

Labor Economics Field Exam
Spring 2011

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 AN AVERAGE OF 75 POINTS IN THE THREE 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. In each period, each generation is composed of N individuals. They have preferences over consumption and leisure which are represented by the utility function $U(c, l) = \frac{(c^\sigma l^{1-\sigma})^{1-\gamma}}{1-\gamma}$. The only source of heterogeneity when individuals are born is their risk aversion. There are two levels of risk aversions: γ_L and γ_H with $\gamma_L < \gamma_H$. In each period t , the economy is hit by an aggregate shock θ_t which can only take two levels: $\theta_t^B = 0.5$ and $\theta_t^G = 1.5$. The probability of a future realization of the aggregate shock is characterized by some persistence in the following sense: $P(\theta_{t+1} = \theta_t | \theta_t) = 0.75$. In each period, an individual is endowed with a total amount of time T .

In each period t , the young individuals choose the type of education to acquire. They have two choices. They can choose education F (flexible) which allows them to have a wage process when old that varies less with the aggregate shock or education R (rigid) which gives a wage process when old that varies more with the aggregate shock. The cost of education is identical for F and R and equal to C_e . The time required to acquire each type of education is $T_e < T$. All individuals in the young generation are endowed with an exogenous income equal to $y_t > C_e$ which must be consumed (there is no saving technology). In each period t , the old individuals draw a wage offer w_t^F if they have education F and w_t^R otherwise. Given this wage, they must decide how many hours to work and how much to consume. The only source of income for the old individuals is their earnings.

In the economy there are only two firms to whom the old workers can supply labor. The first one employs only workers with education F , whereas the second one employs only workers with education R . Both use the same type of capital K . The labor demand function for the first firm has the following form:

$$\ln H_t^{D,F} = \alpha_0 + \alpha_1 \ln w_t^F, \quad (1)$$

whereas the labor demand for the second firm takes the following form:

$$\ln H_t^{D,R} = \alpha_0 + \alpha_1 \ln w_t^F + \alpha_2 \ln \theta_t, \quad (2)$$

where $H^{D,i}$ is the total demand for labor, $i = F, R$, $\alpha_0 > 0$, $\alpha_1 < 0$, and $\alpha_2 > 0$. The wage for each education group is determined by the equilibrium in the corresponding labor

market.

1. (10 points) Write down the decision problem of a young individual.
2. (10 points) Write down the decision problem of an old individual.
3. (20 points) Solve the problem of an old individual.
4. (20 points) Using the solution obtained in the previous point write down the equilibrium condition in each labor market and find the equilibrium wages. Provide some insight on the equilibrium wage for the two education groups (which variables affect the equilibrium wage and in which direction?)
5. (20 points) Solve the problem of a young individual. Which individuals will choose education F (Just provide the intuition using the general solution you have found)? How do aggregate shocks affect the education choice?
6. (10 points) Suppose you want to structurally estimate this model and you only have one cross-section of the data you need. Can you identify and estimate all the parameters of interest?
7. (10 points) Suppose you have all the data required to identify and estimate the model. Which method would you use for the estimation?

Second Question. 100 Points

Consider an individual who has finished high school and is considering whether or not to attend college. The individual would live for T more periods with absolute certainty. He/she derives utility from consumption and leisure, that is, the individual's per-period utility is:

$$u(c_t, l_t; \theta^c),$$

where θ^c is the vector of parameters associated with the utility function.

The individual has the option of working, in which case he/she will obtain the hourly wage of w_{it} for each of the h_{it} hours he/she works. The hourly wage is a linear function of one's education level (ed) and experience (ex). That is,

$$\log w_{it} = \beta_0 + \beta_1 ed + \beta_2 (ed)^2 + \beta_3 ex + \beta_4 (ex)^2 + \varepsilon_{it}.$$

In addition an individual may obtain income from other sources (non-earned income), denoted by I_{it} .

1. Specify the life-time utility from the present value of discounted expected utility. In doing so, specify all the relevant budget constraints. Explain briefly each constraint.
2. Define the state vector z_{it} , and explicitly explain what the role is of each of the state variables.
3. What are the necessary conditions for an individual to obtain any education? What would be the optimal stopping rule for obtaining education? Explain briefly.
4. Describe how you would go about estimating the model. In particular, provide information regarding the data that you would be using, the econometric methods, and any issues that may arise in estimating the model.
5. Suppose now that there is uncertainty regarding the coefficients in the wage equation. For example, assume that $\beta_t = (\beta_{0t}, \beta_{1t}, \beta_{2t}, \beta_{3t}, \beta_{4t})$ follow a VAR process. How would that affect the optimal choice of education? How would it affect the estimation of the model?
6. Suppose that individuals derive utility from having children. How would that change the structure and implications of the model? Would there likely be differential effects for men and women?

7. In reality, wages are determined in the market place, that is, as a result of the interaction between supply of labor and demand for labor? How would you go about accounting for this factor in the model?
8. How would the introduction of general equilibrium effects such as the one in (7) affect the estimation and interpretation of the model?
9. Suppose now that T is not exogenous, but is random, with mortality being a function of the level of education and investment in health. How would you factor these elements into the model? What implications would you expect? Explain briefly.
10. Please give references to at least two papers that have dealt with similar questions and briefly provide your opinion about these two papers.

Third Question. 100 Points

1. True or False. Short answer (3 or 4 lines). Each is worth 10 points.

a) Consider the following Euler equation:

$$\Delta \ln C_{t+1} = \alpha + \sigma \ln(1 + r_{t+1}) + \beta \Delta Y_{t+1} + \theta' \Delta z_{t+1} + \varepsilon_{t+1},$$

where Y is labor income and z includes demographic and labor supply variables.

Using instrumental variables, a researcher estimates the equation separately for high- and low-wealth households and finds evidence of excess sensitivity of consumption to predictable changes in income for low-wealth households only.

Next, she re-estimates the Euler equation allowing the coefficients on positive and negative expected income changes to differ, and finds that consumption is significantly correlated with *both* predictable income increases and with predictable income declines.

Her results are consistent with the existence of liquidity constraints.

- b) Early structural models of female labor supply made two simplifying assumptions: a) the husband always works; and b) households cannot borrow nor save. Under such assumptions, the standard life cycle model of female participation will tend to understate women's labor force entry and exit rates over the life cycle.
- c) If the standard model of consumption under uncertainty is true, we would expect consumption growth and income growth for an individual to be uncorrelated over time.
- d) In a world where workers cannot perfectly insure against either employment or productivity risk and the two are uncorrelated, a decrease in the variance of productivity shocks raises individual welfare more than a comparable decrease in the rate of job destruction.

2. Choose TWO of the next three essays. (1 page each). Each is worth 30 points.

- a) Several papers have argued that the standard Euler equation, in which consumption growth is a function of intertemporal prices and changes in demographics, over-predicts the level of consumption following retirement (i.e. the level of consumption observed in the data is too low). They claim that this consumption shortfall cannot be fully attributed to the increased leisure time that accompanies retirement. Discuss in detail at least TWO reasons why the evidence presented in these papers is not necessarily inconsistent with the Life-Cycle/Permanent Income Hypothesis.

- b) In his 2005 paper “The Effects of Health, Wealth, and Wages on Labour Supply and Retirement Behaviour”, E. French uses an iterative procedure to account for selection in the wage profiles. Explain why this is important in the context of a retirement model. Discuss other factors that must be accounted for in the estimation of the wage profile of older workers.

- c) Define the household participation puzzle. Explain how the introduction of labor income in a life cycle model of portfolio choice can help rationalize this puzzle. Discuss how your conclusions depend on the correlation between labor income shocks and asset returns.