Price Elasticity

Price elasticity tells how much of an impact a change in price will have on the consumers' willingness to buy that item. It is known that if the price rises, the law of demand states that the quantity demanded of that item will decrease.

Elasticity of demand measures how responsive a product is to price changes:

Elasticity indicates a product's responsiveness to price change.

Inelasticity indicates a product is not responsive) to price changes

What Factors Impact the Elasticity of Demand for Products?

Elastic demand means that consumers of that good or service are highly sensitive (responsive) to changes in price. Usually, a good which is not a necessity or has numerous substitutes has elastic demand. Blue jeans are probably a good example of this kind of product, since there are so many brands of them.

Inelastic demand means that consumers of that good are not highly sensitive (unresponsive) to price changes. If the price of an inelastic good, say cigarettes, rises by, say, 10 percent, sales maybe will decrease by only 1 percent. Consumers will still buy that good, typically because it is essential or has no substitutes.

Review of Total Revenue

Total revenue is the quantity of a good sold multiplied by its price.

R(p) = p q(p)

It is a measure of how much money a company makes from selling its product, before any costs are considered. Obviously, the goal of a company is to maximize profits, and one way to do this is by increasing total revenue. The company can increase its total revenue by selling more items or by raising the price. Elasticity gives a vantage point on price where revenue can be maximized.

How to Calculate and Interpret Price Elasticity

Price elasticity of a good or service is essentially the percent change in quantity demanded of a good divided by percent change in the price for that good. Using calculus, and taking

infinitesimal changes in price as the method of coming up with the *non-calculus* formulation of elasticity of demand is given by the ratio of percent change in price to percent change in demand.

$$E(p) = \frac{\%\ \text{change in demand}}{\%\ \text{change in price}}$$

Elasticity of demand is always negative in this formulation because when price goes up, demand goes down. This is why the absolute value of E is used to get to the conclusion.

In the calculus formula for elasticity of demand, to avoid the need for absolute value, a negative is attached to the ratio, which is derived from the percent change formula, but is done so using incrementals and instantaneous rates, as usual:

$$E(p) = -\frac{p}{q}\frac{dq}{dp}$$

where q is the given *function* $q(p)$, and p is usually a simple variable; *dq/dp* is instantaneous change in demand with resepct to change in price, i.e., $q'(p)$.

$E > 1$ Indicates an elastic commodity, i.e., quantity demanded is highly sensitive to changes in price. Price changes will have a larger impact on quantity demanded.

$E > 1$ Indicates an inelastic commodity, i.e., quantity demanded is not sensitive to changes in price. Price changes will have a small impact on quantity demanded.

If a good/service has a price elasticity $= 1$, also called *unitary elasticity*, a 5-percent change in price will result in a 5-percent change in demand. This is the price at which revenue is maximized, which we typically calculate by:

$$R'(p) = 0.$$

Elasticity of demand and total revenue are closely related because they deal with the same two variables, p and q.

If your product has elastic demand, you can increase your revenue by decreasing the price of that good. p will decrease, but q will increase at a greater rate, thus increasing total revenue. If the product is inelastic, then you can actually raise prices, sell slightly less of that item but make higher revenue. As a result, it is important for management to know whether its product has inelastic or elastic demand.

The final formula is $R'(p) = q(1 - E)$

Notice the sign of marginal revenue is determined by the elasticity of the commodity.

When $E > 1$ (elastic demand), $R'(p) < 0$, marginal revenue is decreasing.

When $E < 1$ (inelastic demand), $R'(p) > 0$, marginal revenue is increasing.

When $E = 1$ (unitary elasticity demand), $R'(p) = 0$, revenue is maximized.

Examples of Elastic and Inelastic Commodities

Inelastic goods and services: Products that customers consider essentials or necessities tend to have less elasticity than products viewed as luxuries or discretionary. There are exceptions, however, based on customer base. Some examples of commodities that are inelastic are:

Food (grocery items like eggs, milk, bread), fuel for heating (natural gas and electric) and transportation (gasoline), basic clothing, cell phone and other basic electronics

Elastic goods and services: A product viewed as inessential is a less likely purchase as the price increases because the customer believes he can live without it. Some examples of commodities that are elastic are:

Meals eaten out, high-end electronics

Summary

Elasticity of demand is an economics concept that analyzes a relative change in demand (dq) associated with a change in price (dp). In general:

A product with *high elasticity* ($E > 1$) will see a relatively significant decrease in demand for it when price is increased a small amount above stated level p. Thus, revenue drops when price rises above p.

A product with *high inelasticity* ($E < 1$) sees relatively little decrease in demand changes when p is increased a small amount. Thus, revenue rises when price rises above p.

A product with unitary elasticity ($E = 1$) sees an identical percent decrease in demand to percent increase of price, and thus no net change in revenue with an increase or decrease in price p. This is the optimal price at which to sell a product in order to maximize revenue.

Further noted:

The more options a customer has to meet a particular functional or emotional need, the more elastic a product's demand. This is why a company with a monopoly has a huge advantage (NYSEG, for example, or at one time, phone companies, like ATT).

Customers without options and feel compelled to buy from the given provider. In highly competitive industries, price differentials are usually less among competing brands because of the ability customers have to select lower-priced alternatives. A closely related factor is the cost of switching brands. Cell phone customers often wait to change providers to avoid penalties if they are obligated to service contracts.

The affect a change in price has on the customer's budget also affects elasticity. A price change that would more severely affect a buyer's budget will lead to greater demand elasticity. A customer is more likely to stretch from $1 to $1.50 to get a snack or drink he prefers than he is to stretch from $200 a month to $300 a month on a car payment. Thus, lower-end products and services, especially those viewed as essential, typically allow more room for pricing adjustments.

Name Brand Value

From a company's perspective, effective advertising can also impact the elasticity of demand. Advertising is used over time to build up the customer's perception of worth of a given brand. If successful, a company can stretch its price more than other brand's in the same industry without as much of a reputation. High-end designer fashion brands are usually more inelastic, for instance, because buyers have strong preferences and are often willing to pay whatever is asked to get what they want.

This is why there are exceptions to elasticity of demand for certain attire. Many parents will buy their kids Uggs or North Face because these are seen as essential items for one's child to have in order to be accepted and popular, or for parents to be perceived as 'successful' or 'good' because they provide such items.