1. Endogenous variables: Variables that are explained by other variables within a model.

2. Exogenous variables: Variables that are not explained by other variables within a model.

Problem Set 4

Submit by 8:00am 20th October

A. High fertility rates are often a concern for policy makers in developing countries. Many studies have found a negative correlation between mother's education and fertility. This then is one of the reasons why promoting girl's education has been advocated as one possible mechanism to reduce fertility. Yet before drawing policy conclusions regarding the relationship between fertility and mother's education, one would want to know whether the relationship is causal.

(i) Explain why education might be endogenous.

(ii) The paper by Sander (1992) analyzes this issue for the US. Read the paper and critically discuss the approach used in this paper (and in particular the choice of instruments). Limit your critique to one page. Reference: W. Sander, "The Effect of Women's Schooling on Fertility," *Economics Letters* 40, 229-233.

B) Computer exercise:

We now want to understand the determinants of fertility, using a dataset on women in Botswana in 1988. The dataset includes information on the number of children, years of education, age and television ownership (among other variables). We also have a birth date of the women, and a number of characteristics about the communities in which the individuals live (access to roads, electricity,…). We want to analyze the effect of education on fertility.

1) We can construct a dummy variable *frsthalf* equaling one if the woman was born during the first six months of the year. Which assumptions do you need in order to use *frsthalf* as an instrument for education? Are these assumptions reasonable in this case? Explain.

2) Estimated the model

i. $$children = \beta_0 + \beta_1 educ + \beta_2 age + \beta_3 age^2 + u$$

with OLS and with IV (using *frsthalf* as an instrument for *educ*). Compare the estimations and interpret the results (and the differences between them) – estimations are reported below.

3) What does the first stage of the IV tell you about the choice of *frsthalf* as an instrument?

4) Do you think it was a good idea to include age and the square of age? Why or why not?

5) Can you conclude from these estimates that a policy increasing education for women is likely to reduce fertility? Explain

6) Some research suggests that exposure to soap operas in TV can be an effective mechanism in developing countries to reduce fertility.[1] How would you test whether fertility preferences are different between people who own a television versus those that don't have a television?

7) How would you proceed if you want to test whether television ownership has an effect on fertility?

[1] Chong, A., S. Duryea and E. La Ferrara, 2012. "Soap Operas and Fertility: Evidence from Brazil." *American Economic Journal: Applied Economics*.