Amherst College
Department of Economics
Economics 58
Fall 2008

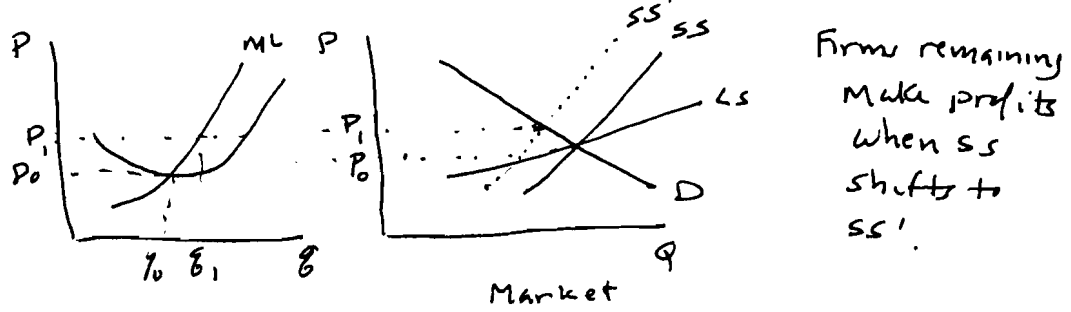
Name SOLUTIONS

Third Examination

There are three questions on this examination. Each is of equal weight in grading. Although the exam is designed to be completed in one hour, you may take up to **75 minutes** to complete your work.

1. The perfectly competitive model of price determination is the most thoroughly developed model in microeconomics. In this problem you will be asked to use the model to analyze how hurricane Katrina affected the market for gasoline. Throughout the problem you should assume that the prices of all gasoline inputs (including crude oil) remained constant. You should also assume that the demand for gasoline did not change throughout the period. A final part of the problem will ask you to think about whether the competitive model really describes this market.

a. Katrina disabled about 25 percent of U.S. gasoline refining industry. If we assume that 25 percent of all firms ceased production temporarily, show with a graph how this would affect the market for gasoline in the short run and how it would affect the position of each firm in the industry that was able to continue to produce.



Firms remaining make profits when SS shifts to SS'.

b. Suppose that the short-run elasticity of supply of gasoline is 0.2 and the short-run elasticity of demand for gasoline is –0.3. Provide an estimate of the extent to which prices will increase in the short run?

Use constant elasticity curves: $Q_D = aP^b = aP^{-.3}$

$Q_S = cP^a = cP^{+.2}$

Initial Equilibrium $aP^{-.3} = cP^{+.2}$ $P^{.5} = \frac{a}{c}$ $P_0 = \left(\frac{a}{c}\right)^2$

now supply shifts to $Q_S = 0.75cP^{.2}$

Equilibrium $P_1^{.5} = \left(\frac{a}{.75c}\right)^2 = \left(\frac{a}{c}\right)^2\left(\frac{1}{.75}\right)^2 =$

$P_0(4/3)^2 = P_0\,16/9$

So Price increases by $7/9 = 78\%$

Can also do this intuitively

c. For many years critics have proposed imposing a "windfall" profits tax on gasoline refiners (and other firms) when natural disasters occur. Suppose that "windfall profits" are defined as the increase in economic profits as a disaster and that the tax rate is set at 85 percent (the normal profit tax rate of 35 percent plus an extra 50 percent). If such a tax had been in effect when Katrina struck how would market reactions been different. Explain your answer in detail.

A tax on economic profits does not affect MC, so it would not affect solution in part b.

d. As discussed in class, the actual corporate profits tax does not only tax economic profits. How might a permanent tax on excess accounting profits tax affect the long-run behavior of the refining industry?

A tax on capital would tax investment meant to cope with disasters. So it would deter such investment.

e. Gasoline refining in the United States is a moderately concentrated industry. It is not perfectly competitive ($P > MC$) but most studies suggest that it is not a perfect cartel either. How might you model this imperfectly competitive industry? Provide a clear specification of how you would model the industry and a brief discussion of whether this alternative model would provide a different prediction of how the gasoline market would respond to a supply disruption (do not consider the possibility of a windfall profits tax).

Many answers are OK. Most don't give qualitatively different answer to what is above.

2. The following questions refer to "Price Discrimination in Competitive Markets" by Luis Locay and Alvaro Rodriquez.

a. Explain the title of this paper – what economic phenomenon are the authors trying to explain? How do they end up explaining the phenomenon?

Seek to explain high popcorn prices in a competitive market for movie attendance. Explain this by theory that people attend movies in groups.

b. Show how the authors use Equations 1, 2, and 3 to get equations 4, 5, and 6. (Hint: Write an equation for indirect utility, U^*. And note that P_q will appear twice in this equation.)

As earlier in course, substitute demand functions back into utility. (M=1)

$$U^* = X + \gamma M + \theta h(q) = Y - P_m - P_q q + Y + \theta h(q(P_q, \theta))$$

$$\partial U^*/\partial P_m = -1$$

$$\partial U^*/\partial P_q = -P_q \partial q/\partial P_q - q + \theta h' \frac{\partial q}{\partial P_q} = -q$$

(cancel; $P \partial q/\partial P_q$)

$$\partial U^*/\partial \theta = \theta h' \partial q/\partial \theta + h(q) - P_q \partial q/\partial \theta = h(q, \theta)$$

(Cancel)

c. Equation 11 on page 958 is probably the key conclusion of the paper. Provide an intuitive explanation for this equation. (Hint: What does the equation imply if $q^s = q_d$? How about the case $q^s \approx 0$?)

$$(11) \quad \frac{P_q - C_q}{P_q} = \frac{q^s - q_d}{q_d} \cdot \frac{1}{E}$$

This looks like standard markup $\frac{P-C}{P} = \frac{-1}{E}$

It is adjusted by extent of those with little taste for popcorn. If $q^s = q_d$ distribution is same and $P_q = C_q$. competition prevails

If $q^s = 0$ there are many popcorn haters and they pay monopoly price $\frac{P-C}{P} = \frac{1}{E}$.

d. The authors claim (on page 959) that Equation 11 also shows that "the more disperse are [tastes for popcorn] the higher will be the markup." Can you explain this result intuitively?

See prin answer. The more diverse are tastes the more theater can act like a monopoly for those who love popcorn because they are captives of members of the group who do not care about popcorn.

e. At the end of the paper, the authors state that their results may depend on precisely how group decisions are made. How are such decisions assumed to be made in this paper? How might an alternative approach change matters?

Here decisions are by majority rule. The median person prevails. If popcorn lovers had more say, markups would be lower. If they have less say, markups will be higher.

3. The following questions are based on "Monopolistic Competition and Optimum Product Diversity" by A. K. Dixit and J. E. Stiglitz.

a. What is the primary conclusion from the Chamberlin model of imperfect competition that the authors of this paper are challenging?

Chamberlin argues there is too much diversity -- too many brands of cornflakes. D+S contradict that.

b. The authors claim that market equilibrium in the model they have specified is given by combining equations 15 and 16. Explain intuitively what each of these equations mean and why they jointly describe the market equilibrium.

Equation 15 is MR = MC (here use |e| I think)

Here $MR = P(1 - \frac{1}{e}) = P(1 - \frac{1}{1+\beta}) = P(\frac{\beta}{1+\beta})$

$= P(\frac{1}{1+\beta})$

so $P = c(1+\beta)$

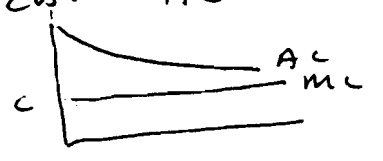
Equation 16 is from zero profit, free entry. $(P_n - c)x_n = a$.

c. On page 300 at the start of section C the authors say "with economies of scale, the first best or unconstrained optimum requires pricing below average cost...". Explain why the cost curve assumed in this paper exhibits economies of scale. Then state why an optimum allocation would require pricing below average cost.

Here costs $= a + cx$

$MC = c$

$AC = (a + cx)/x = \frac{a}{x} + c$



So, downward sloping AC = economies of scale

If $P = c = MC$, $P < AC$.

d. After starting Section C with the quote mentioned above, the authors proceed to calculate what they term a "constrained optimum". What do they mean by a constrained optimum and what do they show about such an optimum.

"Constrained" here means P=ac. There are no subsidies allowed. Hence ~~n=~~ socially optimal number of firms is produced by this form of competition

e. What conclusion do the authors reach when they come to consider an "unconstrained optimum"?

If subsidies allowed, the optimal number of firms increases. Equilibrium for each firm is same q as in constrained case.