Ph.D. Preliminary Examination
Labor Economics
Fall 2014

Answer only one of the 2 blocks
Block A

In the following there are 6 questions for 100 points. Answer all questions. Be as precise as you can and good luck.

Health and Insurance

Imagine a finitely lived agent where utility depends on her own health status \( h \in \{h^1, \ldots, h^n\} \) (with low numbers meaning low health), a regular consumption good \( c \), and on a health-care good \( c^A \). The utility function is separable in \( c \) and \( c^A \) and \( h \) as in

\[
u(c) = \chi_h v(c^A)\]

with \( u \) being a standard CRRA function, \( \chi^{i+1} < \chi^i \) and \( v \) being a decreasing function bounded between 0 and 1. Health status also affect the efficiency units of labor that a person gets that follows also a Markov process with continuous domain, lower health implies lower expected efficiency tomorrow conditional on efficiency today. Survival probabilities depend on age, are increasing in \( h \) and do not depend on \( c^A \) or \( c^B \), denote it \( \psi^{i,h} \). The Markov chain that determines the evolution of health is affected by investments in another type of health care goods (type B) denoted \( x^B \), so if \( x^B_1 > x^B_2 \) the transition probability of health conditional on \( x^B_1 \) stochastically dominates the transition probability conditional on \( x^B_2 \) for all \( h \). All three goods are perfect substitutes in production. Initial wealth is zero and initial earnings and health are drawn from probability distributions \( \gamma^c \) and \( \gamma^h \).

1. (20 points) Pose an agent’s problem that implements this environment where the household has access only to savings at interest rate \( r \). State necessary conditions for optimality of the decision (write down the Euler equations) for all goods.

2. (20 points) Imagine \( \gamma^n = 1 \). Imagine also that the process for efficiency is such that conditional on the first realization, agents stay always in the lower or higher half of the support of \( c \). What can you say about the duration of life conditional on earnings. Do you need any assumption to say this?

3. (10 points) Pose a general equilibrium version of this economy with many agents. Define equilibrium. State some properties of the age dependent wealth distribution.
Living Arrangments and Promotion

Imagine two agents $M$ and $F$ that live for two periods and can live together or apart. They care about their own consumption and the living arrangement that enters separately. If they live together in the first period they have to incur in a set up cost of $\kappa^1$. Their individual consumption is the sum of their earnings (which are 1 unit for each agent) net of set up costs divided by 1.7. If they live apart they consume their earnings. Each of them draws independently a taste for living together $\eta$ from distribution $F$ before they make a choice of how to live.

In period 2, nature tosses a coin. If heads ($\theta = 0$), agent $F$ has earnings of 5. If tails agent’s $F$ earnings are 1. Agent $M$ gets earnings of 1 in the second period. The tastes for living together in the second period are random with uniform distribution with mean the realization of the first period and standard deviation $\sigma_\epsilon$ (both agents draw independently). If they choose to separate in the second period each of them pays a cost $\kappa^2$, otherwise they maintain the economies of scale. If not living together in the first period, they can choose to do so in the second paying cost $\kappa^1$. They make their choices after nature tosses their coins and the taste choices are realized.

4. (25 points) Calculate the thresholds of living together in the first and second period. Give precise formulae for each case.

5. (15 points) Imagine now, that there could be a private good in the second period, call it $c^2$ that enters the utilities in a separable way. Compute the take it or leave offer that agent $F$ would make if nature draws heads. How does it depend on the shocks?

6. (10 points) Does the possibility of the private good change the thresholds of living together in the first period. Show whether it makes this event more or less likely.
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Labor Prelim Exam, BLOCK B

August, 2014

There are 3 questions totaling 100 points in this block. You have 4 hours to complete the exam. Remember that if you choose a certain block you need to answer questions only in that block. Good luck!

1. [35 points] Rosen’s Human Capital Model.

   (a) [10 points] Describe Rosen’s version of Ben-Porath model in as much detail as possible. List and explain in detail the differences and similarities between this model and Ben-Porath (1967)’s original model.

   (b) [15 points] Write down the dynamic programming problem for Rosen’s model and derive the optimality condition(s). According to Rosen, what is an important reason for wage differences across employers?

   (c) [10 points] Suppose now that workers differ in their ability to learn skills. What assumptions do you need to impose on the cost of human capital investment function for the model to generate positive sorting, i.e., high skill workers to choose firms offering more training?

2. [40 points] In this question, we would like to write a model of wages and job search over the lifecycle. We would like to build upon Jovanovic’s (1979) classic job match framework but understand the effects of firing taxes.

   (a) [15 points] To warm up, write down the equations for Jovanovic’s original model. You can make the simplifying assumption (as in Ljungqvist and Sargent’s book) that the uncertainty regarding match quality is resolved in finite time—for example, in 1 or 2 periods.

   (b) [25 points] Now suppose that we introduce a government into this economy, which imposes a “firing tax”, that is a tax that is imposed if an employment relationship is terminated. Recall that in the original Jovanovic model under the assumption in (a), an employment relationship is never terminated after period 2 (i.e., one period after productivity is revealed). Consider two cases: (i) a lump sum tax, and (ii) a proportional tax based on expected match quality. In each case, analyze what happens to (i) unemployment duration, (ii) quits as a function of wage, (iii) quits as a function of job tenure. As much as possible use equations to make your case, but if you get stuck at some point, you will get credit for using sound economic reasoning to make conjectures (if they are correct).
3. [25 points] During the 1970s, the US economy has witnessed diverging trends in two measures of inequality. On the one hand, the college premium (i.e., between-group inequality) fell consistently during this decade. On the other hand, residual (or within-group) inequality rose during the same period. This questions asks you to analyze if these joint trends are puzzling or not in the context of a "single skill index model." Specifically, suppose that all market skills can be summarized by a one-dimensional skill index. Some people have more of this skill whereas others have less. To simplify further, suppose that this skill index can take on only two values: H (high) or L (low) and an individual can be one of these two types. The wage rate of a type H (respectively L) individual is $W_H$ (resp. $W_L$). Education itself has no intrinsic value in such a model, but suppose that the college graduates group have a larger fraction of high skill individuals (denote this fraction by $\phi_c$) compared to the non-college group ($\phi_n$).

(a) [10 points] In this setting, define the college premium and within-group inequality in terms of the parameters just introduced.

(b) [10 points] What does this framework imply about the connection between between- and within-group inequality? Can they go in opposite direction in response to a change in the skill premium ($W_H/W_L$). How is the skill premium and the average wage rate related?

(c) [5 points] How can you modify this framework to make it consistent with the divergent trends presented above?