WRITTEN PRELIMINARY Ph.D. EXAMINATION

Department of Applied Economics

January 26, 2009

Consumer Behavior and Household Economics

Instructions

• Identify yourself by your code letter, not your name, on each question

• Start each question’s answer at the top of a new page

• You are to answer a total of FOUR questions

• Answer Question #1 (you MUST answer this question)

• Answer THREE of the remaining FIVE questions (question 2 - 6)

• You have four hours to complete the examination
Question 1. All students must answer this question.

1. (Static utility maximization.) Suppose that a household has a utility function \( u = (q_1 - \gamma_1)^\beta (q_2 - \gamma_2)^{1-\beta} \), with budget constraint \( x = p_1 q_1 + p_2 q_2 \).

   a) Solve for the Marshallian demands using standard constrained optimization methods.

   b) Solve for the Hicksian demands by using standard constrained optimization methods, where cost is minimized given the constraint \( u = (q_1 - \gamma_1)^\beta (q_2 - \gamma_2)^{1-\beta} \).

   c) Use your answer to a) to show the indirect utility function.

   d) Use your answer to b) to show the cost function.

   e) Show how the indirect utility function and the cost function are “inversions” of each other.
Questions 2 through 6: Answer any three of these five questions

2. Consider an individual with the following utility function for a single good over T time periods:

\[ U = v_1(c_1) + v_2(c_2) + \ldots + v_T(c_T) \]

Assume that \( v_t'(c_t) > 0 \) and \( v_t''(c_t) < 0 \) for all \( t \) from 1 to \( T \). Assume also that this individual has an income of \( y_i \) for each time period, and can borrow or save money at an interest rate \( r \). Finally, let the initial wealth of this individual be \( A_1 \).

a) Write out explicitly this individual’s intertemporal budget constraint.

b) Solve this individual’s intertemporal utility maximization problem. Suppose that \( r > 0 \). Use your derivations to show which is larger, \( v_t'(c_t) \) or \( v_{t+s}'(c_{t+s}) \), where \( s > 0 \). What is the intuition behind your result?

c) Suppose that the function \( v_t(c_t) \) has the more specific functional form \( v_t(c_t) = (1+\delta)^t v(c_t) \), where \( v'(c_t) > 0 \) and \( v''(c_t) < 0 \) for all \( c_t \geq 0 \). Will this individual increase consumption over time, reduce it over time, or keep the same level of consumption over time? Explain your answer, using your answer to part b) If more than one of these trends over time is possible, explain under what conditions it is possible.

d) Next, consider the more realistic situation where there is uncertainty. Recall from Apec 8403 that life cycle utility maximization implies that:

\[ v_t'(c_t) = E_t[(1+r_{t+1})v_{t+1}'(c_{t+1})] \]  \hspace{1cm} (assuming only one type of financial asset)

Under what assumptions will this individual’s consumption follow a “martingale”? That is, under what conditions will \( E_t[c_{t+1}] = c_t \)? You can start by assuming that \( v_t'(c_t) > 0 \) and \( v_t''(c_t) < 0 \) and that \( r_t > 0 \) for all \( t \) from 1 to \( T \). But state all other additional assumptions explicitly.
3. At a well known U.S. University with a well known basketball team, the school holds a lottery for students to obtain tickets to the home games. The stadium is too small for all students who want tickets to attend. Entering into the lottery is a time consuming process meaning that everyone eligible to enter the lottery has a considerable investment in time and energy even before they know if they have won a ticket. After the lottery the students who entered the lottery belonged to two groups, winners has tickets, losers did not.

Two enterprising economics professors at this University decided to do an experiment to learn the “value of the basketball tickets” to the students. They called up 100 students who were in the lottery line-up and asked those who had received a ticket how much they would sell it for and asked those who did not win a ticket how much they would be willing to sell it for.

The winners of a lottery ticket would be willing to sell it for an average of $2400.

The losers would be willing to pay an average or $170.

a) What principles of Behavioral Economics does this illustrate?

b) What principles of neo-classic economic theory – rational behavior - does it not support?

c) Outline a Behavioral Economics Theory (model) that helps to explain this behavior.

4. In making choices over time a generalized hyperbolic discount function helps to explain the observed behavior of consumers. It may be written as

$$\Phi(t) = (1 + \alpha t)^{-\beta/\alpha}$$

a) Explain what happens if $\alpha \to 0$.

b) Explain how this equation satisfies the “Matching Law” that explains findings from experimental economics. Include how you it can be used to explain the asymmetry of value of gains and losses.

c) Explain how hyperbolic discounting might be used to explain preference reversals in the choice of products or activities that are different in the short run than they would be in the long run.
5. Gary Becker introduced the idea that consumers produce “non-market” goods and services (such as health) with inputs of “market” goods and services.

a) Explain in some detail the difference between a health production function and a health demand equation. Write out each type of equation and be sure to define the variables in each.

b) Explain how education might affect this production process for health. In particular, discuss the possible effects of education on productive efficiency versus allocative efficiency, as first explained by Michael Grossman.

c) Many studies have found that education is one of the most important correlates of good health. However, there is concern whether this correlation reflects actual causality from more schooling to better health. The relationship may be affected by “reverse causality” and/or “omitted third variables”. Please discuss these issues in some detail.

6. Causation and Econometric Analysis

a) Why is it argued that the typical econometric analysis of survey data can only identify possible associations, but not actually causation? Under what circumstances might we have more trust that the results from the analysis of survey data should be believed?

b) What type of analysis is necessary to identify causation? What is considered the “gold standard” for establishing true cause and effect?

c) Why is the article by Card and Krueger, “Minimum Wage and Employment”, considered a classic example of a natural experiment or quasi-experiment? Start by describing a natural experiment and the key characteristics of a good natural experiment.