Answers to First Midterm Exam
1) (30 points) The following is a true quote from a Wall Street investment banker describing
the shift in demand for financial professionals that occurred in the U.S. between the
1970s and the 1980s.

> In 1974 as a successful young investment banker with 8 years experience,
> I was paid less than my peers in the large industrial companies or utilities
> and had no benefits of significance. Everyone left the office at 5:00
> o'clock and it was resented if you tried to come into the office on
> weekends (doors locked, no staff, no lights, a/c almost off). By 1985 I
> was a mid-level partner earning $4 million a year, working 12-14 hour
> days and frequent weekends, and the busiest parts of the firm had second
> shifts of support staff every day and all weekend.

a) (20 points) Start with the market for financial professionals on Wall Street and
use additional markets as needed to write down a story that connects the shift in
demand for financial professionals and the salaries that business schools pay their
professors. For full credit, write down two different stories. Illustrate your story
(stories) with appropriate supply and demand curves.

Answer: One story involving three markets:

- High salaries for financial professionals stimulate more students to want an MBA and
the demand curve for places (i.e. admissions) in business schools shifts out.

- Colleges as a group respond to increased demand by offering more business school
admissions - existing MBA programs expanding, new business schools beginning, etc.

- Increased business school admissions lead to increased demand for business school
faculty.

# of Financial Professionals   # of places in MBA programs   # Bus. School Faculty.
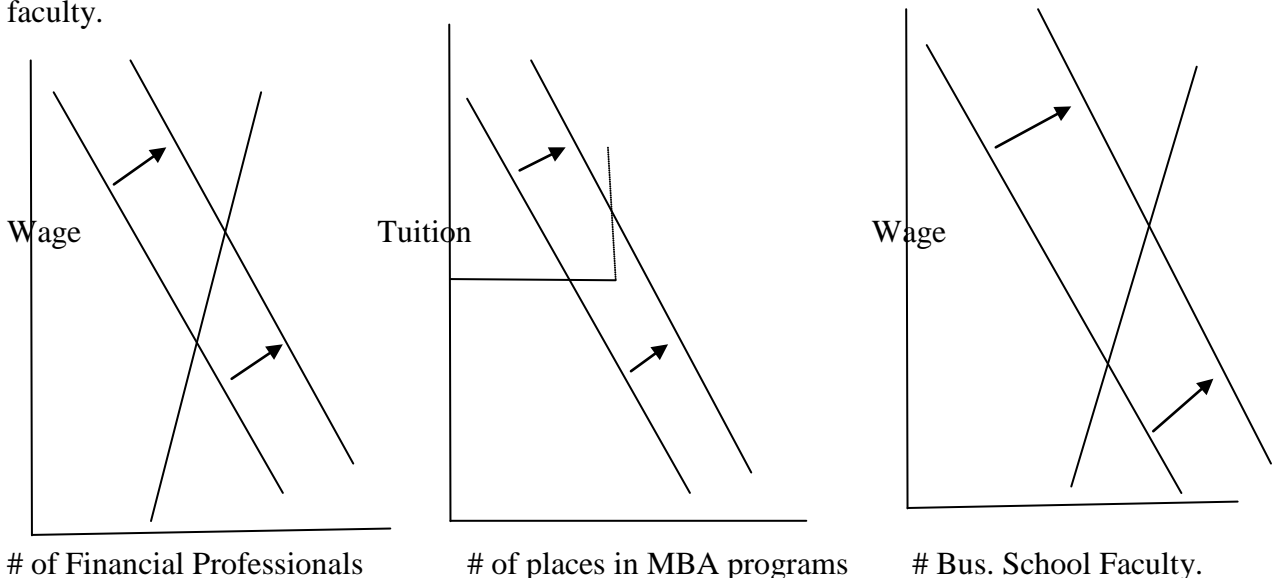
(Note – drawing the market for business school places could be like the Yogi Berra Restaurant problem since when demand exceeds supply, tuition may not rise enough to equate them.)

Writing down this story with three graphs was worth 15/20.

A second story (which actually has happened) is that financial houses tried to fill financial professional slots by hiring business school faculty directly. In this situation salaries at business schools (particularly for finance professors) had to rise to meet the competition – i.e. business school finance professors now had higher opportunity cost.

Financial Professionals

Business School Professors
(particularly in finance)
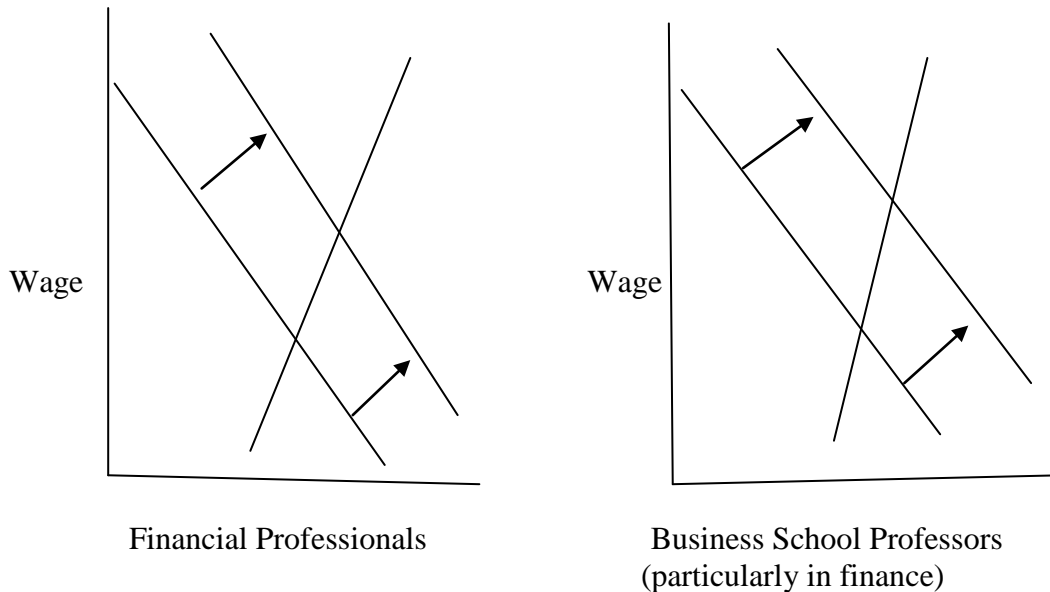
(Note in this case that the demand curves in the second graph include both the original business school demand and the added new demand from the financial sector – "Wall Street").

   b) (10 points) Between 2001 and 2007, there was a significant increase in U.S. automobile production (including production in foreign owned plants located in the U.S.) and a corresponding outward shift in demand for U.S. autoworkers. Nonetheless, there was no increase in U.S. autoworkers' wages.

   Use an appropriate supply and demand curve to illustrate the autoworkers' situation. Using basic economic ideas, and additional supply-demand curves as appropriate, explain what economic factors might account for the difference between autoworkers' wages over 2001-2007and investment bankers' wages in the 1970s/1980s.

Answer: The basic difference between the markets involves labor supply: there are many people who have the skills to be trained fairly quickly to work in automobile plants.

There are many fewer people who can be trained quickly to be financial professionals (see graph below). Many people gave the unionization of autoworkers as the main difference. Unions are important in wage setting **when there are a significant number of people available to do the job – i.e. when wages might otherwise be lower because the supply of workers is greater than the demand.** If there were a real shortage of auto workers, unions would not be needed to guarantee high wages since supply/demand would do it automatically.

Wage

# of Auto Workers
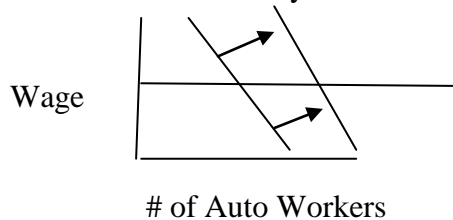
(25 points) During World War II, the government used rationing to limit people's consumption of gasoline, meat, sugar, etc., so that output could be diverted to the armed forces. People were given booklets of ration coupons. In a store, each scarce commodity had two prices: a ration requirement and a money price, and **purchasing the commodity required you to pay in both money and ration coupons**.

Consider Lou, our favorite consumer, who has a utility function defined over apples and hamburgers and faces a simplified ration system:

$$\text{Utility} = 6LN(\text{Apples}) + 4LN(\text{Hamburgers})$$

Money Prices: $P_{Hamburger} = \$5.00$, $P_{Apple} = \$1.00$, Income = $\$75.00$

Required Ration Coupons: $C_{Hamburger} = 15$, $C_{Apple} = 1$, Total Coupons = 120

a) (10 points) Use an appropriate diagram to carefully graph the combinations of apples and hamburgers that Lou can purchase given his income and his total ration coupons.

Answer: Lou's money budget constraint funs from 75 apples to 15 hamburgers. Lou's ration budget constraint runs from 120 apples to 8 hamburgers. This means the two budget constraints cross (see below). Because you have to pay in both money and cash, the more binding budget constraint is always the operative one. In other words, you can purchase anything in the set defined by the solid lines.

Apple

120   A   B   C

75

Hamburger

8   15
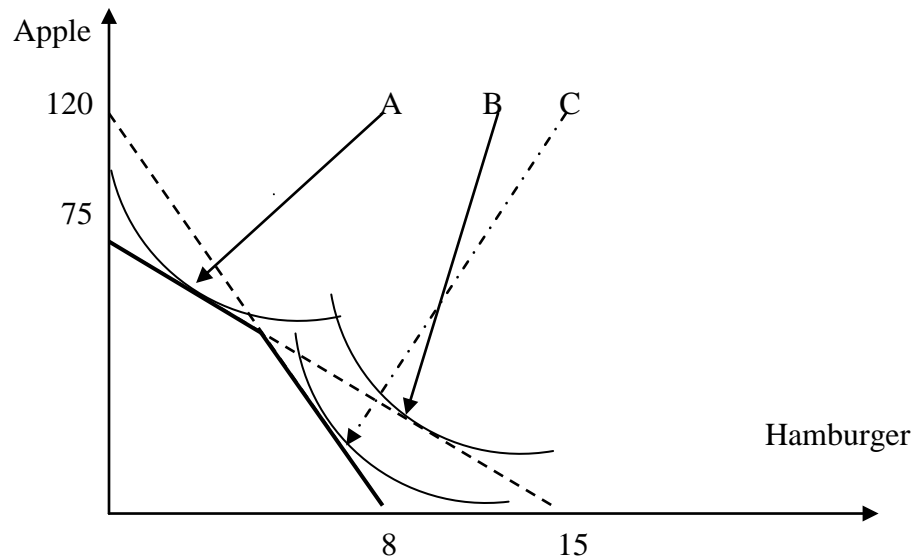
b) (15 points) Describe, as well as you can, how you would solve Lou's utility maximization problem: what equations you would use and how you would use them. **There is no need to actually calculate a solution** but your description of your solution method should be as complete as possible.

Answer: Think about the problem using trial and error.

 - Start by looking for the tangency between the utility function and the of money budget line. There are two possibilities: the tangency will occur in the relevant part of the money budget line (solid line) at a point like A. Alternatively the tangency will occur on the dotted portion of the budget line that is not relevant because you are limited by ration coupons (Point B).

If the tangency occurs at a point like A, you are done. Looking at the graph, you can see that if there is a tangency at A, there will be no higher indifference curve that is tangent on the relevant part of the ration coupon constraint – the other solid line segment. segment of the money budget constraint.

If the tangency occurs at a point like Point B, then look for the tangency between the utility function and the ration budget constraint. If that tangency occurs on the relevant part of the ration budget constraint (e.g. Point C), you are done.

If there is no tangency on the relevant portion of either constraint, maximum utility will occur at the corner where the two solid segments intersect. This is not a tangency per se because there is no "slope" at the corner but it is the best you can do.

This is not an easy problem and the point was to see how much progress you could make with it.

2) (35 points) In talking about supply and demand, we have always assumed that the quantity supplied can respond quickly to changes in demand. In reality, that's not always true. Consider the supply curve for pigs. Pigs take about 2 years from the time they are born to the time they are ready for market. Once they are ready for market, farmers start losing money if they keep them longer since the pigs must be fed but they don't grow any larger.

   a) (5 points) Given this description, draw two supply curves for pigs.

- A short run supply curve that shows how the supply of pigs responds within a month to a change in price.

- A long run supply curve that shows how the supply of pigs responds to a change in price after two years.

Price/Pig   Price/Pig

\# of Pigs (two week response)   \# of Pigs (2 year response)
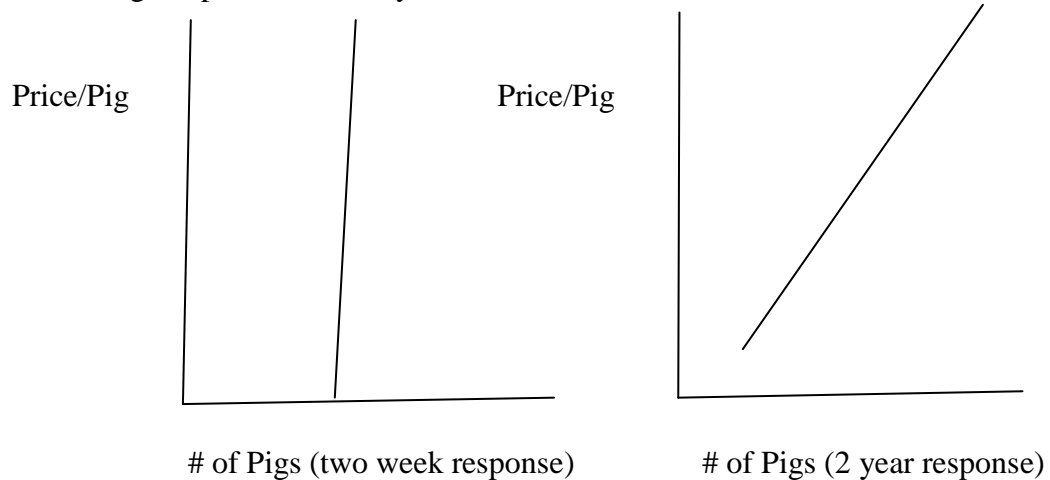
   b) (15 points) Suppose that farmers decide how many pigs to start raising today on the basis of today's price – that is, they assume that when the pigs are ready to be sold, the price will be the same as it is today. Then consider the following scenario:

- On October 5, the pig market is in long run equilibrium where the demand curve crosses the long run supply curve.

- On October 6, a page 1 article in the *Wall Street Journal* reports a medical study that shows that eating pork loin roast, ham, bacon, etc. helps maintain a youthful complexion well into a person's 80s.

Using appropriate diagrams, show the article's effect on the price and quantity sold of pigs this month.
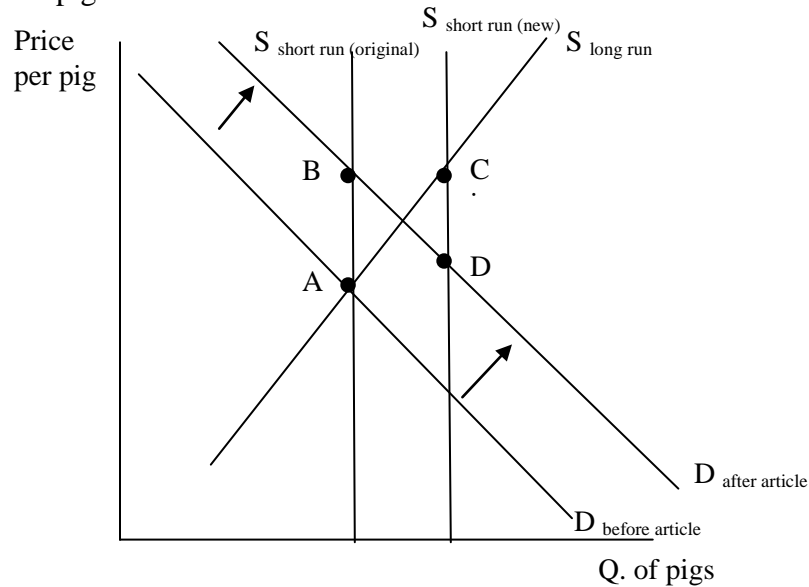
Answer: We start out knowing two things: First, the article will cause the demand curve to shift out. Second, the short run supply curve of pigs is inelastic so the increase in demand must lead to price changes but little or no quantity changes.

A = Original equilibrium. Because the problem starts out in equilibrium, the long run supply curve and the (inelastic) short run supply curve both pass through the equilibrium point.

B = the price and quantity after demand shifts out due to the *Wall Street Journal* article. Quantity doesn't change because the short run supply curve is inelastic, but price jumps up.

c) (15 points) Given the assumptions about farmers' production behavior, the price you diagram in (b) will also affect farmers' decisions about how many pigs to start raising today - pigs that will come to the market in two years. Using an appropriate diagram, show how many pigs they now choose to raise. In two years' time, when these pigs actually do come to market, will the farmers' expected price prove to be correct? Explain.

Answer: The quantity of pigs they choose to start raising now is at point C above. We get to C by taking the new high price at B and seeing where it intersects the long run supply curve.

We also know that in two years time when the pigs started today come to market, the farmer's price expectation won't prove to be correct. In the diagram above, when these

new pigs come to market in two years, the supply curve will be a vertical line at the quantity associated with point C. This vertical line intersects the demand curve at point D which is lower than the price at B/C.

4) (10 points) Just as we talk about the elasticity of a supply curve or a demand curve, we can talk about the elasticity of the tax system – the percentage change in tax revenue brought about per one percent change in tax rates.

For simplicity, suppose everyone works for the same hourly wage rate and their earnings are subject to a constant rate income tax. If that tax rate is reduced, people get to keep a greater fraction of every dollar they earn. The greater take-home pay represents an increased incentive to work and so people may choose to work more hours.

It follows that the effect of a tax cut on tax revenue involves two parts: less revenue collected per hour of work, and more hours of work. To summarize these effects, we can talk about the elasticity of the tax system.

The Governor of DUSP is considering a tax cut. She has the following information:

- All people in DUSP work for $20 per hour.

- All people pay taxes at a constant rate of 10%.

- The Total Tax Revenue is currently $24 million and the governor believes the government can get by on $21million dollars

- The elasticity of the tax system is .8

Using the standard point elasticity formula used in class, calculate the reduction in the tax rate that the governor is prepared to offer. (In your answer, think carefully about what it means to change a tax rate by a certain percent.)

Answer: The trick here is to distinguish a percentage change in the tax rate from a percentage point change in the tax rate. As the problem says, the formula for elasticity of the tax system is:

(ΔTax Revenue/Tax Revenue)/(ΔTax Rate/Tax Rate)

Filling in the numbers from the problem, we get: (3/24)/ (ΔTax Rate/.10) = .8

Or ΔTax Rate = .0156   That is, the governor is offering to cut taxes by 1.56 percent.

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