

# Defining Elasticity

by Sophia



## WHAT'S COVERED

This tutorial will define elasticity and explain the difference between elastic, inelastic, and unit elastic demand.

Our discussion breaks down as follows:

1. What Is Elasticity?
2. Equation of Elasticity
3. Perfectly Inelastic Demand
4. Inelastic Demand
5. Perfectly Elastic Demand
6. Elastic Demand
7. Unit Elastic Demand

## 1. What Is Elasticity?

Let's begin with a quick review of the laws of supply and demand:

*As prices rise, consumers buy less and producers supply more.*

*As prices fall, consumers buy more and producers supply less.*

In this tutorial, we will be discussing exactly how *much* more or less, and if it is the same for every good.

**Elasticity** is the measurement of the change in quantity demanded or supplied which indicates the sensitivity of one variable to characteristics of another variable or income.

In this tutorial, it is easier to discuss this concept with quantity demanded.



HINT

In other tutorials, we will cover what happens when the prices of related goods change and how it affects the buying of a good or service, which is called cross-price elasticity. We will also discuss a change in income and its impact on consumer's purchasing habits. Or, we could look at this concept in the context of quantity supplied, meaning as prices change, how much do producers change the amount they are supplying? As you can see, elasticity can be applied in many different ways.

In today's lesson, though, we are focused on elasticity in the context of quantity demanded.

In other words, how much do people respond--by buying more or less--when something else changes, like price or income?

The answer is that it really depends on the good or service:

- How necessary is it?
- Are there close substitutes?
- How expensive is it?
- Is it addictive?



#### TERM TO KNOW

##### Elasticity

Measurement of change in quantity demanded (supplied) which indicates the sensitivity of one variable to characteristics of another variable or income

## 2. Equation of Elasticity

Now, elasticity is a proportion. The equation for elasticity is the percentage change in quantity-- how much people respond--divided by the percentage change in price.



#### FORMULA TO KNOW

##### Elasticity

$$E = \frac{\% \text{ change in quantity}}{\% \text{ change in price}} \text{ or } \frac{\% \Delta Q}{\% \Delta P}$$

Notice that for demand, elasticity will always be negative because the relationship between quantity and price is negative, as they move in opposite directions. If the price goes up, then people buy less.



#### HINT

In situations involving own-price elasticity, where the price of a good itself is changing, elasticity will always be negative and we can simply focus on absolute value. For other measures, we will need to pay closer attention to the sign of it.

For supply, it will always be positive because quantity and price move in the same direction. As prices go up, producers want to supply a greater quantity, and vice versa.

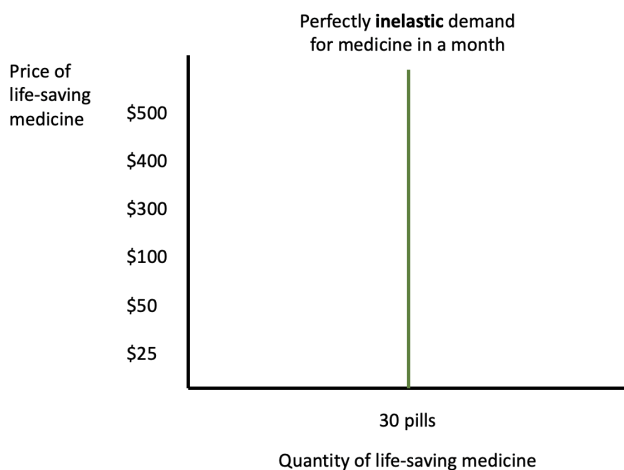
Elasticity Equation	
For Demand	For Supply
NEGATIVE, since Q & P move in opposite directions	POSITIVE, since Q & P move in the same direction

### 3. Perfectly Inelastic Demand

Let's look at an extreme example of monthly demand for life-saving medicine.

Notice we have the price of this life-saving medicine on the y-axis and the quantity that people are purchasing on the x-axis.

Now, no matter how expensive this medication gets, people are purchasing the exact same quantity--30 pills per month. Therefore, they are not responsive at all to a price change because a life-saving medicine is a necessity, and there are no substitutes.



One way to remember the concept of inelasticity is by noting that the more straight up and down something is, it looks like the capital letter "I"--just like the graph above. Also, think about a product that is very inelastic, like insulin. Both words start with the same letters--"In"--which can also help you to remember the concept.

**Perfectly inelastic** demand, then, is defined as demand for goods and services that remains the same regardless of a change in price, resulting in a vertical line on the demand curve.



**Perfectly Inelastic**

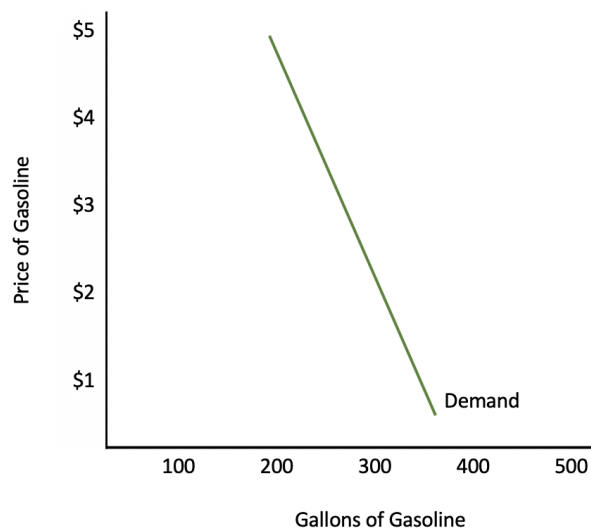
Demand for goods and services remains the same regardless of change in price, resulting in a vertical line on a demand curve

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## 4. Inelastic Demand

Now, most things in the world are not perfectly inelastic, but there are items like gasoline that are relatively inelastic.

This is not straight up and down, or completely vertical, because people do change their behavior somewhat as the price of gasoline goes up.



However, notice how the price can change significantly, yet consumers do not change their purchasing habits very much. This is because most people view gasoline--at least in the short term--as a necessity and without a substitute.



BIG IDEA

The more vertical the curve, the more inelastic the demand for something is.

Now, as prices goes up significantly, people do tend to stop going on long trips or they carpool, so there are things that can be done, but it is still relatively inelastic.

**Inelastic** demand is demand that does not respond easily to the changes of other economic variables.



TERM TO KNOW

### Inelastic

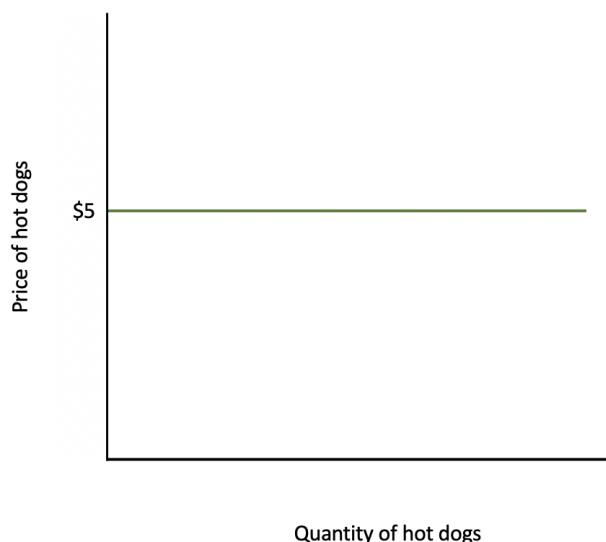
Demand that does not respond easily to the changes of other economic variables

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## 5. Perfectly Elastic Demand

Let's look at the opposite extreme, which is **perfectly elastic** demand.

Again, this is difficult to find in the real world, but we will use the hypothetical example of a hot dog stand that is one of 200 stands in a baseball stadium. They are all selling an identical product and are all charging \$5 for that identical hot dog.

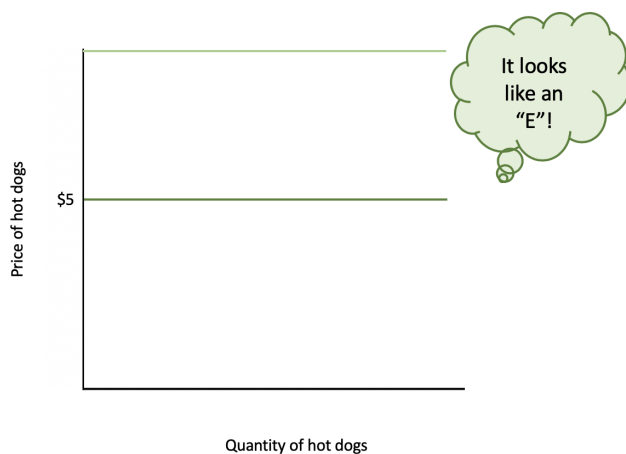


If one hot dog stand out of 200 decided to raise price, even marginally, no one would purchase a hot dog there. The quantity demanded, in theory, according to this curve, would drop to zero.

There is no ability to change price here; there is only one price they can charge. They can sell all that they want at this price, so there is no incentive to drop the price. Conversely, if they raise the price at all, nobody would purchase from them.



A visual way to remember the concept of perfectly elastic demand is if you place a line at the top of the graph, it looks like the letter "E," for elastic.



Perfectly elastic demand refers to demand for goods and services that changes significantly due to change in price, resulting in a horizontal line on the demand curve.



#### TERM TO KNOW

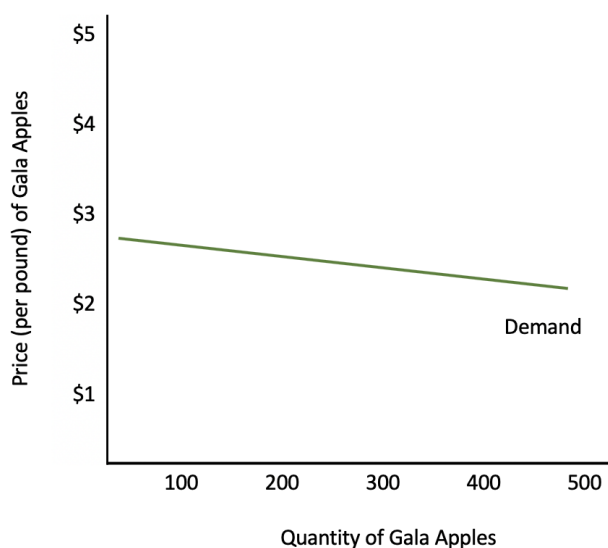
##### Perfectly Elastic

Demand for goods and services change significantly due to change in price, resulting in a horizontal line on the demand curve

## 6. Elastic Demand

However, not many things are perfectly elastic in the world, so here is an example of something that is simply **elastic**, which would be the demand for a specific brand of something.

Demand for a specific type of apples, like Gala apples, would be somewhat elastic, because there are many substitutes for a single brand of apples.



If Gala apples are the only ones changing in price, notice how even a small change in the y-axis, in price, results in a large change in quantity being purchased of Gala apples.

It is not completely horizontal, because prices could increase a bit and you would still see purchases of Gala apples by people who simply prefer them.



#### BIG IDEA

The more horizontal the curve, the more elastic it is going to be.

Elastic demand is defined as demand that responds easily to the changes of other economic variables.



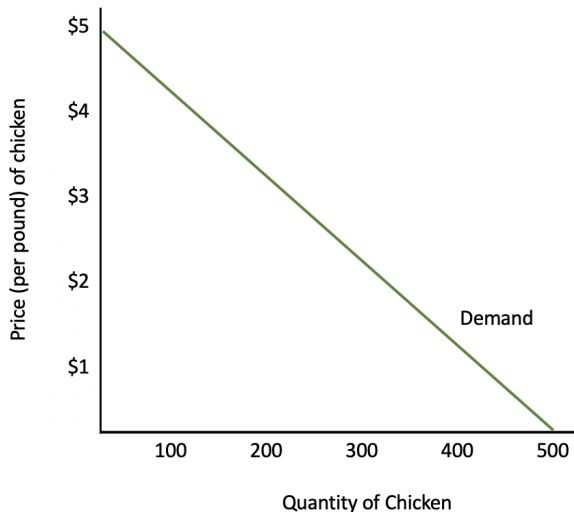
#### TERM TO KNOW

## Elastic

Demand that easily responds to the changes of other economic variable

# 7. Unit Elastic Demand

Finally, we have **unit elastic** demand, illustrated by this example using demand for chicken.



Along this curve, let's assume that the price of chicken rises by 10%, and as a result, consumers buy exactly 10% less chicken. Perhaps they buy beef instead of chicken that week.

Unit elastic means that the change in price proportionately changes the level of demand.



### TERM TO KNOW

#### Unit Elastic

Change in price proportionately changes the level of demand



### SUMMARY

Today we learned that **elasticity** measures how responsive consumers and producers are to a price change, and how to calculate it using the **equation of elasticity**. We also learned about the differences between the extremes of elasticity in demand, from **perfectly inelastic**, which is the straight up and down vertical curve, to **perfectly elastic**, which is the horizontal curve, and everything in between: **inelastic**, **elastic**, and **unit elastic**.

Source: This work is adapted from Sophia author Kate Eskra.



## TERMS TO KNOW

### Elastic

Demand that easily responds to the changes of other economic variables.

### Elasticity

Measurement of change in quantity demanded which indicates the sensitivity of one variable to characteristics of another variable or income.

### Inelastic

Demand that does not respond easily to the changes of other economic variables.

### Perfectly Elastic

Demand for goods and services change significantly due to change in price, resulting in a horizontal line on the demand curve.

### Perfectly Inelastic

Demand for goods and services remains the same regardless of change in price, resulting in a vertical line on a demand curve.

### Unit Elastic

Change in price proportionately changes the level of demand.



## FORMULAS TO KNOW

### Elasticity

$$E = \frac{\% \Delta Q}{\% \Delta P} = \frac{\% \text{ Change in Quantity}}{\% \text{ Change in Price}}$$