Labor Economics

Written Preliminary Exam

Spring 2010

Instructions: Choose one of the following three blocks of questions and follow the instructions for that block. Be as brief as you can. Good luck.

You have four (4) hours for this exam.

This exam has a total of six pages including this one.
Livist Studi (Block A)

Labor Prelim Exam
May 2010

If you choose this block you should answer three questions out of the following five.

1. The evolution of female labor force participation over the last century in US.
   
   - Describe the evolution of aggregate female labor force participation (LFP) over the period.
   
   - Using cohort analysis, describe the evolution of female LFP by age, marital status and presence of children. What different information does cohort analysis convey?
   
   - How has LFP changed over the life cycle for married women of different cohorts? Has the evolution been geographically homogeneous?

2. What are the main theories about the evolution of female LFP that you know? Briefly describe their main ingredients.

3. Consider the following static problem of a married couple:

   \[
   \begin{align*}
   \max & \quad \lambda f \left[ \mu \log(c_f^1) + \nu \log(c_f^2) + (1 - \mu - \nu) \log(l_f) \right] \\
   & + \lambda m \left[ \mu \log(c_m^1) + \nu \log(c_m^2) + (1 - \mu - \nu) \log(l_m) \right] \\
   \text{st} & \quad c_f^1 + c_m^1 + qk \leq (1 - \tau_f)wl_f^1 + (1 - \tau_m)wl_m^1 \\
   & \quad c_f^2 + c_m^2 = Ak^\theta(l_f^2)^{1-\theta} \\
   & \quad l_f + l_f^1 + l_f^2 = 1 \\
   & \quad l_m + l_m^1 + l_m^2 = 1 \\
   & \quad l_m^1 \geq 0, \quad l_m^2 \geq 0 \quad l_f^1 \geq 0 \quad l_f^2 \geq 0
   \end{align*}
   \]

   where \(c_f^1\) and \(c_m^1\) are the consumption of the market good by the women and the man, \(c_f^2\) and \(c_m^2\) are the consumption levels of home good, \(l_f^1\) and \(l_m^1\) are the hours they work in the market and \(l_f^2\) and \(l_m^2\) are the hours they work in the home.

   - Derive under which conditions on the parameters the solution implies \(l_m^2 = 0\). Given these conditions, show that hours worked by women in both market and home are independent of \(A\) (technological progress in the household).
• How would you answer change if the utility functions were not logarithmic?

• What assumptions in Greenwood, Seshadri and Yorukoglu guarantee that female work hours increase in response to an improvement in home technology?

4. In the model of preference transmission of Bisin and Verdier (QJE), there are two possible types of cultural traits in the population \{a, b\} and the fraction of individuals with trait \(i \in \{a, b\}\) is denoted \(q^i\). All children are born without defined preferences or cultural traits, and are first exposed to their parent’s trait. Direct "vertical" socialization to the parent’s trait, say \(i\), occurs with probability \(d^i(q^i)\). If a child from a family with trait \(i\) is not directly socialized, which occurs with probability \(1 - d^i(q^i)\), he/she picks the trait of a role model chosen randomly in the population (i.e., he/she picks trait \(i\) with probability \(q^i\) and trait \(j \neq i\) with probability \(q^j = 1 - q^i\)).

• Write the transition probabilities \(P_{ii}\) and \(P_{ij}\) for all \(i, j \in \{a, b\}\) and the equation that describes the evolution of the fraction of the population with trait \(i\) in the continuous time limit.

• What are the conditions on the transmission mechanisms which induce heterogeneity in the long run stationary distribution of preferences in the population?

• For which cultural traits you think these conditions are more likely to be satisfied?

5. In the model of Villaverde, Greenwood and Guner, changes in culture lag in time and are driven by changes in technology. Discuss at least two issues with these conclusions.
Fatih Guvenen

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May 2010

There are 2 questions in this block. You must choose at least one question from this block.

1. [50 points] In the United States, the college premium—the average wage of college graduates relative to the high-school graduates—fell persistently during the 1970s and then increased significantly in the 1980s and 1990s.

(a) Suppose that, in addition, you are told that the relative supply of college graduates (i.e., the number of workers with a college degree relative to the number of workers with a high school degree) has increased very fast in late 1960s and 1970s, but this trend has slowed down after that. Assume that the latter trend is exogenous and write a simple model that generates the non-monotonic behavior of the college premium observed in the data. Be as specific as possible: State your assumptions—the necessary functional forms, etc., and make any necessary derivations to support your arguments.

(b) Based on the empirical evidence you know, how can you justify taking the relative supply of college workers as exogenous? What would be the problem in your model if the relative supply cannot be taken exogenous?

(c) To explain the phenomenon in part (a) you do not need an acceleration in the demand for skilled workers. However, there are many papers in the literature that document that the demand for skilled workers relative to unskilled ones has grown faster since mid-1970s than before. Many of these theories—but not all—simply assume or postulate that this is because technological change in this period has become more skill biased. Describe one theory that generates an acceleration in the demand for skilled workers relative to unskilled workers starting in mid 1970’s that does not rely on new technologies being skill biased by default.

2. [50 points] This question considers the life cycle permanent income model and asks you to think about how you can identify some properties of a stochastic income process by observing the joint dynamics of consumption and income. To this end, consider individuals whose income can be written as:

\[ y_t = y^P_t + \eta_t \]

\[ y^P_t = y^P_{t-1} + \epsilon_t \]
where \((\eta_t, \epsilon_t)\) are i.i.d over time and across individuals. Preferences are quadratic and are defined over consumption only. Individuals can borrow and save at a constant interest rate \(r\) and also discount future utility at the same rate \(r\). Therefore, the maximization problem of the individual can be written as:

\[
\max E_t \left[ -\frac{1}{2} \sum_{\tau=0}^{T-t} (1 + r)^{-\tau} \left( c^{*} - c_{t+\tau} \right)^2 \right]
\]

subject to

\[
\sum_{\tau=0}^{T-t} (1 + r)^{-\tau} (y_{t+\tau} - c_{t+\tau}) + A_t = 0
\]

where \(A_t\) is financial wealth at the beginning of period \(t\).

(a) Write down an expression that directly links the transitory and permanent income shocks \((\eta_t, \epsilon_t)\) to consumption change, \(\Delta c_t\). According to this equation, how does consumption respond to permanent income shocks? How does it respond to transitory innovations? [Hint: This question will require you to fully solve the maximization problem above. If you get stuck, you can simplify the problem by setting \(r = 0\) and \(T = 2\).]

(b) Suppose that you are interested in measuring the size (ie., variance) of permanent and transitory income shocks. You have panel data on consumption and income collected from \(N\) individuals for \(T^*\) years. Write down a set of data moments (covariances)—that use both consumption and income data—that will allow you to recover the two variances you are interested in. What is the minimum time span of the panel that will allow you to identify these two parameters?

(c) You realize that consumption in your data set is measured with error. That is, your consumption data is \(c_t^{**} = c_t + \nu_t\), where the measurement error \(\nu\) is i.i.d over time and across individuals and also independent of true income innovations. Which variation in the data you can look at to measure the variance of measurement error (read: which moment you should compute that will allow you to calculate the variance of \(\nu\))?  

(d) Finally, you are told that in reality when individuals experience a permanent change in their income (ie, an \(\eta\) shock) their consumption goes up by less that one for one. Is your model consistent with this fact? If not, how can you modify your model so that the optimal consumption choice of the agents in the model is consistent with this empirical observation?
Labor Prelim Part C (Victor’s)

If you choose to do this part answer all questions. In the following there are 6 questions for 130 points. Answer questions for a total value of 100 points. Be as BRIEF as you can and good luck. Imagine a household with finite life that is subject to health shocks that both reduce instantaneous utility in a nonseparable way and do require some expenditures.

1. (25 points) Pose a household problem with complete markets. Make you explain how your modelization choices implement these requirements.

2. (25 points) Write the problem of a household without insurance markets but with access to a savings technology.

3. (15 points) Can you say something about how the solutions compare?

4. (25 points) Define the general equilibrium of an overlapping generations economy composed of a measure of agents of each age with both complete markets and a deterministic savings technology.

   Imagine now that the household has two members that decide via bargaining how to allocate resources. Imagine also that a health shock of one of the household members induces pain that can be alleviated by using time of the other member.

5. (25 points) Write the problem of this type household with only access to savings.

6. (15 points) If the possible uses of time are care, work and leisure, can you say something about the time allocation of households with a bad health shock (a disability shock) and healthy households?