University of California, Davis
Department of Economics
PUBLIC ECONOMICS

Date: July 2, 2009
Time: 3 hours
Reading time: 20 minutes

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

- **Please answer all three (3) of the following questions.**
- **Put your identifying number on your exam.**

1) Use this question to demonstrate your knowledge about empirical methods in Public Economics. For each part, be as precise and comprehensive as possible.

You are trying to measure the causal impact of medical spending on infant care on child health outcomes. Your initial strategy is to regress infant mortality (a binary variable indicating death within the first year of life) on the amount of money spent during pregnancy and delivery, as well as a set of covariates related to maternal health habits, education, age, etc.

a) Describe the "standard reasons" why we should be concerned about biased coefficients from estimating by OLS. Be as specific as possible, and indicate the direction of expected bias.

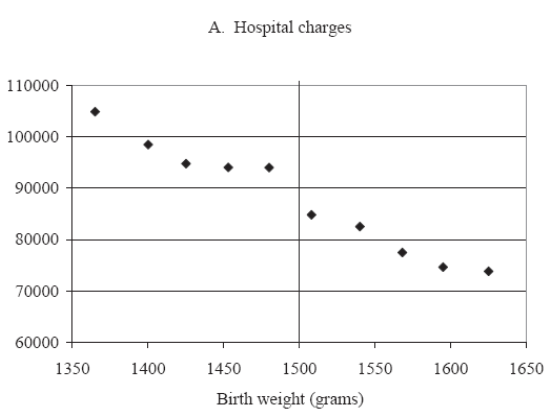
b) Are there other key estimation concerns (aside from biased coefficients) in this setting?

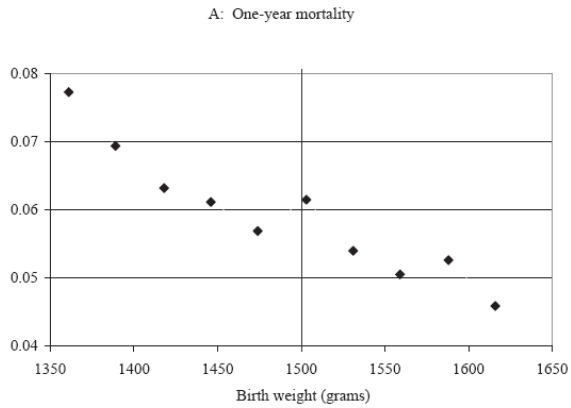
c) You decide to use Instrumental Variables. What are the conditions and assumptions needed to perform IV estimation?

d) Specifically, you choose "average Hospital spending per adult patient" as your instrumental variable. What is your assessment of the validity of the assumptions in part C in this example? Be as specific as possible.

e) As a separate strategy, you aim to use Regression Discontinuity (RD). Describe the conditions and assumptions needed to perform RD estimation.

f) You are told by a doctor that if an infant is born less than 1500 grams, the hospital spends extra care and interventions on the child's care. You get ready to estimate RD models with "infant mortality" and "hospital expenses" as the outcome variables, and get the following patterns:





What is your assessment of the validity of the RD assumptions in part (e) in this example? Be as specific as possible.

g) How, specifically, would you implement RD estimation for this setting? Write out the econometric model you would use, letting us know how you would get your estimates of the impact.

h) What sort of robustness/specification checks should you perform to assess the validity of this RD design?

2) Willingness to Pay for Pollution Control Under Income Uncertainty.

Suppose that a consumer's utility depends on income (c) and whether regional air quality is improved (δ=1) or the air is left polluted (δ=0), according to the utility function

$$u(c,\delta) = c^{.5} + \delta.$$

Note that for a given air quality level the consumer is risk averse, but that the marginal utility derived from air quality improvement is the same regardless of income. The consumer's exogenous income is uncertain: it is e_1 with probability p_1 and e_2 with probability p_2. Although $e_1<e_2$, the utility *function* is the same in both states.

a) Write down an equation which defines the willingness-to-pay locus in (γ_1,γ_2) space.

b) Use the implicit function theorem to find the slope of the willingness-to-pay locus, and determine whether it is concave or convex. Then illustrate the locus in a figure having γ_1 on the horizontal axis and γ_2 on the vertical axis.

c) Write down an equation for the line of the points having an expected value equal to a constant A.

d) Taking A=OP (the option price), prove that the willingness-to-pay locus at the 45° line is *steeper* than is the locus of points with expected value equal to OP. Then illustrate the locus of points with expected value OP in your figure.

e) Give an intuitive interpretation of your result in part (d).

3) In recent years, the most significant policy change affecting low skilled single women with children is the expansion of the Earned Income Tax Credit and the contraction of welfare. This question explores issues around these two programs.

   a) How would you expect the expansion of the EITC and the contraction of welfare (AFDC/TANF) to affect the labor supply of single women with children? A complete answer to this question must include: budget constraints showing how EITC and welfare (AFDC/TANF) affect income/leisure opportunities, a discussion of the labor supply effects of the programs referring to income and substitution effects, and a discussion of intensive and extensive labor supply predictions.

   b) What about low income married women with children? How do these two programs affect the labor supply of this group? To answer this question, assume that married couples are categorically eligible for TANF (e.g. they can receive benefits just as single women with children do as long as they are income eligible). Further, if desired you can assume women are secondary earners and that the labor supply decisions of the married couples obey the secondary earner labor supply model.

   c) Turning to the empirics of studying the EITC program, suppose you are interested in estimating the impact of the EITC on the employment decisions of single women with children. You assemble 20 years of the CPS, covering 1985 to 2004. This period include three federal EITC expansions (1986, 1990 and 1993) as well as a period of tremendous expansion in State EITC programs. You regress employment (EMP, a 0/1 variable) on the maximum EITC credit (MAXCREDIT) the woman is eligible for given the year, her state of residence, and her number of children. What fixed effects should you control for in this model? What fixed effects can you NOT control for given this research design? What is the identification assumption in this research design?

   d) How might you improve on this research design?

   e) Suppose you (somehow!) obtain an unbiased estimate of the coefficient on MAXCREDIT. How would you use this parameter to obtain an estimate of the elasticity of participation (employment) with respect to income or wages?

   f) Now, you take the model outlined in (c) and use it to estimate the impacts on the intensive margin by replacing the dependent variable with the number of hours worked. You limit the sample to working women. Aside from the issues discussed above in (c) and (d), discuss the merits of this research design. What if, conditional on working, hours of work were fixed for each woman (but could vary across women). What would the “true” intensive margin labor

supply elasticity be? Would this research design result in an unbiased estimate of the intensive margin elasticity? Why or why not?