Econ 361: Intermediate Microeconomic Analysis
Prof. Sarah West
Spring 2012

Homework 1
30 points

1. (6 points) Use the tables found at the Occupational Employment Statistics archived data pages (http://www.bls.gov/oes/oes_arch.htm) and at the CPI page (http://www.bls.gov/cpi/#data) at the Bureau of Labor Statistics to answer the following questions. You should use the mean wage for all national occupations and the CPI for all urban consumers (current series).

a. What is the percentage change in the nominal average wage (average of all national occupations) in the U.S. between 2001 and 2009?

$Wage_{2001}$ = \$16.35/hour
$Wage_{2009}$= \$ 20.90/hour, so the %change in nominal wages is
(20.90 – 16.35) / 16.35 = 27.83%.

b. What is the percentage change in the real average wage (average of all national occupations) in the U.S. between 2001 and 2009?

CPI_{2001} = 177.70; $Wage_{2001}$ = \$16.35/hour
CPI_{2009} = 213.86; $Wage_{2009}$ = \$20.90/hour
Note: These are the May CPI index values as the wage data goes from May to May.

To find the real wage in 2009 in terms of 2001 dollars, evaluate:

(CPI_{2001}/CPI_{2009})* Nominal Wage 2009 = (177.70/213.86)*20.90 = \$ 17.37/hour = real wage in 2009. Because CPI_{2009} and nominal wages in 2009 are both in 2009 dollars, the units cancel out and we are left with 2001 dollars.

The %change in real wages over this period is (17.37-16.35)/16.35 = 6.24%.

c. What can you say about the change in workers' purchasing power between 2001 and 2009?

The purchasing power of the average worker in the U.S. grew by only 6.24% (not annualized) from May 2001 through May 2009. The average worker is better off in 2009 than they were in 2001 in terms of the amount of goods their wages can buy.

2. (6 points) Is demand for a good likely to be more or less elastic in the long run? Explain, making sure you use examples where relevant.

With the exception of durable goods, demand tends to be more elastic in the long run rather than in the short run. Demand tends to be more price elastic the longer that we allow consumers to respond to a price change by varying their purchasing decisions. In the short run, the demand may be inelastic, because it takes time for consumers both to notice and then to respond to price fluctuations. For example, after the two world oil price shocks of the 1970s - the "response" to higher oil prices was modest in the immediate period after price increases, but as time passed, people found ways to consume less petroleum and other oil products (mainly by buying more fuel efficient cars).

In the case of durables, we would expect demand to be more elastic in the short run than in the long run. To understand this, recall that an elasticity is all about change in quantity as a proportion of some base quantity. And, with durables, it is likely that the consumer needs only one or a few of the items, and that they have some choice over the good's "retirement" date. For example, if the price of refrigerators rises, then households are likely to hold on to their current refrigerator for longer. A change in the number of refrigerators purchased may be very low as a proportion of the total number owned, but very high as a proportion of the total sold. In the longer run, however, obsolescence and depreciation of the existing stock of refrigerators causes fewer households to put off buying a new one, and therefore the reduction in the quantity sold in the long run as a proportion of the number sold before the price increase is smaller than in the short run.

3. (6 points) Canada is considering increasing the price of alcohol in order to reduce alcohol consumption (this is true—they are considering establishing a minimum price). You have been hired to determine the likely effect of the new policy on the market for alcohol.

> **a. From published peer reviewed articles and from reputable websites, gather and write down the empirical estimates and other data required to predict the effect of an increase in price on the alcohol market. It may be helpful to read part (b) below first.**

> You need to know the price elasticity of demand (E^D_P), the price elasticity of supply (E^S_P), quantity demanded, and price. In Economic Inquiry, Grossman, Chaloupka, et al (1998) found that youth short term price elasticity of demand for alcohol is -0.41.In Microeconomics (Pindyck and Rubinfeld, 2009), the price elasticity of supply of liquor is quoted as 4.0. Numbeo reports that average price for 0.5 liter bottle of beer is 2.90. So P=$5.8/liter On average, 2.3 billion liters of Canadian beer was sold (CBC news).
> I use only beer to drive considerations for policy making on all alcohol.

> Thus, $E^D_P = -0.41$; $E^S_P = 4$; P = $5.8/Canadian Dollar; Q = 2.3 billion liters.

b. Use these estimates to derive the main equations in your model of the alcohol market. Provide example equations and link them explicitly to the estimates.

To estimate a linear demand curve of the form Q = a – bP, we first need to estimate b.

$$E^{D}_{p} = -b*(P/Q), \text{ so } -0.41 = -b\ (5.8/2.3) \text{ and } b = 0.16.$$

Next solve for a:

$$2.3 = a - (0.16)*(5.8)$$
$$a = 3.23$$

The linear demand curve is: $\underline{Q = 3.23 – 0.16*P}$

To estimate a linear supply curve of the form Q = c+dP, we first need to estimate d.

$$E^{S}_{p} = d*(P/Q), \text{ so } 4 = d(5.8/2.3) \text{ and } d = 1.59$$

Next solve for c:

$$2.3 = c + 1.59*(5.8)$$
$$c = -6.92$$

The linear supply curve is $\underline{Q = -6.92 + 1.59*P}$

c. List and explain three potential problems with your model. What should policymakers take care to consider when employing your model?

Three potential problems with this analysis are: 1) Using linear demand curves is only an approximation of the true demand curve, even if these elasticity estimates are exactly correct. The larger the change in price, the more unreliable these linear curves will be. 2) A point elasticity is a function of price and quantity, so the larger the change in price the more unreliable the estimates of price elasticities will be. 3) The elasticities used were calculated over different time periods. A better analysis would have used arc elasticities that were calculated over the same time period, and average prices and quantities for that period as well.

Lastly, I only use the price and quantity of beer to proxy P/Q for all alcohol due to data limitation. This is probably a fair but simplifying assumption, and ideally should use the P and Q information for all alcohol.

4. (4 points) A market has a demand curve is given by $P = 200 - Q$ and a supply curve given by $P = 0.5Q$. Is demand elastic or inelastic with respect to price? How about supply? Explain.

Using these supply and demand curves, solve for the price elasticity of both supply and demand.

First, solve for P and Q
D: Q = 200 – P
S: P = 0.5Q
So P = 66.67 and Q = 133.33

Note that to get the change in quantity over the change in price for supply, we need to solve for quantity in terms of price:

S: Q = 2P

As Q = 200 – P and Q = 2P
Price elasticity of demand = -1 * (66.67 / 133.33) = -0.5
Price elasticity of supply = 2 * (66.67 / 133.33) = 1

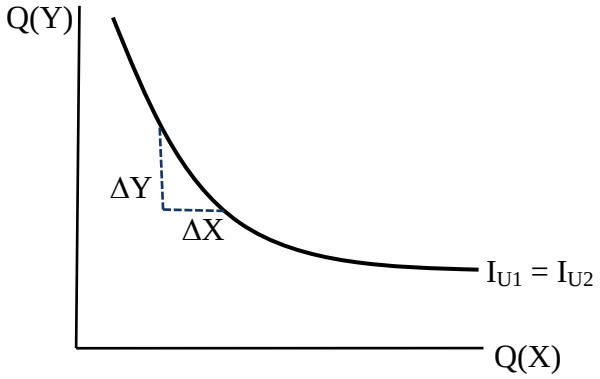
Demand is inelastic with respect to price (-0.5) and supply is unit elastic (1). A 1% rise in price would cause an approximate 0.5% fall in demand. A 1% increase in price would cause an approximate 1% reduction in supply.

5. (4 points) Write down a utility function that represents the same preferences as $U = x^{1/2}y^{1/2}$, and explain why you chose the function you did (you should explain what in general characterizes a set of functions that represent the same preferences).

$U = 2x^{1/2}y^{1/2}$ would represent the same preferences. In fact, the set of functions U = (x,y) which have MUx/MUy = y/x would represent the same preferences because utility is ordinal rather than cardinal. What matters is how much utility is derived from one good versus the other, not the total amount of utility. Both of these utility functions would provide the same rankings of different baskets of goods, so they represent the same preferences.

Mathematically, to show why $U = 2x^{1/2}y^{1/2}$ is the function we desire, we calculate the ratio of the marginal utilities, the MRS. It would be identical for both utility functions. For $U = 2x^{1/2}y^{1/2}$, Mux/MUy = y/x. For $U = x^{1/2}y^{1/2}$, Mux/MUy = y/x. The MRSx,y are the same for both utility functions, meaning that the preferences are the same. For any basket (x,y), consumers with either utility function would be willing to give up y/x units of y to receive on unit of x.

Graphically,



At any given basket of goods, the MRSx,y are equal for both utility functions. Because there is no U axis, the indifference curves look exactly the same, and for our purposes they are.

6. (4 points) Suppose that Sheila's marginal utility of consuming one more pack of M&Ms equals 5 utils, and her marginal utility of consuming one more Snickers bar also equals 5 utils. Is she maximizing utility? Explain.

One's utility is maximized when MRS equals to the relative price of two goods, ie. MUx/Px = MUy/Py, meaning the last dollar spent on each goods produces the same utility. MUx = MUy does not guarantee the above. Thus, if the price of M&M is different from that of Snicker bar, she is not maximizing utility.