University of Notre Dame
Department of Finance
Economics of the Firm
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Self Assessment Quiz #3:

1) Suppose that you have the following demand curve:

$$Q = 400 - 5P + 3I$$

Where P is price and I is average income (in thousands). Assume that average income is currently $50,000.

a) Calculate the point price elasticity at prices of $50 and $60.

First, substitute out income:

$$Q = 400 - 5P + 3(50) = 550 - 5P$$

At a price of $50: $Q = 550 - 5(50) = 300$

At a price of $60: $Q = 550 - 5(60) = 250$

At a price of $50: $\varepsilon = -5\left(\frac{50}{300}\right) = -.83$

At a price of $60: $\varepsilon = -5\left(\frac{60}{250}\right) = -1.2$

b) Calculate the arc elasticity for the price range of $50 to $60.

$$\%\Delta Q = \left(\frac{250 - 300}{275}\right) = -.18$$

$$\%\Delta P = \left(\frac{60 - 50}{55}\right) = -.18$$

$$\varepsilon = \frac{-.18}{.18} = -1$$

c) If you were interested in maximizing revenues, what price would you charge?

To maximize revenues, we need to be at a point on the demand curve where elasticity of demand is equal to -1. From above, we can see that a price between \$50 and \$60 will work. If we calculate a point elasticity at \$55:

At a price of \$55: $Q = 550 - 5(55) = 275$

$$\varepsilon = -5\left(\frac{55}{275}\right) = -1$$

A \$55 price should maximize revenues

d) Calculate the point income elasticity at an income of \$50,000 and a price of \$50.

$$\varepsilon = 3\left(\frac{50}{300}\right) = .5$$

e) Suppose that you observe a 10% increase in average income (from \$50,000 to \$55,000). How much could you raise your price and still maintain your current level of sales?

We know that $\%\Delta Q = \varepsilon\%\Delta P + \varepsilon_I \%\Delta I$

At an income of \$50,000 and a price of \$50, we can substitute in the elasticities from above:

$\%\Delta Q = -.83\%\Delta P + .5\%\Delta I$

We know that the percentage change in income is 10 and we want the percentage change in quantity to be zero:

$0 = -.83\%\Delta P + .5(10)$

$.83\%\Delta P = 5$

$\%\Delta P = 6$

2) Suppose that you have estimated the following demand curve for gasoline:

$$\ln Q = 3.95 - .525 \ln P + .129 \ln Y - .211 \ln P_c$$

Where Q is gallons sold (in thousands) P is the price per gallon, Y equals average income (in thousands), and P_c is the average price of a car (in thousands).

a) What is the price elasticity of demand for gasoline? What is the cross price elasticity of demand?

The elasticity of demand is -.525 and the cross-price elasticity is -.211

b) Calculate a forecast for gasoline assuming a price of $2.50, average income equal to $50,000 and the average price of a car equal to $30,000.

$$\ln Q = 3.95 - .525 \ln(2.50) + .129 \ln(50) - .211 \ln(30) = 3.25$$

$$e^{3.25} = 25.9$$

c) What effect would a 15% rise in the price of a car have on forecasted sales? If you wanted to maintain your current sales forecast, by how much would you have to lower price?(Assuming average income is constant)

A rise in car prices of 15% would lower gasoline sales by .211*15=3.165%

We know that $\%\Delta Q = \varepsilon \%\Delta P + \varepsilon_{cp} \%P_c$

$$0 = -.525\%\Delta P - .211(15)$$
$$.525\%\Delta P = -3.165$$
$$\%\Delta P = -6$$

3) Suppose that you have the following data:

Year	**Sales**
2006	208
2007	235
2008	262
2009	***

a) Make a sales forecast for 2009 using an exponential smoothing model with w = .5. (let your forecast for 2006 equal actual sales).

2006 = 208

2007 = .5*208 + .5*208 = 208

2008: .5*208 + .5*235 = 221.5

2009: .5*221.5 + .5*262 = 241.75

b) Make a forecast for 2009 using a moving average model of length 2.

(262 + 235)/2 = 248.5