Economics Department 2004 Honors General Exam

You must answer ONLY TWO of the four micro questions. If you try to answer more than two micro questions, you will not get any credit for any work done on questions beyond the first two you try to answer.

You must answer ALL TWO macro questions.

You must answer ONLY ONE of the two econometrics questions. If you try to answer both econometrics questions, you will not get any credit for any work done on the last question you try to answer.

You must use a SEPARATE blue book for each question, so you will hand in five (5) bluebooks.

Calculators are NOT permitted.

Econometrics Cheat-Sheets are NOT permitted, nor are any cheat-sheets.

Make sure your name and the question number (Micro 3, Macro 1, etc.) are on the outside of each of the five bluebooks! The number should refer to the actual question number on the exam.

Good luck!

Micro Question 1

A competitive industry is in a long run equilibrium. All firms have the same U-shaped cost curves. The government then imposes a $2 per unit tax. Note: in the following questions, assume that the market demand is downward sloping. All firms have the same cost curves in both the short run and the long run.

1. What will happen to the market price in the short-run (when there is no firm entry or exit)? Why? (Compare the change in market price to the tax level–i.e., is the change in price less than, equal to, or greater than the tax?)

2. What will happen to the market price in the long-run (when firm entry and exit is possible)? Why? (Compare the change in market price to the tax level–i.e., is the change in price less than, equal to, or greater than the tax?)

3. What happens to the number of firms in the industry in the transition to the long-run?

Micro Question 2 (New Blue Book)

Wendy earns $4 per hour at her current job. She has 80 hours per week to allocate between work and leisure, and has no other source of income other than her job. Her utility function is $U = cr$, where c is her consumption (measured in dollars) and r is leisure (measured in hours). Wendy is free to work as many hours as she wants, up to the 80 hours she has available.

1. With the consumption good c on the weekly vertical axis and leisure r on the horizontal axis, graph Wendy's budget constraint. Clearly indicate the endpoints and slopes of any line segments.

2. What is Wendy's optimal choice of work hours per week?

3. Now assume that Wendy is paid an overtime rate of $6 per hour for all work hours above 40 hours per week. On a separate graph, show Wendy's new weekly budget constraint. Again, clearly indicate the endpoints and slopes of any line segments.

4. Will Wendy choose to work any overtime hours? If so, how many overtime hours will she choose to work?

Micro Question 3 (New Blue Book)

There is a continuum of consumers, each of whom gets a different value for glow-in-the-dark galoshes. Utility for each consumer equals $X_1+U(X_2, X_3, ..., X_N)$ for consumers who don't own these wonderful galoshes, and $X_1+U(X_2, X_3, ..., X_N)+v$ for consumers who own at least one pair. The price of X_1 is 1. (Note that X_1 is not galoshes.) The function $U(X_2, X_3, ..., X_N)$ is identical across consumers, but different consumers have different levels of income and different values of v.

1. What is the right interpretation of v?
2. What assumption guarantees that v will be weakly positive?

   Assume that there is a continuum of consumers whose values of v are uniformly distributed on the interval $[A - B, A + B]$.

3. What is the market demand curve for glow-in-the-dark galoshes?

   Assume that there is a single producer who faces costs of production equal to quantity produced squared times c.

4. How much will this producer choose to produce and what will the price be?
5. If there are N producers, all with the same production costs (as above), what will the price and output levels be?

   Assume that there is a continuum of producers, each of whom can produce only one unit of the good at a cost k. The costs for these producers (i.e., k) are distributed uniformly on the interval $[K - J, K + J]$.

6. Describe industry supply for this product.
7. What are the equilibrium price and quantity for this good?

Micro Question 4 (New Blue Book)

Consider the following game:

First period: Jim offers John some amount of money, denoted X, between zero and ten dollars.

Second period: John decides whether or not to accept the offer.

Final period. John gets paid the offer of X dollars and Jim receives $(10 - X)$ dollars.

1. What are the Nash Equilibria of this game?
2. What are the Subgame perfect equilibria of this game? Explain the difference between the two concepts.

   Now restrict your attention to subgame perfect equilibria, and assume that John is a vengeful person who hates getting maltreated. As a result, John receives total utility from accepting an offer of X if the offer is above some cutoff level K, and $X - Z$ if the offer is below that cutoff level.
3. If the level of K and Z is known to Jim, and if $Z > 10 > K$, what is the subgame perfect equilibrium of the game? What happens to John's total welfare if he is an angry type–i.e., as K increases?
4. Now assume that $10 > Z > K$, what will the subgame perfect equilibrium of the game be? What about if $10 > K > Z$, what will the subgame perfect equilibrium be? Can it be bad to be vengeful under these assumptions?

Macro Question 1 (New Blue Book)

Imagine a world where there are two different production technologies, *High* and *Low*. Technology *Low* is the one available in countries with low level of capital per worker and is described by the following production function:

$$Y = AK^a L^{1-a}$$

where a=1/2, A=1.

Technology *High* can be used only in countries where capital per worker is bigger than 50, and is described by the following production function:

$$Y = AK$$

where A=1.

Suppose that the depreciation rate is 1% and the growth rate of population is 1% in all countries. Also assume that all countries save 10% of output and that A is constant at the level of 1.

1. Draw a graph showing the evolution over time of the growth rate of *GDP per capita* (graph the growth rate of y against time), and graph the evolution over time of the natural log of *GDP per capita* (graph ln y against time) in a country starting with a capital stock *per capita* of:

   (a) 1

   (b) 49

   (c) 60

2. Will there be convergence in *GDP per capita* in this world? How would a plot of the growth rate of *GDP per capita* against initial *GDP per capita* look like under this model?

Macro Question 2 (New Blue Book)

Consider an economy whose aggregate demand behavior is characterized by the following IS and LM equations:

$$Y = C(Y - \bar{T}) + I(r) + \bar{G} \qquad \text{(IS)}$$

$$\frac{\bar{M}}{P} = L(r, Y) \qquad \text{(LM)}$$

In the long run, output is given by full employment of capital and labor and the level of productivity:

$$Y^f = AF(\bar{K}, \bar{L})$$

At a given point in time, the price level is $\bar{P}$. Over time, the price level changes according to the following "Phillips Curve" equation:

$$\Delta P = \alpha(Y - Y^f),\ \alpha > 0$$

1. Suppose the level of productivity, A, rises significantly. What are the effects on (i) Y, (ii) r, and (iii) P in the short run (when P is fixed), in the long run (when P has adjusted fully to its new level), and in the medium run (the transition period between the two price levels)?

2. Now suppose that expected inflation matters for aggregate demand. We modify the IS and LM curves to take account of this possibility:

$$Y = C(Y - \bar{T}) + I(i - \pi^e) + \bar{G} \qquad \text{(IS')}$$

$$\frac{\bar{M}}{P} = L(i, Y) \qquad \text{(LM')}$$

   where i is the nominal interest rate. The other equations are unchanged.

   (a) Explain briefly how expected inflation affects aggregate demand in the modified IS-LM system.

(b) Does this modification to the IS-LM system change your answer for the short- and medium-run effects of higher productivity in part A? Explain why or why not.

3. Now suppose that in addition to random shocks to productivity, the economy is also subject to shocks to the IS curve, u (we can regard these as changes in consumption or investment demand due to changes in 'consumer confidence' or 'animal spirits'):

$$Y = C(Y - \bar{T}) + I(i - \pi^e) + \bar{G} + u \qquad \text{(IS")}$$

Suppose the Federal Reserve wishes to manipulate the money supply to keep output as close to its full-employment level, Y^f, as possible, but cannot observe shocks to productivity (A) or to the IS curve (u). Thus, it does not observe Y^f directly. It does observe all the standard macro variables: Y, r, P, C, I, i, π, M, etc. Suggest a simple rule the Fed might follow to achieve its objective. What implications does this rule have for how the Fed should set the money supply?

Econometrics Question 1 (New Blue Book)

This question was inspired by Cecilia Rouse's "Private School Vouchers and Student Achievement: An Evaluation of the Milwaukee Parental Choice Program." We want to determine the value of giving poor students vouchers so that they can attend private schools. Rich parents can send their kids to private school if they don't like the public schools. Poor parents cannot afford to choose between public and private schools. It has been argued that giving vouchers to parents to send their kids to private schools will lead to improved academic achievement.

In Milwaukee in the early 1990s, some parents were randomly made eligible to receive a voucher. Not all parents who were eligible chose to accept the voucher. Assume that about 5% of those parents who were eligible for vouchers chose to accept the voucher and send their kids to private school; the other 95% turned down their vouchers and their children remained in public school. We want to measure two quantities:

1.) We want to measure the causal effect of attending a private school on test scores. We define this effect to be the change in test scores when a single student is transferred from a public to a private school.

2.) We also want to determine the value of this program–i.e., we want to know if making vouchers available to more parents will have a significant effect on test scores in Milwaukee.

Suppose we have a random sample of students. Let $voucher_i$ be a dummy equal to 1 if student i received a voucher, and 0 otherwise. So for each student i we have observations on $private_i$, $score_i$, and $voucher_i$.

1. Will an OLS regression of *score* on *private* deliver an unbiased estimate of the causal effect of attending a private school on test scores? Explain your answer.

2. Suppose parents were made eligible for vouchers in a purely random fashion. Explain how you would use $private_i$, $score_i$, and $voucher_i$ to estimate the causal effect of attending a private school on test scores. Describe the steps you would take to construct the estimator.

3. It turns out that the vouchers were not in fact purely randomly assigned. The program randomly assigned vouchers to both rich and poor parents, but the odds changed depending on the parents' income. Really poor parents had good odds of getting a voucher, slightly richer parents had lower odds of getting a voucher, and rich parents had virtually no chance of getting a voucher. Would your estimation strategy from part 2 be valid for estimating the causal effect if you had this sample of parents? Explain your answer. Suppose we have observations on $faminc_i$, the family income of the i^{th} student. Describe in some detail how to use $faminc_i$ to estimate the causal effect of attending private school on test scores.

4. Suppose that randomly moving a student from a public school to a private school leads to a significant boost to their test scores, and you correctly estimate a large causal effect from attending private schools on test scores. You then run the regression

$$score = \gamma_0 + \gamma_1 voucher + \gamma_2 faminc + u.$$

Your estimate of γ_1 is highly statistically significant, but is in a practical sense quite small. Consequently, we are convinced that giving a student a voucher on average leads to higher test scores, but only slightly higher scores.

   (a) Suppose now that a politician approaches you and wants advice on whether or not to expand the program. The politician wants to know whether making vouchers available to more parents will lead to significantly higher average test scores in Milwaukee. What do you tell this politician?

   (b) How do you reconcile the practically large causal affect of attending a private school with the practically small estimate of γ_1?

Econometrics Question 2 (New Blue Book)

1. Provide a derivation of the omitted variable bias formula.
2. Provide an example to explain how panel data (such as repeated observations on the same firms over time or observations on siblings within a family) can be used to eliminate certain kinds of omitted variable bias.
3. Consider the case of longitudinal data (such as repeated observations on the same firms over time). Discuss the problems that arise in obtaining appropriate standard errors and confidence intervals, and some solutions to these problems.