

University of Notre Dame
Department of Finance
Economics of the Firm
Fall 2009

Project #1: Due in class, Saturday, October 3rd.

1) Suppose that we have the following observations:

Observation #1: Honda Accords are selling for \$18,000. A Toyota Camry has a price of \$21,000, but Toyota is offering a \$4,000 rebate. You choose to purchase the Honda Accord.

Observation #2: A year later, Honda begins offering a \$2,000 rebate (Honda Accords still sell for \$18,000). Toyota has the same deal that they had a year ago (\$21,000 list price plus a \$4,000 rebate). You decide to buy the Toyota.

Explain why this would be considered irrational buyer behavior.

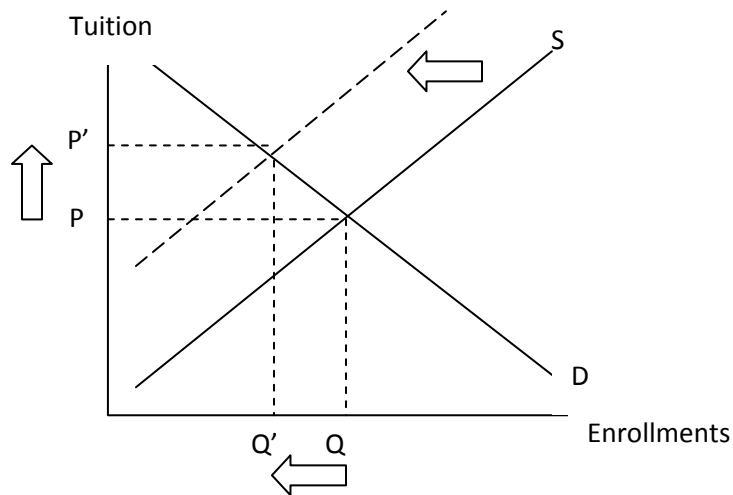
We assume that consumers are rational. This means that consumers make decisions in line with a set of preferences that are consistent over time. In this case, observation #1 suggests that this consumer strictly prefers Hondas to Toyotas (she was willing to purchase the Honda even though it was more expensive). However, in Observation #2, the behavior suggests that the consumer prefers the Toyota (she bought the Toyota even though it was more expensive).

- 2) Explain how each of the following events would affect the supply curve for education (by colleges), the demand curve for education (by potential students), total enrollments, and tuition rates.

(Note: There is not necessarily one correct answer for these questions. What I am interested in is that you can recognize how a change in supply or demand influences market price and market sales)

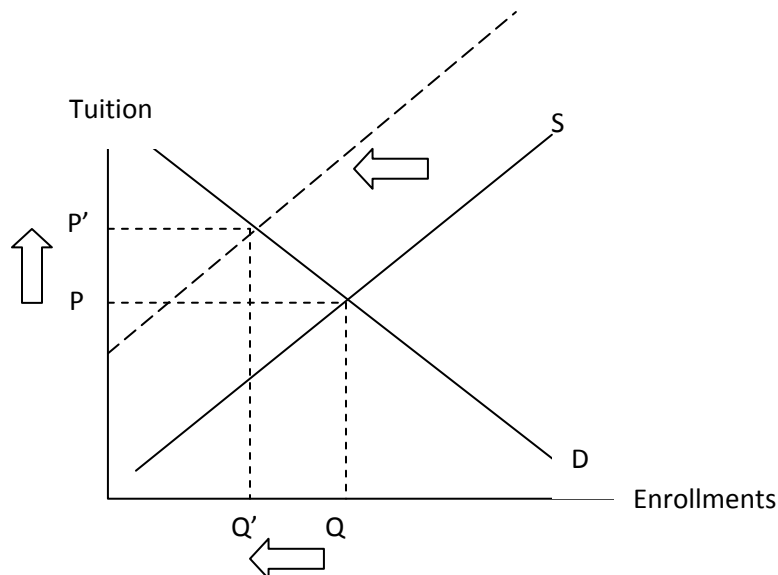
- a) University professors unionize and use their increased bargaining power to increase their salaries by 20%.

The main question here is: "Can we say that an increase in professor salaries affects the universities at the margin, or will this simply represent an increase in a fixed cost". If costs are affected at the margin, then the increase in costs lowers supply, raises price, and lowers enrollments.



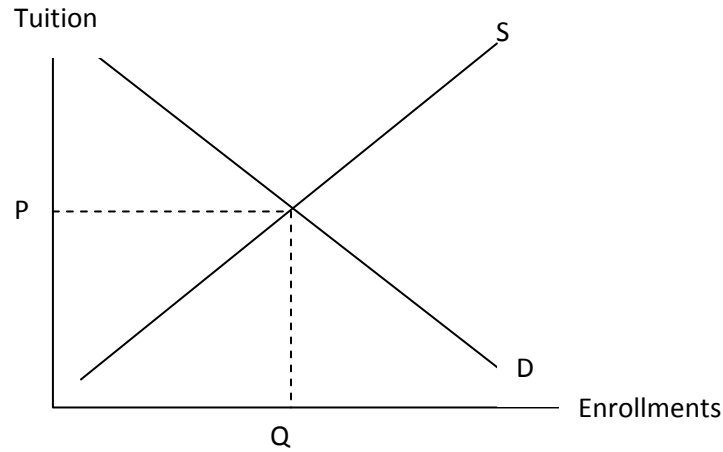
- b) Legislation is passed raising the minimum wage.

The rise in minimum wage will increase costs at the margin. Supply decreases, price rises, and enrollments drop.



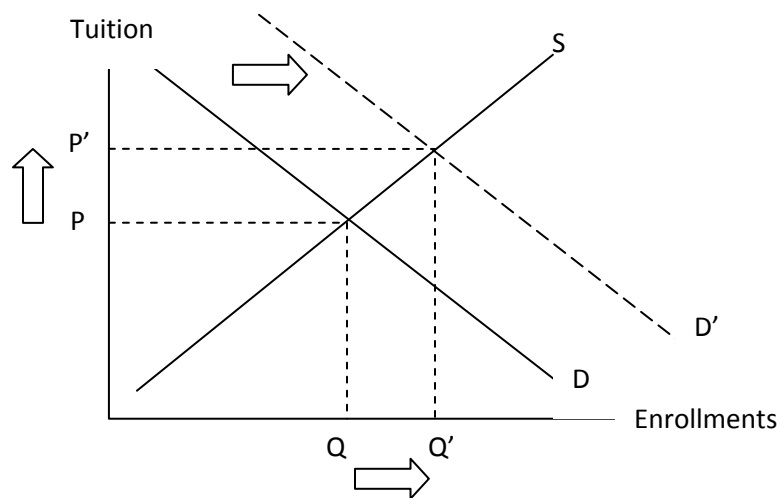
- c) Students nationwide file a class action lawsuit charging universities with unfair tuition policies. The result is that each university nationwide is fined \$200M.

In this case, the settlement represents an increase in a fixed cost. No decisions are affected.



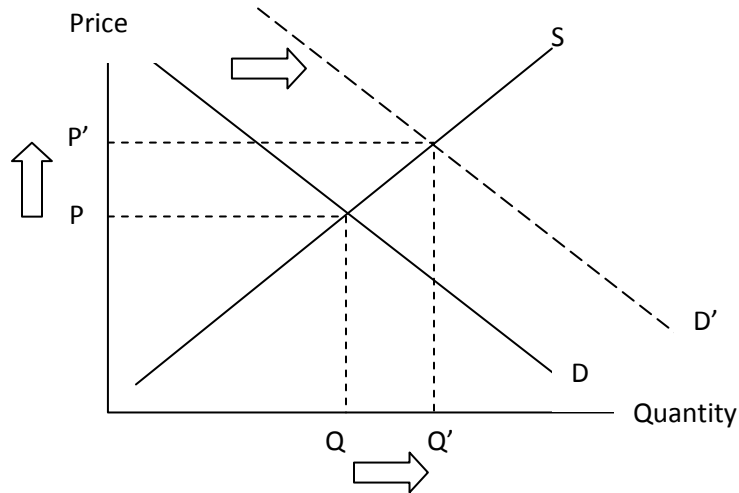
- d) Universities increase the availability of student aid.

The availability of aid raises demand. This will raise price and raise enrollments.



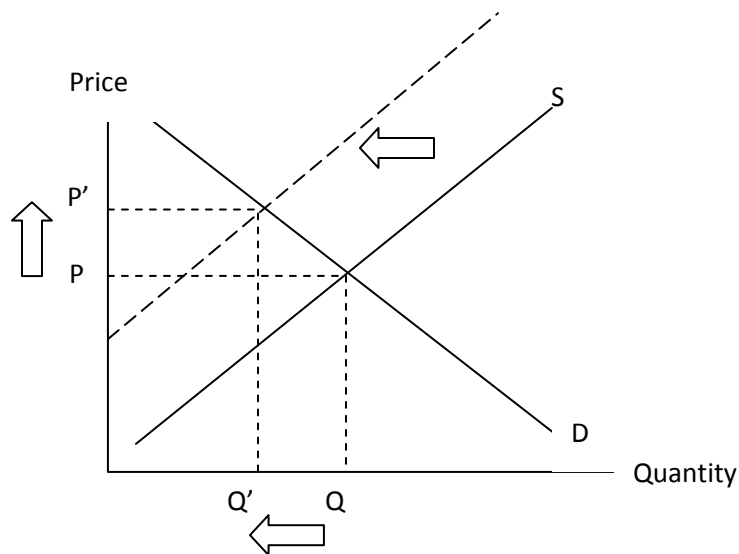
- 3) Explain how each of the following events would influence market prices/quantities
- The surgeon general announces that eating oranges lowers the risk of a heart attack (market for oranges)

The announcement should increase demand for oranges. This increase in demand should raise the market price and increase sales.



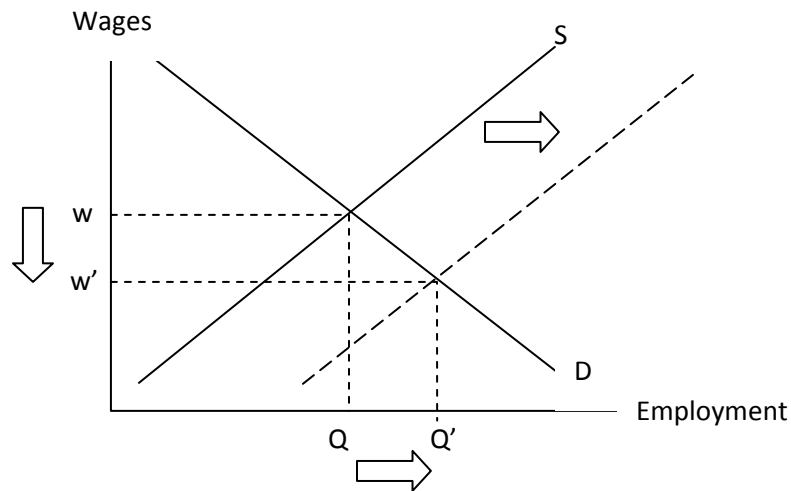
- Terrorists destroy a major oil pipeline in Iraq (market for oil)

The drop in supply will raise price and lower sales.



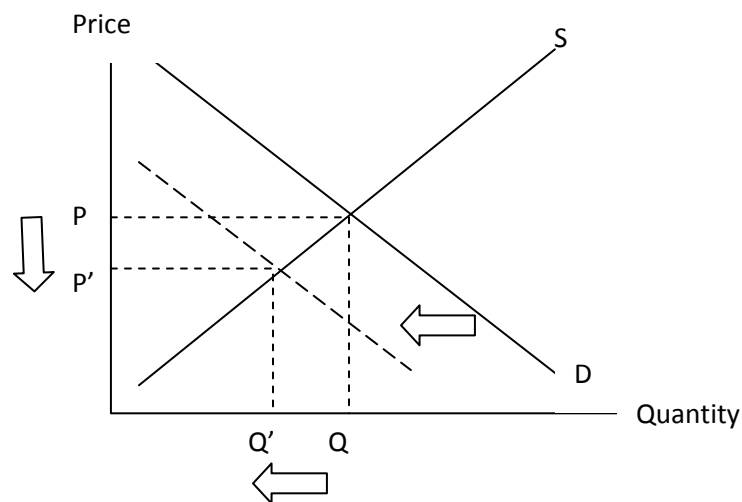
c) Immigration increases in the US by 20% (market for labor – what's the price here?)

The rise in supply should lower wages (the price of labor) and increase employment.



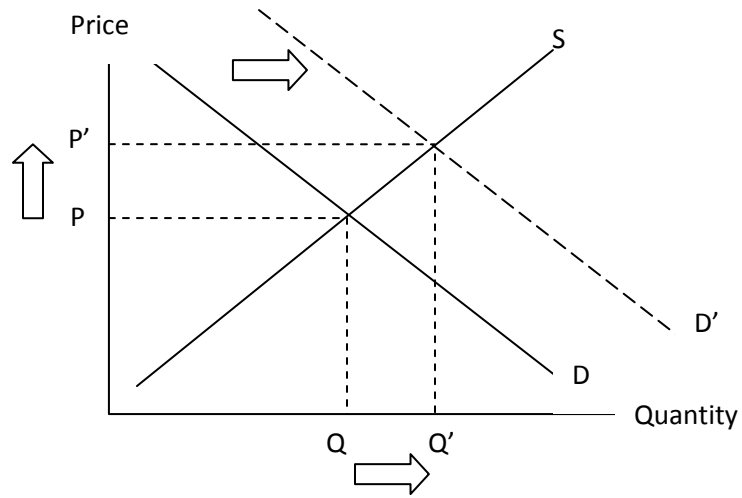
d) Consumers start getting their news from the internet (market for newspapers)

The drop in demand should lower price and lower sales.



e) Real income in the US increases (the market for BMW's)

The rise in income should increase demand for BMWs. This increase in demand should raise the market price and increases sales.



4) Suppose that you estimated the following demand curve.

$$Q = 400 - 6P + .005I$$

Q Represents quantity demanded, P represents price and I represents average income.

You know that the current market price is \$50 and average income is \$20,000

a) Calculate current demand.

$$Q = 400 - 6(50) + .005(20,000) = 200$$

b) Calculate the price elasticity of demand.

There are one of two ways to do this. First, we could simply alter price by some percentage, say, 10% and then calculate the new quantity demanded:

A 10% price increase would result in a new market price of \$55.

$$Q = 400 - 6(55) + .005(20,000) = 170$$

Now, calculate the percentage drop in sales:

$$\% \Delta Q = \left(\frac{170 - 200}{200} \right) * 100 = -15\%$$

Now, calculate elasticity:

$$\varepsilon = \frac{\% \Delta Q}{\% \Delta P} = \frac{-15}{10} = -1.5$$

Alternative: We can take the definition of elasticity and move some things around:

$$\varepsilon = \frac{\% \Delta Q}{\% \Delta P} = \frac{\Delta Q / Q}{\Delta P / P} = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{P}{Q} \right)$$

The first expression in parentheses represents the change in quantity per dollar change in price which is the interpretation of the coefficient in front of price on the demand curve. The second term is the current price and quantity. Plugging everything in, we get

$$\varepsilon = \frac{\% \Delta Q}{\% \Delta P} = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{P}{Q} \right) = -6 \left(\frac{50}{200} \right) = -1.5$$

- c) Calculate current market expenditures.

Total expenditures is market price times market sales:

$$\$50 * 200 = \$10,000$$

- d) If you wanted to increase revenues, would you raise or lower price? Explain.

In this example, elasticity is greater than one (in absolute value) meaning that sales are very responsive to price changes. In this case to raise revenues, you should lower price which will have the effect of raising sales.

- 5) Now, suppose, we know what demand and supply look like for restaurant meals:

$$Q_d = 40 - 2P + 3I$$

$$Q_s = 20 + 2P$$

Where Q is the number of meals sold (in thousands) per month, P is the average meal price and I is average income (in thousands). Assume that average income is equal to \$20,000.

- a) Calculate the equilibrium price and quantity.

In equilibrium, supply will equal demand:

$$Q_d = Q_s$$

$$40 - 2P + 3I = 20 + 2P$$

Plug in 20 for income and solve for price:

$$40 - 2P + 3I = 20 + 2P$$

$$40 - 2P + 3(20) = 20 + 2P$$

$$100 - 2P = 20 + 2P$$

$$80 = 4P$$

$$P = 20$$

Now, plug 20 into the supply curve to get sales: $Q_s = 20 + 2(20) = 60$

- b) Calculate the elasticity of demand at the equilibrium price.

Just like in question #4:

The first expression in parentheses represents the change in quantity per dollar change in price which is the interpretation of the coefficient in front of price on the demand curve. The second term is the current price and quantity. Plugging everything in, we get

$$\varepsilon = \frac{\% \Delta Q}{\% \Delta P} = \left(\frac{\Delta Q}{\Delta P} \right) \left(\frac{P}{Q} \right) = -2 \left(\frac{20}{60} \right) = -.67$$

- c) What effect would a 10% increase in average income have on the price of restaurant meals?

Repeat part (a) with Income = 22

$$40 - 2P + 3I = 20 + 2P$$

$$40 - 2P + 3(22) = 20 + 2P$$

$$106 - 2P = 20 + 2P$$

$$86 = 4P$$

$$P = 21.50$$

Now, plug 20 into the supply curve to get sales: $Q_s = 20 + 2(21.50) = 63$

- 6) Suppose that you have estimated the following regression (standard errors associated with each are below in parentheses):

$$Q_d = 300 - 4P + \varepsilon$$

$$(6.5) \quad (1.2) \quad (60.5)$$

- a) Calculate your forecast at the sample average of \$50.

For the forecast, plug in the \$50 price (the error term is mean zero)

$$Q_d = 300 - 4(50) + 0 = 100$$

- b) Calculate the 95% confidence interval for your forecast.

First, we need to calculate the standard error of the regression (this is just a formula which would be given to you:

$$SD = \sqrt{6.5^2 + 50^2(1.2)^2 - 2(50)(50)(1.2)^2 + 60.5^2} = 10.1$$

Note that in the second expression under the square root, the 50 is the point in which we are calculating the forecast. IN the third expression, the first 50 is the point at which we are calculating the forecast while the second 50 is the sample average.

A 95% confidence is 2 standard deviations in either direction of our forecast.

$$100 \pm 2*(10.1)$$

- c) Why might you be worried about calculating an estimate of demand at a price of \$70?

A price of seventy is a long ways away from the sample average of \$50. When we stray from the sample average, our forecast errors increase.

- 7) For this portion, you will need the data set entitled: Floridavote.xlsx. This is available for download at www.nd.edu/~jstiver – go to “Economics of the Firm”. In the class notes, I ran a regression to explain the number of votes Buchanan received in Palm Beach county in 2000. It’s not necessary, but it might be useful to reproduce the results in the class notes.
- a) Now, try and create a regression analysis to explain the votes received by Bush, Gore, or Nader. Try and get the best regression you can.

See excel sheet for details. I chose not to use logs for my Bush regression, so everything is in percentage terms:

- b) Explain the meaning of the coefficients in your regression equation
- A 1% increase in the Black Population lowers Bush’s vote percentage by .42%
 - A 1% increase in the Hispanic Population lowers Bush’s vote percentage by .24%
 - A 1% increase in the over 65 Population lowers Bush’s vote percentage by .61%
 - A 1% increase in the college Population lowers Bush’s vote percentage by .70%
 - A \$1,000 increase in income raises Bush’s vote percentage by .55%
- c) Calculate a forecast for votes using your regression.

My forecast is that Bush would get 253,326 votes (see excel sheet for details)