

AAEC6311 - Applied Econometrics II

Spring 2008

Instructor: Eric Belasco

Exam 1

Name: _____

You have one hour and 15 minutes to complete the exam. There are four questions. Point values will sum to 100, with points associated with each question indicated accordingly. **USE YOUR TIME WISELY.** Also, I will address clarifying questions, but not substantive questions. You are allowed to use one 3x5 note sheet (front and back), a calculator, and a pencil/pen. Good luck!

Question 1 (31 points). You are asked by the USDA to conduct a study on the impacts of demographic factors on cheese consumption in the US. The following double-hurdle model is derived following the specification by Cragg (1971).

$$y = d \cdot y^*, \text{ where } d = \begin{cases} 1 & \text{if } z\alpha + v > 0 \\ 0 & \text{otherwise} \end{cases}$$
$$y^* = \max(0, x\beta + \varepsilon)$$

such that $y_i = y_i^*$ only if $d_i^* > 0$ and $y_i^* > 0$. Both z and x contain the same variables which include an intercept (Constant), weekly household income (\$000)(Income), and binary variables that take 1 when the household has children under the age of 9 (Age<9), receives foodstamps (Foodstamp), and gender of the meal planner is female (FemPlan), while all variables take on a zero otherwise. The dependent variable is weekly expenditures on cheese consumption (\$).

(a) (5 points) A colleague of yours suggests that you use a Tobit formulation since it has been the model of choice in past studies. Explain the fundamental differences between the Tobit and double-hurdle model as it pertains to this particular study.

(b) (8 points) Describe a test that might be used to test the validity of a Tobit formulation (*hint: Cragg model is computed using maximum likelihood estimation*).

(c) (8 points) The results from the previously specified model are presented below. Discuss the impacts from participation in federal food stamp programs (Foodstamp) on the consumption of cheese by interpreting both α and β parameters. Is it reasonable that the signs on the participation and consumption equations are different concerning the impact of Foodstamps on weekly cheese expenditures.

Variable	Participation (α)		Consumption (β)	
	Parameter	Std. Error	Parameter	Std. Error
Constant	0.854	0.140	0.772	0.054
Income	0.040	0.010	0.010	0.003
Age < 9	0.122	0.039	0.127	0.022
Foodstamp	-0.154	0.099	0.104	0.052
FeemPlan	0.178	0.064	-0.050	0.031

(d) (5 points) Discuss the similarities between modeling participation in cheese consumption with a Probit model and the one method used above.

(e) (5 points) What issues with the linear probability model are resolved through using the Probit model?

Question 2 (18 points). Consider the following wage-price inflation model:

$$\begin{aligned}\pi_t &= \beta_0 + \beta_1 w_t + \beta_2 m_t + u_{1t} \\ w_t &= \alpha_0 + \alpha_1 \pi_t + \alpha_2 n_t + u_{2t}\end{aligned}$$

where π_t , w_t , m_t , and n_t are respectively the rate of price inflation, rate of wage inflation, rate of growth in the money supply, and the unemployment rate, where the t subscript refers to time. m_t and n_t are assumed to be exogenous.

(a) (5 points) Explain the issues associated with using OLS in these two separate equations.

(b) (8 points) Derive the reduced form model

(c) (5 points) Are Rank and Order conditions satisfied? Which of the equations can be identified?

Question 3 (28 points). You are asked to evaluate choices made concerning experiments conducted on candy characteristics. Subjects were offered four different pieces of candy with choice-specific attributes which include two chocolate types (1=Dark, 0=Milk) with and without nuts (1=Nuts, 0=No Nuts), amounting to four possible choices per observation. The following questions refer to the results from this experiment.

(a) (5 points) Are the basic requirements satisfied in order to use a random utility model? Explain.

(b) (10 points) Set up the conditional logit model to estimate this model and explain the estimation procedure.

(c) (5 points) Results from conditional logit estimation are shown below. Briefly interpret the results.

	Parameter Est.	Std. Error	p-value
Dark Chocolate	1.386	0.791	0.080
With Nuts	0.847	0.690	0.220

(d) (8 points) Under the current specification there are 4 possible choices. Assume that two new options are added that include almonds with dark and milk chocolate candies. Also, assume that almonds are found to be close substitutes with nuts in candy. Explain the restriction imposed through the assumption of Independence of Irrelevant Alternatives (IIA). Does this assumption seem realistic in this case?

Question 4 (23 points). Consider estimation of a linear model with a single endogenous variable:

$$y_i = x_i\beta + \varepsilon_i \quad \text{for } i = 1, \dots, 20$$

by using a single instrument, z_i .

- (a) (5 points) Explain any issues associated with using OLS estimation for the above situation.
- (b) (8 points) Describe what is necessary for z to be considered a valid instrument. Also, what characteristics would work to strengthen the instrument? What is meant by “strengthen the instrument”?
- (c) (5 points) Compute $\hat{\beta}_{IV}$, given $\sum_{i=1}^n z_i'x_i = 2$ and $\sum_{i=1}^n z_i'y_i = 3$.
- (d) (5 points) Is the model under-identified, just-identified, or over-identified? Explain the difference.

