. luxuries
- Convenience gas and snacks (inelastic)

2. Share of the budget

The greater the share of the consumer's total budget spent on a good, the greater is the price elasticity.

- Cars (elastic) vs. Gum (inelastic)

3. The length of time allowed for adjustment

The longer any price change persists, the greater is the price elasticity of demand.

The length of time allowed for adjustment

	Estimated Elasticity	
Category	Short Run	Long Run
Air travel (business)	0.4	1.2
Air travel (vacation)	1.1	2.7
Beef	0.6	N.A.
Cheese	0.3	N.A.
Electricity	0.1	1.7
Fresh tomatoes	4.6	N.A.
Gasoline	0.2	0.5
Hospital services	0.1	0.7
Intercity bus service	0.6	2.2
Physician services	0.1	0.6
Private education	1.1	1.9
Restaurant meals	2.3	N.A.
Tires	0.9	1.2

Figure 5: Long vs Short Run