WRITTEN PRELIMINARY Ph.D. EXAMINATION

Department of Applied Economics

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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 ONE of the first TWO questions (either question 1 or question 2)

• Answer THREE of the remaining FOUR questions (question 3 - 6)

• You have four hours to complete the examination
Consider the AIDS functional form for a static demand system. The cost function for this demand system is:

\[
\log[c(u, p)] = (1-u)\log[a(p)] + u\log[b(p)]
\]

where \(\log[a(p)] = \alpha_0 + \sum_{k=1}^{n_0} \alpha_k \log(p_k) + (1/2) \sum_{k=1}^{n} \sum_{j=1}^{n} \gamma_{kj} \log(p_k) \log(p_j)\)

\(\log[b(p)] = \log[a(p)] + \beta_0 \prod_{k=1}^{n} p_k^{\beta_k}\)

a) What is the corresponding indirect utility function for this demand system?

b) For some good k, what is the (Hicksian) budget share \(w_k\) for that good? Show how this is derived from the cost function given above.

c) Explain how you can calculate the \textbf{compensated} (Hicksian) price elasticities for good k using your answer to b). You do not have to work out the calculations; just explain what you need to do.

d) You want to compare the “fit” of the AIDS functional form to the “fit” of the Rotterdam model functional form for some data that you have. What kind of estimation (including what kind of data are needed) do you have to perform using the AIDS demand system to make this comparison? Do not show any mathematical manipulations. Just given your answer in words.
2. A rational consumer faces an intertemporal utility maximization problem, from time period 1 to time period T. She has a life cycle utility function:

\[ U = v(c_1)/(1+\delta) + v(c_2)/(1+\delta)^2 + \ldots + v(T(c_T))/(1+\delta)^T \]

Assume that she faces the same interest rate \( r \) in all time periods. Each time period she has an income of \( y_t \).

a) Write out the intertemporal budget constraint, assuming that the consumer has an initial stock of assets equal to \( A_1 \). Assuming no uncertainty, derive the first order conditions for consumer’s utility maximization problem.

b) Assume that \( v'(c) > 0 \) and \( v''(c) < 0 \) for all values of \( c \). Will the consumer’s consumption increase, decrease, or remain steady over time? Explain your answer.

c) Consider 2 possible functional forms for \( v(c_t) \), namely \( v(c_t) = c_t^{1-\rho}/(1 - \rho) \) and \( v(c_t) = k_0 + \alpha c_t + (\beta/2)c_t^2 \). Under what conditions do they satisfy the assumptions that \( v'(c) > 0 \) and \( v''(c) < 0 \)?

d) Now suppose that there is uncertainty. In the general case the maximizing condition is \( \lambda_t(c_t) = E_t[(1+r_{t+1})\lambda_{t+1}(c_{t+1})] \), where \( \lambda_t(c_t) = v_t(c_t) \). [Note the t subscripts on the \( \lambda \) and \( t \) functions!] Recall also that any variable \( x_t \) follows a martingale process if \( E[x_{t+1}] = x_t \). For either of these functional forms does \( c_t \) follow a martingale process? Show your answer and be clear about any additional conditions that may be needed.
3. a. Describe the basic specification of Lancaster’s technology of consumption (attributes or characteristics) model. Be sure to define the terms you use in any equations.

b. Draw a graph with two goods containing different amounts of two attributes. Carefully label your graph. In a second graph with the same two goods and characteristics, add a “new” good that has a still different combination of the two attributes. Draw the graph such that no rational consumer would purchase/consume the new good. Explain why no rational consumer would purchase the new good, referring to your graph.

c. Briefly describe why the Lancaster model provides a conceptual justification for nutrition labeling on food packages or estimated miles per gallon of gasoline labels on new automobiles.

d. Briefly describe the research by Fred Waugh entitled, “Quality as a Determinant of Prices” and how it relates to hedonic price analysis.

4. The labor market for care assistants for the elderly in southern England consists of a large number of small firms undertaking a homogeneous activity in a concentrated geographic area. The workers are not unionized, and there is no minimum wage. There are two or three different categories of care assistants depending on workers’ training.

a) Describe the necessary conditions for the labor market to be competitive. Assuming this labor market is competitive, what predictions would you make about wages? In particular, describe how wages differ across workers and across firms. Explain.

b) Design a study to test whether or not the predictions of the theoretical competitive labor market are supported by the evidence from this labor market. Describe in detail the data you would collect, including the specific variables. Specify and explain the econometric model you would estimate and the hypotheses you would test. Discuss two possible econometric problems you might encounter in estimating this model.

c) A recent study of care assistants in England found that all workers within each firm were basically paid the same, but wages differed across firms. Describe a theory of the labor market that would be consistent with these findings. Explain.
5. Below are two situations faced by consumers. Each consumer must choose one opportunity from situation 1 and one opportunity from situation 2.

   a.) Identify a pair of rational choices (A or B from situation 1 and C or D from situation 2) that consumers would make if they behaved according to neoclassical expected utility theory?

   b.) Explain why this is a rational pair of choices. Illustrate why the two choices are of equal value.

   c.) What combination (pair) of choices do most people select? How are these choices explained in the Behavioral Economics literature by anomalies that have been repeatedly observed?

   d.) What axioms of expected utility theory are violated by the usual choice behavior you described in c) above? Explain why it violates those axioms.

Situation 1:
Choose one of the following opportunities (A or B)

A: Receive $1,000,000 with probability = 1

B: Receive $5,000,000 with probability = 0.10
   Plus $1,000,000 with probability 0.89
   Plus $0 with probability .01

Situation 2:
Choose one of the following opportunities (C or D)

C: $1,000,000 with probability 0.11
   Plus $0 with probability 0.89

D: $5,000,000 with probability 0.10
   Plus $0 with probability 0.9
6. Consider an individual who maximizes a utility function of the form:

\[ U(L,C) = C^\alpha L^\beta \]

subject to the budget constraint:

\[ pC = w(1 – L) + Y \]

where \( C=\text{consumption}, \ L=\text{leisure}, \ P=\text{price of the composite consumption good}, \ W=\text{wage}, \) and \( Y=\text{nonlabor income}. \) \( H \) and \( L \) are the fraction of total time spent in work and leisure, respectively, so that \( H = 1 – L. \)

a) If the individual is working at the point of utility maximization, what is the marginal rate of substitution between consumption and leisure?

b) Using the first order conditions for utility maximization, derive the labor supply function \( (H) \) and consumption demand function \( (C) \) for this worker.

c) What is the slope of the labor supply function? Is it positive or negative (or ambiguous)?

d) Write out the general form of the Slutsky equation showing a change in labor supply due to a change in wage, and explain each term. Then derive the compensated substitution effect of a wage change for the (Marshallian) labor supply function in part c, \( \partial H / \partial W |_u \), using the Slutsky equation. (You do not need to use the expenditure function or Hicksian approach.)

e) Define reservation wage and derive the equation for the individual’s reservation wage given this utility function.