Labor Economics Field Exam

June 2015

Instructions

You have 4 hours to complete this exam.

This is a closed book examination. No written materials are allowed. You can use a calculator.

THE EXAM IS COMPOSED OF THREE QUESTIONS. EACH QUESTION IS WORTH 100 POINTS. YOU MUST OBTAIN AT LEAST 75 POINTS IN AT LEAST TWO QUESTIONS TO PASS THE LABOR FIELD EXAM.

Please answer each question in separate booklets.

First Question. 100 Points

Consider an economy in which there is one firm which produces a given amount of product y using two inputs: skilled workers L_s and unskilled workers L_u. The firm's production function takes the following form:

$$y = f(L_s, L_u) = L_s^{\rho} L_u^{1-\rho}.$$

with $0.5 < \rho < 1$. The firm pays skilled workers a wage w_s and unskilled workers a wage w_u. The price of the product is fixed and normalized to be equal to 1. The firm chooses how many skilled and unskilled workers to employ by maximizing profits.

The economy is also populated by N individuals, half of them are skilled and half are unskilled. These individuals have preferences over consumption and leisure that can be represented using the following utility function:

$$u_i(c, l) = \sigma c + \epsilon_i l,$$

where ϵ_i is an individual shock drawn from a uniform distribution defined in the interval $[0, 1]$. Each individual has 1 unit of time that can be devoted either to work for the only firm in the economy or to leisure. If an individual chooses to work, she or he must work full time and spend the entire unit of time working, i.e. leisure is either 0 or 1. If they choose to work, they receive the wage w_s or w_u depending on whether they are skilled. In addition, they are endowed with non-labor income y, which is identical across individuals. Denote with M_s and M_u the number of skilled and unskilled individuals who choose to work.

1. (10 points) Write down the firm's problem.

2. (10 points) Solve the firm's problem for the optimal amount of skilled and unskilled labor employed in the production of y.

3. (10 points) Write down the problem of an individual living in the economy.

4. (10 points) Solve the problem of a skilled and of an unskilled individual for consumption and leisure (or labor supply).

5. (10 points) Determine the fraction and number of skilled and unskilled individuals who choose to work.

6. (10 points) Write down the equilibrium conditions for the skilled and unskilled labor market using your answers to questions 2, 4, and 5.

7. (10 points) Does the skilled or the unskilled labor market have the higher wage? Provide a proof.

   Suppose that at the equilibrium wages the number of employed skilled and unskilled individuals is greater than zero, i.e. $M_s > 0$ and $M_u > 0$. The government decides to introduce a minimum wage $\underline{w}$ which is higher than the equilibrium wage of the unskilled workers, but lower than the equilibrium wage of the skilled workers, i.e. $w_u^* < \underline{w} < w_s^*$, where w_s^* and w_u^* are the equilibrium wages of skilled and unskilled workers.

8. (10 points) What is the effect of the introduction of the minimum wage on the fraction of skilled and unskilled workers that are employed in the economy?

9. (10 points) Propose an implication of the model that can be used to test whether it is consistent with the U.S. data.

10. (10 points) What data do you need to estimate the parameters of the model (you can create experiments to generate the data you need as long as they are feasible)? What estimation method would you use to estimate the model?

Second Question. 100 Points

QUESTION 1: Indicate whether the following statements are true or false and explain your answer in approximately half a page. Be specific and refer to the topics studied in the course when possible. No points will be given for vague answers. Each question is worth 10 points.

(a) Consider how researchers proceed in order to estimate the parameters of a life cycle model. The objective is to find the value of the model parameters that minimizes the distance between the behavior predicted by the model and that observed in the data. For example, a researcher may compute the age-saving profile from the data, and then look for parameter values so that his model will generate an age-saving profile that is *as close as possible* to the empirical one.

Scholz, Seshadri and Khitatrakun (2006) do not follow the standard procedure in their paper. In fact, they do not estimate the model parameters at all, instead choosing standard values from previous literature.

True or False: Estimating the model parameters following the standard procedure prevents a researcher from evaluating the optimality of observed behavior (in Scholz, Seshadri and Khitatrakun's case, it would have prevented them from answering the question of whether Americans are saving optimally for retirement).

(b) Hubbard, Skinner and Zeldes (1995) argue that means-tested social insurance programs depress savings of poor families. The mechanism is the following: Suppose that a social insurance program provides a consumption floor of $1,000. If an individual has no savings and is hit by a shock that prevents him from working, the Government will pay him $1,000 to cover his basic needs. If the same individual has $250 in savings when he is hit by the shock, the Government will make up the difference with the consumption floor, that is, it will pay him $750. Individuals who have a high probability of being hit by a shock are better off increasing their consumption and keeping $0 savings.

Consider now a social insurance program that is not means-tested, such as unemployment benefits. There is no asset limit in order to qualify for unemployment insurance.

True or false: In the context of the life-cycle model, insurance programs that are not means-tested, such as unemployment insurance, will also depress savings.

(c) Rogerson and Wallenius (2013) argue that it is difficult to generate the abrupt change in labor supply that takes place at retirement as the optimal decision in a life cycle model.

True or False: The existence of fixed costs of work can help explain the existence of abrupt transitions from full time work into full retirement.

(d) Friedman developed the permanent income theory of consumption in 1957. As a result, researchers who had traditionally estimated regressions of consumption as a function of current income (Keynesian consumption function) started estimating regressions of consumption as a function of permanent income. Permanent income was commonly proxied using averaged lagged income values.

True or False: According to the Lucas Critique, estimates using this proxy for permanent income will be biased.

QUESTION 2: Choose **TWO** out of the next three question. Each answer should be approximately two pages long. Each is worth 30 points.

(a) In a simple version of the life cycle model, savings are just an instrument to smooth consumption across periods, and it is optimal for individuals to die with no wealth. However, while taking a look at the Health and Retirement Study data, you observe that the majority of respondents die with positive wealth.

i. Describe two possible scenarios that are compatible with the life cycle model and lead to individuals dying with positive wealth.

ii. For each of the scenarios you described above, discuss whether you would expect high- or low-permanent income individuals to die with higher wealth.

iii. Discuss a policy intervention in each of the two scenarios that would make the wealth at death closer between rich and poor individuals.

iv. Suppose only one of the two scenarios you propose is true in the data. If you had the ability to collect any data and to run any type of model, explain how you would identify the correct scenario.

(b) Katz and Goldin (2002) discuss the mechanism through which the introduction of the contraceptive pill altered women's marital and career decisions.

i. In a paper that we DID NOT see in this class, Akerloff, Yellen and Katz study the decline of a practice they refer to as "shotgun marriage", whereby whenever premarital sexual relations resulted in pregnancy, the partners would marry. This custom was prevalent until the early 1970's, but has all but disappeared nowadays. Discuss how the introduction of the contraceptive pill could have led to the disappearance of "shotgun marriages".

ii. Discuss how the disappearance of "shotgun marriages" may have affected women's marital and career choices.

iii. Different authors have argued that the distribution of power within the household affects investment in children. In particular, households where the woman has more bargaining power invest more in their kids. Discuss how the introduction of the contraceptive pill could have affected investment in children.

(c) Consider an implicit contract designed to protect workers in the event of disability. Assume that disability forces full-time worker to switch to part-time work.

i. Describe the observed wage profile for workers subject to this contract who go through healthy and sick periods (assume that disability is not an absorbing state).

ii. Describe the shadow wage profile (the shadow wage is equal to the marginal product of labor).

iii. Describe the profile of hours worked and explain how it relates to the previous two profiles.

iv. Suppose this type of contract is widespread. How would this affect estimates of the intertemporal elasticity of substitution of labor supply such as those obtained by Altonji (1986), who assumes that the standard labor supply model holds?

v. Why would any firm be interested in offering such a contract?

Third Question: 100 Points

Each sub-question has the same number of points. Please make an effort to write down formulas where they help to clarify what you are talking about. Also, please write LEGIBLY!

An analyst estimates the following model for the log of wages (w) for workers using data from a recent Current Population Survey:

$$\log w = \alpha + \beta S + \gamma Exp + \delta Exp^2 + \theta Male + \lambda Use\_Computer + \varepsilon$$

where (α, β, γ, δ, θ, λ) are coefficients, S is years of schooling, Exp represents potential labor market experience, Male is a dummy variable equal to 1 for male workers and 0 for females, and Use_Computer is a dummy variable equal to 1 for workers who state that they use a computer on the job. He obtains an estimate of λ=0.25, and an estimate of β=0.08 (both are very precisely estimated). Fitting a similar model that omits the Use_Computer variable he obtains an estimate of β=0.05.

Question 1. IV and the Return to Computer Use

(a) Explain the concept of Local Average Treatment Effect (LATE). Under what circumstances does an instrumental variable regression estimate LATE? How does LATE help rationalize the results typically obtained in the instrumental variable studies on the returns to schooling?

(b) Suppose somebody suggests using the presence of a computer lab in the local high school as an instrument for computer use among recent high school graduates in the area. Briefly show how you would implement this procedure. Discuss threats to validity to this exercise, i.e., argue whether this is a good instrument or not considering all three properties of instruments.

(c) How would you calculate the standard errors in a typical regression of log wage on schooling to account for the presence of group-level errors components?

Question 2. Twins and the Return to Computer Use

(a) Use the omitted variables formula to explain the connection between the estimates of β when Use_Compute is included and excluded. What must be true about the correlation between computer use and schooling?

(b) Discuss a set of assumptions under which the analyst's estimates represent causal estimates of the effect of schooling and of computer use.

(c) Some analysts have questioned the causal interpretation of the λ coefficient. Discuss alternative interpretations. What evidence would you suggest to use to support or refute these interpretations?

(d) Another approach to address omitted variable bias has been the use of data on twins. There are two approaches to use twin data – differencing and correlated random effects. Briefly explain them both.

(e) Show how you would use twin data to estimate the returns to computer use. Are you worried about measurement error in this context? How does first differencing affect the influence of classical measurement error?

(f) What does a twin-estimator implicitly assume about the choice of computer use within the family? Given this assumption, when is a within family estimator indeed better than a between family estimators? How could you try to assess this assumption using data on observable characteristics (you can follow the suggestion by Ashenfelter and Rouse)?

(g) One way to use twin information is to include the average propensity of computer use among both twins as separate regressor in the individual model for earnings. How is this similar to the control function approach?

(h) In class, we have shown how the twin estimator is a special case of a matching estimator. Write down the general matching estimator of the effect of computer use on wages. Define the propensity score. What is its role in matching estimators and what justifies its use?