Economics Department 2009 Honors General Exam

This is a 3-hour exam. (For joint concentrators with economics as the secondary field, this is a 1-hour exam. Choose one section of the exam to complete, and turn in your bluebook one hour after the exam begins.)

The exam has three sections: microeconomics (Questions 1-3), macroeconomics (Questions 4-7), and econometrics (Questions 8-9). Each section of the exam is of equal point value. Thus you should spend roughly 1 hour on each section of the exam.

You must answer either the first TWO (Questions 1 and 2) or the last ONE (Question 3) of the three Micro questions. Questions 1 and 2 are of 30 points each, and Question 3 is of 60 points. If you try to answer all three questions, you will not get any credit for any work done on the third question (Question 3). If you try to answer one of the first two questions (Questions 1 or 2) and the third question (Question 3), you will not get any credit for any work done on questions beyond Question 3.

You must answer TWO of the four Macro questions. Each question is of equal point value (30 points). If you try to answer more than two macro questions, you will not get any credit for any work done on questions beyond the first two you try to answer.

You must answer ONE of the two Econometrics questions. Each question is of equal point value (60 points). 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 four (4) or five (5) bluebooks. Make sure your name and the question number are on the outside of each of the bluebooks! The number should refer to the actual question number on the exam.

You can bring one calculator, but no notes are permitted.

Good luck!

Microeconomics

Question 1 (Microeconomics, 30 minutes). A ticket to a newly staged opera is on sale through sealed-bid auction. There are three bidders, Alice, Bert and Carl. Alice values the ticket at \$10, Bert at \$20, and Carl at \$30. The bidders are free to submit a bid of any positive amount.

a. (**6 points**) Show that there is no dominant strategy for any bidder if the highest bidder wins the ticket and pays his own bid.

b. (**5 points**) From now on, assume this is a second-price auction, that is, the highest bidder wins the ticket and pays the second-highest bid. If everyone bids his or her own valuation, what is the payoff of each bidder?

c. (**4 points**) Show that "everyone bids his or her own valuation" is a Nash Equilibrium.

d. (**7 points**) Now suppose that there is a large number of tickets on sale and a large number of bidders, with $\frac{1}{3}$ of them valuing the ticket at \$10, $\frac{1}{3}$ at \$20 and $\frac{1}{3}$ at \$30. Each ticket is sold at a second-price sealed-bid auction independent of other auctions, and each auction has 3 bidders attending, where each of them can be any of the three types. Knowing that each bidder will still bid his or her own valuation, what is the expected revenue from a single auction? (Note: if there is a tie, for example: $(20, 20, 10)$, the second highest bid will be 20.)

e. (**8 points**) The auctioneer knows that if the tickets are not sold, they can be sold later for \$15 each. Therefore he sets a minimum bids of \$15 for each auction. That is, if the second-highest price is less than \$15, the highest bidder will be asked to pay \$15. Bidders may choose to bid \$0, in which case they will not win the ticket even if all the other bidders bid \$10 (the ticket will not be sold if all 3 bidders bid \$0. However, for example, if the bids are $(20, 0, 0)$, the second highest bid is 0, and the bidder who bids \$20 will win the ticket and pay \$15).

How much will each type of bidders bid in the Nash Equilibrium, and what is the expected revenue from a single auction, not counting the later sale if the ticket is not sold?

Question 2 (Microeconomics, 30 minutes). The demand function in a particular industry is of the form $q = \frac{100}{p^2}$, where q is the quantity demanded and p is the price. The technology in the market is such that each unit can be produced at the constant cost of \$5.

a. **(4 points)** If the industry is supplied by perfectly competitive firms, what is the equilibrium price and industry output? What is the price elasticity of demand faced by a single firm at this price if the firm increases its price?

b. **(10 points)** If the industry is supplied by a monopolist, what is the equilibrium price and industry output? What is the price elasticity of demand faced by the monopolist at this price if the firm increases its price?

c. **(11 points)** If the industry is supplied by two identical oligopolists engaged in Cournot (simultaneous quantity setting) competition, what is the equilibrium price and industry output?

d. **(5 points)** If the industry is supplied by two identical oligopolists engaged in Betrand (simultaneous price setting) competition, what is the equilibrium price and industry output? If there are n Betrand oligopolists, what is the equilibrium price and industry output?

Question 3 (Microeconomics, 60 minutes). Individuals live for two periods and can either invest in securities, which pay an interest rate of r, or in housing.

a. **(15 points)** Write down the individual maximization problem and give conditions under which the rate of return from the two types of investment will be equal, and when the two types of investment can have different returns. Remember to clearly describe the complete equilibrium in the economy algebraically.

b. **(15 points)** Assume that there is a positive externality from individuals owning homes. Compare the private equilibrium with the first best.

c. **(15 points)** Are there conditions under which a mortgage subsidy will create the first best outcome? What alternative policies could achieve the first best?

d. **(15 points)** Compare the situation where the amount of housing in the economy is fixed with a situation where builders can create more homes? How will elastic supply of homes impact the policies you have discussed above? Again, no points are given for verbal answers, you must fully characterize the economy algebraically.

Macroeconomics

Question 4 (Macroeconomics, 30 minutes). The relationship between China and the United States is often in the news. To refresh your memory, here are four facts about the Chinese economy:

- China manages its exchange rate with the dollar.
- China runs a trade surplus with the United States.
- The Chinese central bank owns a large number of U.S. Treasury bills.
- Individual Chinese residents are not free to invest their savings in foreign countries as they would like. Any movement away from a managed exchange rate would probably include a relaxation of these restrictions.

Now evaluate the following claims below with three to five sentences for each. You should also feel free to use graphs or equations where appropriate. Your goal is to discuss why the claim is true, partially true, or not true at all.

a. **(5 points)** "Cheap imports from China come a steep cost – lost jobs and lower wages for American workers."

b. **(5 points)** "Over time, the Chinese government can maintain an unfair trading relationship with the United States by pegging its currency to the dollar at a low level."

c. **(5 points)** "In the long run, if China continues to peg its currency to the dollar at an abnormally low value, it may incur a significant increase in its price level."

d. **(5 points)** "The only way for the United States to close its bilateral trade deficit with China is to either raise national savings in the U.S. or reduce investment in new plant and equipment in the U.S."

e. **(5 points)** "Because China has a fixed exchange rate, it is unable to conduct discretionary monetary policy."

f. **(5 points)** "If China stopped managing the value of its currency, the value of the China's currency would strengthen relative to the dollar and U.S. interest rates would rise.

Question 5 (Macroeconomics, 30 minutes). Assume that, in the short run, there are two types of "shocks" which may cause the level of GDP to deviate from the long run, full employment level: (1) changes in autonomous investment spending; and (2) changes in autonomous money demand.

Explain how you reached your results for all the parts of this question (a. through d.). You should feel free to use graphs or equations where appropriate.

For all the parts of this question (a. through d.), analysis should be conducted for the short run only.

a. **(9 points)** Suppose that the Fed sticks to money supply targeting: in response to any investment spending or money demand shocks, the Fed will leave the money supply at the predetermined and targeted level. How will this money supply targeting strategy affect the deviations of output from the full employment level under each of the two types of shocks?

b. **(9 points)** Now suppose that the Fed targets the interest rate: In response to any shocks, it adjusts the money supply to maintain the interest rate at its initial targeted level. How will this interest rate targeting strategy affect the variations of output from the full employment level under each of the two types of shocks?

c. **(6 points)** If the only source of "shocks" in the economy is autonomous investment spending, should the Fed stick to money or interest rate targets to best stabilize GDP?

d. **(6 points)** If the only source of "shocks" in the economy is fluctuating autonomous money demand, should the Fed stick to money or interest rate targets to best stabilize GDP?

Question 6 (Macroeconomics, 30 minutes). Please answer each question below. You will be graded on the quality of your explanation.

a. **(6 points) True/False/Uncertain.** Long run equilibrium of the good market determines the real interest rate, that of the money market determines the price level. Explain.

b. **(6 points)** What clears the good market in an open economy?

c. **(6 points) True/False/Uncertain.** The AK growth model predicts club convergence in per capita GDP across countries. Explain.

d. **(6 points) True/False/Uncertain.** Trade liberalization and deunionization explain the recent upsurge in wage inequality. Explain.

e. **(6 points)** How can one escape the Malthusian trap?

Question 7 (Macroeconomics, 30 minutes). True/False/Uncertain.

Please answer each question below. You will be graded on the quality of your explanation.

a. **(7.5 points)** In general, corporate investment and real interest rates move together.

b. **(7.5 points)** If nominal wages are sticky, then a high inflation rate tends to be associated with low real wages.

c. **(7.5 points)** Raising government expenditure raises GDP at least dollar for dollar.

d. **(7.5 points)** Households spend some constant fraction of their paycheck and save the rest.

Econometrics

Question 8 (Econometrics, 60 minutes).

This question consists of two subquestions, each worth 30 points.

1. **(30 points)** In this question we will look at the relation between the logarithm of weekly earnings and years of education. Using data from the National longitudinal study of youth, we find the following results for a regression of log weekly wage on years of education, experience, experience squared and an intercept:

$$\begin{array}{rcccccccc} \widehat{\log(\text{earnings})}_i & = & 4.016 & + & 0.092 \cdot \text{educ}_i & + & 0.079 \cdot \text{exper}_i & - & 0.002 \cdot \text{exper}_i^2 \\ & & (0.222) & & (0.008) & & (0.025) & & (0.001) \end{array}$$

a. **(5 points)** Construct a 95% confidence interval for the effect of years of education on log weekly earnings.

b. **(6 points)** Consider an individual with 10 years of experience. What would you expect to be the return to an additional year of experience for such an individual (the effect on log weekly earnings)?

c. **(4 points)** Labor economists studying the relation between education and earnings are often concerned about what they call "ability bias." Suppose that invididuals differ in ability, and that the correct specification of the regression function is one that includes ability:

$$\log(\text{earnings})_i = \beta_0 + \beta_1 \cdot \text{educ}_i + \beta_2 \cdot \text{exper}_i + \beta_3 \cdot \text{exper}_i^2 + \beta_4 \cdot \text{ability}_i + \varepsilon_i$$

In this regression, what do you expect the sign of β_4 (the coefficient on ability) to be?

d. **(4 points)** What do you think is the sign of the correlation between ability and years of education?

e. **(6 points)** If we estimate the regression function with ability included, do you think that the estimated value of β_1 will be greater or less than what it was in the regression without ability? Explain.

f. **(5 points)** Another approach to dealing with ability bias has been to use data on pairs of individuals from the same household, or even better, twins. Suppose you had observations for N households with twins. Let Y_{i1} and Y_{i2} be the values of log earnings for the first and second twin in household i, and X_{i1} and X_{i2} be their education level. What regression would you run to estimate the effect of education on earnings to avoid ability bias?

2. **(30 points)** To estimate the effect of minimum wage on employment, David Card and Alan Krueger, collected data on fast food restaurants in two neighbouring states, New Jersey and Pennsylvania, in 1992, before and after an increase in the legal minimum wage came into effect in New Jersey. Prior to that the minimum wage was the same in New Jersey and Pennsylvania. Let Y_i be employment in restaurant i, let S_i be an indicator for the restaurant being in New Jersey, and let T_i be an indicator for whether the employment was measured post minimum wage change.

   a. **(5 points)** Suppose we only had data from New Jersey. What is the regression you would run to estimate the effect of the change in the minimum wage?

   b. **(5 points)** Suppose we only had data on employment after the change in the minimum wage, in both states. What regression would you run?

   c. **(6 points)** What are the problems with both these estimation strategies?

   d. **(7 points)** What regression would you run with both before and after data for both New Jersey and Pennsylvania?

   e. **(7 points)** Suppose we had data from three states, the third one (New York) like Pennsylvania not experiencing a change in the legal minimum wage. What regression would you do now?

Question 9 (Econometrics, 60 minutes). There has been recent work using supermarket scanner data to form longitudinal data sets to study consumer behavior. For example, the following paper was presented in March at the Harvard-MIT Industrial Organization Workshop: "State Dependence and Alternative Explanations for Consumer Inertia." From the abstract: "For many consumer packaged goods products, researchers have documented a form of state dependence whereby consumers become "loyal" to products they have consumed in the past. ... However, it has not been established that this form of state dependence can be identified in the presence of consumer heterogeneity of an unknown form. Most importantly, before this inertia can be given a structural interpretation and used in policy experiments such as counterfactual pricing exercises, alternative explanations which might give rise to similar consumer behavior must be ruled out."

Here is a simple version of the problem. We observe $Y_{it} = 1$ if household i purchases a particular product at date t, and $Y_{it} = 0$ otherwise ($i = 1, \ldots, N$; $t = 1, \ldots, T$). There are $N = 500$ households and $T = 9$ observations per household.

a. **(20 points)** Suppose that the conditional expectation function

$$E(Y_{it} \,|\, Y_{i,t-1})$$

does not depend upon t. Provide an explicit estimator for this function.

b. **(20 points)** Now bring in the heterogeneity issue. Suppose that there is a household-specific probability p_i of purchasing the product, and that, conditional on p_i, the random variables $(Y_{i1}, \ldots, Y_{iT})$ are mutually independent, so that

$$\text{Prob}(Y_{it} = 1 \,|\, Y_{i,t-1}, p_i) = p_i.$$

Then there is no "loyalty" (state dependence) once we condition on p_i. Explain why the conditional expectation function in (a) will nevertheless show a dependence on $Y_{i,t-1}$.

c. **(20 points)** We do not have data on p_i but want to know whether some state dependence would remain if we could condition on p_i. We do have data on an indicator variable X with $X_{it} = 1$ if household i faced a discount price or special promotion for the product at date t, and $X_{it} = 0$ otherwise. Explain how this data could be used to determine whether or not there is state dependence, allowing for heterogeneity.