Eco671, Spring 2006, Final Exam.
Prof. Bill Even

Directions: Put all answers on the paper provided using only one side of the paper. Please number the questions and each of its parts. Be sure that your answers are detailed, unambiguous, and complete. Ask for clarification if you have any difficulty interpreting a question or the information provided.

1. (35 points) Wilhelm (1996)[1] examined whether parents' bequests are "altruistic". According to the altruistic model of bequests, a parent with several children would leave larger bequests to children with lower lifetime earnings. His empirical model can be described as follows: Define B_{ij} as the bequest that parent i gave to child j. Explanatory variables in the model include the projected present value of life-time earnings of each child ($Earnings_{ij}$), a dummy indicating whether the child was female ($Female_{ij}$), and whether the child has given parented a grandchild ($Granchild_{ij}$).

The model was estimated as a fixed effects model which allows for a common intercept across children within a family.

$B_{ij} = -.151Earnings_{ij} \ -.016Female_{ij} \ -.023Grandchild_{ij}$

Only earnings was statistically significant at the .05 level.

a. Describe how the above regression could be estimated as a fixed effects model. Be precise in your definition of the variables and regression.

b. The author mentions that parental income is available in the data set (i.e. the income of those making the bequests) and yet the variable is not included in his estimate of the fixed effects model. Why should you have expected this? Be precise in explaining the nature of the problem that would emerge.

c Suppose that the model above was estimated using OLS instead of a fixed effects model. Further, suppose that the unobservables that cause a parent to want to pass an inheritance on to their children also lead them to invest heavily in their children's education. Would you expect the coefficient on earnings in the OLS model to be larger or smaller than that in the fixed effects model? Why? (Provide the econometric conditions that determine whether the OLS estimate is likely to be biased up or down and relate it to the behavioral assumption regarding unobservables.)

d. Explain how you could test whether the fixed effects in the above model are statistically significant. For simplicity, assume two children per family, 1000 parents making bequests, and the three explanatory variables listed above. Be precise in describing degrees of freedom for and the distribution of your test statistic.

e. Under what conditions would it be appropriate to estimate the above model as a random effects model instead of a fixed effects model? How could you test whether these conditions are supported by the data? Provide the details of how the test statistic would be constructed and its distribution.

f. If the random effects model is appropriate, why would it be preferred to the fixed effects model?

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[1] Mark Wilhelm, "Bequest Behavior and the Effect of Heirs' Earnings: Testing the Altruistic Model of Bequests", *American Economic Review*, September 1996.

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2. (35 pts) Suppose that you work for an insurance company and have been asked to evaluate the cost of two types of insurance programs. The first plan has a $1000 deductible and the second plan has a $100 deductible. In all other ways the plans are identical. Your insurance company has decided to offer both of these plans to a group of workers at a large local firm. The worker must pay an extra $400 annually to get the policy with the $100 deductible instead of the $1000 deductible. Each worker was allowed to pick the policy of her choice. You have done a regression estimating the amount the insurance company pays per insured employee with the following results:

Insurance Cost = 2500 + 1600(DEDUCT100) + 10*age + 50*female

where deduct100 is a dummy variable that equals one if the person elects the policy with the $100 deductible, age is the person's age, and female is a dummy equal to one for women.

a. Other things being the same, switching from a $1000 to a $100 deductible should raise insurance cost by at most $900 per year. Why do you think the estimated effect of the $100 deductible policy is so high ($1600)? That is, what is a likely source of bias in this study? Explain with a combination of the economics of deciding whether to choose the lower deductible and how this relates to the econometric theory of bias in the OLS model described.

b. If the insurance company wants to get a true estimate of the effect of switching the entire company from the $1000 to the $100 deductible, what would be an appropriate econometric method? Assume that you have cross sectional data on all employees for one year of insurance pay-outs, the type of policy they have, and information describing each insured person. Give details on the exact procedure that you would use and explain how you actually derive an estimate of the true effect of switching workers to a $100 deductible. Be precise in defining variables, parameters, and functions. Also, be sure that you are providing an estimate of the cost of switching ALL workers to the $100 deductible relative to none of the workers on the $100 deductible.

c. If OLS is used to estimate the model described above, is the estimated effect of age likely to be over- or under-stated? Explain and be sure to outline any assumptions you make in determining the sign of the bias on the age coefficient.

d. Using the model and the estimates you described in (b), explain how you could predict insurance costs for

i. workers who chose to join the $100 deductible plan voluntarily
ii. workers who chose NOT to join the $100 deductible plan if they are forced into the $1000 deductible plan.

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3. (30 points) In a paper by David Macpherson and myself, we estimate the determinants of employee contribution rates to pension plans. The contribution rate is defined as an employee's contributions as a percentage of his/her salary. Since this cannot be less than 0, we used a tobit model to correct for truncation at zero. The estimated coefficients, standard errors, and the means of the independent variables are listed in the table below.

Variable	Coefficient	Standard error	Mean of variable
Intercept	1.47	2.22	
Education dummies: (high school drop out is reference group)			
High school graduate	1.33	0.71	0.31
Attended some college	1.6	0.72	0.3
College graduate	2.66	0.72	0.36
Matching dummy	0.55	0.27	0.81
variance of error (σ^2)	5.77	--	--

The matching dummy takes on a value of one if the employer matches employee contribution and is a zero otherwise.

For each of the following questions, provide a numerical answer and a description of how you derived your estimate.

a. For a high school graduate whose employer provides matching contributions, what is the predicted probability that she will contribute something greater than zero to the pension plan?

b. For the person in (a), what is the expected contribution rate?

c. For the person in (a), what is the predicted probability that the contribution rate would be greater than 10%?

d. What is the estimated effect of employer matching on the expected contribution rate for the person described in (a)?

e. If the above model of contribution rates had been estimated with OLS instead of Tobit, what would you expect would happen to the estimated coefficient on the matching variable? Justify your answer by explaining the source of any bias in the OLS model in this example.