Labor Economics Field Exam
Spring 2014

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 where a young and an old generation overlap. You should think of the young generation as composed of working-age individuals and the old generation as composed of retired individuals. Each generation lives for two periods, has a discount factor β, and preferences over a standard non-durable consumption good c and the current health status h. The corresponding utility function takes the form $u(c,h) = v_1(c) + v_2(h)$. The objective of each generation is to maximize its life-time utility. Assume that there is no altruism between a given generation and future ones. The young generation is endowed with an amount of income y_t which is assumed to evolve deterministically. The young generation can save an amount b_t using a risk-free asset with a gross interest rate R. The only source of income for the old generation is the amount of savings they possess when old.

In each period t, the health status of a generation is a function of three variables: the technology used to maintain and improve its health θ_t, the amount of resources spent on health care c_t^h, and a health shock ϵ_t. Assume that the amount of resources spent on health is a deterministic function of the adopted technology, i.e. $c_t^h = g(\theta_t)$. As a consequence, the health status is simply a function of the health shock and of the technology, i.e.

$$h_t = f^j(\theta_t, \epsilon_t) \qquad j = y, o.$$

The technology evolves over time as follow. In each period t, the economy is characterized by two technologies that can be used to affect the level of health: a modern technology θ_t^m and an outdated technology θ_t^{ou}. In each period, a new technology becomes available with a probability P_θ. If it does, the outdated technology can no longer be used, whereas the modern technology becomes outdated. At each point in time only one technology can be used. Conditional on the health shock, the newer technology guarantees higher levels of health, but it also requires larger health expenses c_t^h. As mentioned above, each technology is associated with a given level of health expenditure, i.e. when the health technology is chosen, health expenditure is given.

In the economy, there is an infinitely-lived government whose role is to choose which health technology to adopt in the current period and how to fund the corresponding health expenditure. The government can use taxes on the young τ_t and government debt d_t to pay for health expenses. As a consequence, the young only choose consumption and savings. The old only choose consumption.

1. (14 points) Write down the decision problem of an old individual: objective function being maximized and constraints. Derive his or her optimal level of consumption (optimal consumption is straightforward to derive in this case).

2. (14 points) Write down the decision problem of a young individual: objective function being maximized and constraints.

Now suppose that the infinitely-lived government chooses the health technology, taxes, and the amount of outstanding debt by maximizing a weighted sum of the welfare of the two generations with both weights being strictly positive. You can think of the weights as the political power of the two generations.

3. (14 points) Write down the problem solved by the government: objective function being maximized and constraints.

4. (14 points) When a new technology becomes available, does the government choose to adopt it or to keep the technology used in the previous period? (Use the problem you wrote down in the previous point to answer the questions)

5. (12 points) Does the government use taxes, debt, or a combination of the two to pay for the health expenditure required by the technology adopted in the current period?

6. (12 points) Independently of your answer to question 4, suppose that the government decides to adopt the new technology. Does the corresponding increase in health expenditure affect the consumption and saving decisions of the young generation? (Hint: use the Euler equation to answer the question)

7. (10 points) Now suppose that the utility function of the two generations is no longer strongly separable between consumption and health status. In this case, does an increase in health expenditure change the saving decisions of the young? Under which conditions on the utility function would savings increase?

8. (10 points) Describe which variables and which variation in the variables you would need to observe to estimate the model.

Second Question. 100 Points

Part 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) Define pre-retirement wealth as the wealth accumulated by age 60. For simplicity, assume that no individual retires before age 60, and that you observe actual consumption and not just expenditure. Consider the correlation between pre-retirement wealth and the absolute size of the drop in consumption at retirement.

True or false: For individuals who retire at the anticipated date (i.e., those whose retirement is "expected"), the sign of this correlation is positive. For individuals who are forced to retire early because of an unexpected health shock, the correlation is negative.

(b) Huggett, Ventura and Yaron (2011) find that individual characteristics measured at age 23 are a more important source of lifetime inequality than shocks received over the rest of the working lifetime. In particular, variations in human capital at age 23 are the main explanatory factor for lifetime inequality. Based on those findings, a policy maker decides to give yearly financial transfers to poor parents that can only be spent on their childrens' education.

True of False: The policy will reduce lifetime inequality.

(c) True or false: Models that assume that 2-person households behave as a single agent account for the risk-sharing implicit in household saving, but ignore the income-pooling component.

(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.

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

(a) Sketch a lifecycle model augmented to account for the female participation and fertility decisions. For simplicity, you can assume that only women make choices, female labor supply is a binary variable (FT or 0 hours), women can have one child in every period, and male labor supply is exogenous.

- Describe the parts of the model that determine the tradeoff facing women when they choose whether to have a child.
- Give an example of a mechanism operating within the model that would lead to more productive women having more children (there are many ways to do this, and you just need to outline one. You may choose the value of some model parameters, choose specific values for the correlations between unobservables and model parameters, etc.).
- Give a different example in which more productive women would have fewer children.

(b) Consider an implicit contract designed to protect workers in the event of disability.

- 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).
- Describe the shadow wage profile (the shadow wage is equal to the marginal product of labor).
- Describe the profile of hours worked and explain how it relates to the previous two profiles.
- 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?
- Why would any firm be interested in offering such a contract?

(c) Imai and Keane (2004) argue that standard micro estimates of the intertemporal elasticity of substitution of labor supply (i.e.s.) such as those in Altonji (1986) are biased because they ignore individuals' incentives to accumulate human capital.

- Explain the source and sign of the bias.
- How would you test whether the human capital accumulation motive is important?
- Describe other sources of bias to the standard micro estimates of the i.e.s. obtained from a sample of young workers.
- A researcher decides to estimate the i.e.s. following the procedure outlined in Altonji, but using a sample of workers aged 60 to 70. Assume that workers do not accumulate human capital after age 55, so that this is no longer a source of bias. Describe other potential issues specific to older workers that may bias the researcher's estimates.

Third Question. 100 Points

First Question. 100 Points

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Third Question. 100 points

Part 1: Instrumental Variable Estimates of the Returns to Schooling

Consider the following cross-sectional model for individual earnings:

(1) $\log y_i = \alpha_i + \beta_i S_i + \varepsilon_i$

where y_i and S_i are log earnings and years of schooling of individual i, respectively. α_i is an individual constant that may be correlated with schooling, and β_i is the return to schooling, which is allowed to vary across individuals. Let $B = E(\beta_i)$ be the average return to education in the population.

a. Under what conditions will the least squares estimate of the coefficient on schooling in model (1), β_{OLS}, be a consistent estimate of the population average return to education B?

b. What are the sources of omitted variable bias (a.k.a., 'ability' bias) and selectivity bias (a.k.a., self-selection bias) in the OLS estimator?

c. For 2 individuals, i and j, with different abilities (a_i, a_j), marginal returns to education (b_i, b_j), and marginal costs of education (r_i, r_j), graphically depict the education selection process and briefly discuss how it relates to the least squares coefficient, β_{OLS} (hint: put (log y) on the y-axis and S on the x-axis and exploit the explicit functions for returns and costs we had assumed in class).

d. Suppose there exists a variable, z_i, that is a valid instrumental variable, i.e., that differentially affects the costs of schooling across individuals for exogenous reasons and that does not have an independent effect on the earnings:

   (2) $S_i = \theta z_i + v_i$

   Under what additional condition will two-stage least squares (2SLS) estimation of equation (1) yield a consistent estimate of the average return to education B? In this case, explain why 2SLS eliminates both the ability bias (this is standard) and the self-selection bias.

e. Suppose the additional assumption on the instrument z_i do not hold; what parameter does 2SLS estimate and under what additional condition? Give the parameter an economic interpretation.

For the remainder of the questions, consider now the case in which $\alpha_i=\alpha$ and $\beta_i=\beta$ for all i.

f. Show that if the assumption of exogeneity fails, IV can have a worse omitted variable bias problem than OLS when the instrument is only weakly correlated with schooling even if the correlation of the instrumental variable with omitted variables is small.

g. Even without having a bias in large samples, IV suffers from small sample bias problems even in large sample if the first stage relationship is weak. Briefly describe the problem

of weak instruments in this context. What approach to avoid this problem has been proposed in the literature? Does that solve the problem in question 1.g as well?

h. Suppose S_i is measured with error that is "classically" distributed. How will this measurement error bias the least squares estimate of the returns to education, and how is this bias related to the noise-to-total variance ratio corresponding to S_i?

Part 2: Short Question

A researcher is interested in the effect of mother's education on her first child's birth weight. She suggests comparing the birth weight of first born children of twin mothers to hold constant any 'genetic' factors.

a. Write down the basic statistical model of schooling determination she has in mind; write down the statistical model for birth weight, and show how a within twin estimator could solve the problem of omitted variables.

b. How would you try to assess whether in this case a within or between family estimator would be better?