Price elasticity of demand

7-31-09

According to the economic **law of demand**, consumers will purchase less of a good if the price of the good increases.   This negative demand function allows economists to predict how consumers will react to changes in price.   **Price elasticity of demand** is the most common measure used to determine consumers' sensitivity to price. The price elasticity of demand is the proportional change in demand given a change in price. In other words, the price elasticity of demand measures how a percentage change in price of a good will affect demand for that good.

$$Price\ elasticity\ of\ demand = \frac{\%\ change\ in\ quantity\ demanded}{\%\ change\ in\ price}$$

Goods are said to be **inelastic** if consumers will continue to demand the good, regardless of the price. Insulin is an example of an inelastic good: patients that require insulin will continue to pay almost any price for it. Products are said to be **elastic** if consumers stop demanding the product as prices increase. Restaurant meals are an example of an elastic good: most consumers will eat at restaurants less as the price of a meal increases.[1]

There are several factors that affect elasticity:[2]

- **Substitutes**: When there are more substitutes for a good, elasticity is higher, as consumers can easily switch to other goods in response to price changes. Restaurant meals are elastic, as there are many restaurant options to choose from, as well as the ability to eat at home.
- **Transaction costs**: If there is a high cost involved with switching between products, then demand is relatively inelastic. For example, until the recent change in legislation, mobile phone service was an inelastic good, as carriers charged a penalty for switching carriers.
- **Percentage of income**: If a good represents a high proportion of a consumer's income, demand for that good will be more elastic. If a consumer spends a significant portion of his or her total income on restaurant meals, an increase in the price of a meal will decrease the consumer's demand for dining out. However, if a consumer only spends a small portion of his or her total income on restaurant meals, an increase in price of a meal is unlikely to decrease the consumer's demand.
- **Time**: In the short run, demand for goods tends to be inelastic, as consumers do not immediately notice or react to price changes. In the long run, demand for goods tends to be

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[1] "AS Markets & Market Systems: Price Elasticity of Demand." Tudor2u, accessed July 21, 2009. www.tutor2u.net/economics

[2] ibid

elastic, as consumers have the opportunity to change their spending habits. Airline travel is inelastic in the short-term but elastic in the long run.

- **Necessity and luxury**: As a good becomes more necessary for a consumer, elasticity decreases, as the consumer will purchase the good at nearly any price. Goods that are considered luxury items are more elastic, as consumers can do without them. For example, consumers addicted to cigarettes or alcohol will purchase these goods at almost any price.
- **Breadth of definition**: If the definition of the good is broad, elasticity will be lower. For example, food in general has a low elasticity, whereas a brand name cereal will have higher elasticity.

The value of the price elasticity of demand determines how elastic or inelastic the demand for that good is. Table 1 below shows the value and meaning of various price elasticities of demand.[3]

TABLE 1	
Price Elasticity of Demand (PED)	
Value	**Meaning**
PED = 0	**Perfectly inelastic**: consumer demand does not change at all when the price of a good changes
-1 < PED < 0	**Relatively inelastic**: consumers are relatively insensitive to changes in price
PED = -1	**Unit elastic**: the change in consumer demand for a good is equal to the change in the price of the good
- ∞ < PED < -1	**Relatively elastic**: consumer demand is relatively sensitive to changes in price
PED = - ∞	**Perfectly elastic**: consumer demand is completely sensitive to changes in price (any increase in price will cause demand to drop to zero)

Table 2 below shows some of the estimated price elasticities of demand for various goods and services related to the convention center expansion financing options.[4]

| TABLE 2	
Estimated Price Elasticities of Demand	
Inelastic Goods	**Estimated Elasticity of Demand**
Airline travel (short-run)	-0.1
Taxi (short-run)	-0.6
Elastic Goods	**Estimated Elasticity of Demand**
Restaurant meals	-2.3
Airline travel (long-run)	-2.4
Hotel rooms (in Hawaii)[5]	-1.5

[3] ibid
[4] Anderson, Patrick L., Richard D. McLellan, Joseph P. Overton. Gary L. Wolfram. "Price Elasticity of Demand." Makinac Center for Public Policy, November 13, 1997. http://www.mackinac.org/article.aspx?ID=1247
[5] Fujii, E., M. Khaled, J. Mak. "The Incidence and Exportability of Hotel Room Taxes: Some Further Estimates," Working Paper No. 88-9. University of Hawaii and Victoria University, New Zealand, February 1988.

Price elasticity of demand is an important measure for **revenue maximization**. If the price elasticity of demand for a product is inelastic, an increase in the price of the product will cause revenue to increase: if the price of insulin increases, the revenue for insulin producers increases. If the price elasticity of demand for a product is elastic, an increase in the price of the product will cause revenue to decrease: if the price of sugar increases, the revenue for sugar producers decreases. If the price elasticity of demand for a product is **unit elastic**, an increase in the price of a product is equal to the corresponding increase in the demand of the product. Revenue is maximized when consumer demand is unit elastic.

The price elasticity of demand for a good can change depending on the price of the product. In the graph below, revenue is maximized when the price elasticity of the product is unit elastic, at point P_0 and Q_0. If the price of the product decreases to P_1 the price elasticity of demand for the product becomes inelastic as consumers demand more of the product. Conversely, if the price of the product increases to P_2, the price elasticity of demand for the product becomes elastic as consumers decrease demand for the product. Therefore, if a taxi an inelastic good, the price elasticity of the taxi may become elastic if the price increases past the point of unit elastic demand.[6]

Price ($)

Elastic
Demand

P_2

Unit Elastic Demand

P_0

Inelastic
Demand

P_1

Quantity

Q_2 Q_0 Q_1
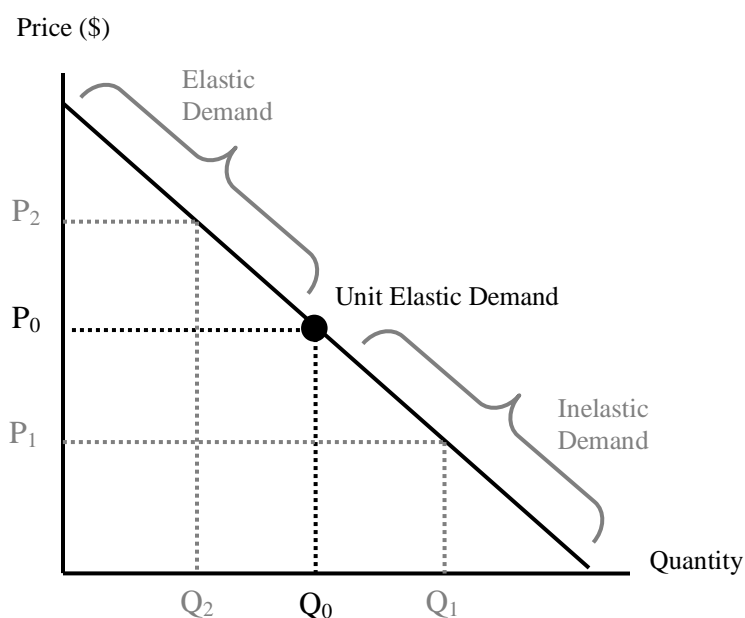
The price of related goods can also impact consumers' sensitivity to changes in price. **Cross-price elasticity of demand** is the proportional change in demand of one good (Good X) given a change in price of another good (Good Y).

$$Cross-price\ elasticity\ of\ demand = \frac{\%\ change\ in\ quantity\ demanded\ of\ Good\ X}{\%\ change\ in\ price\ of\ good\ Y}$$

Some goods are **substitute goods**, such as public transportation and taxis. For example, if the price of taxis increases significantly, consumers' demand for public transportation will increase because consumers will substitute away from the more expensive service. Other goods are **complement goods**, such as airline tickets and rental cars. If the price of airline tickets increases, consumers'

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[6] "Pricing in Mass Markets: Price Elasticity." University of Melbourne, Melbourne Business School, accessed July 24, 2009. http://www.mbs.edu/home/jgans/mecon/value/Segment%203_3.htm

demand for airline tickets will decrease and rental cars will decrease. As hotel rooms, rental cars and restaurant meals are most likely all complementary goods for tourists in San Diego, rate or tax increases for any one of those goods could decrease consumer demand for the whole package of goods.[7]

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[7] ibid