#27 PS

August 2003
Labor Economics Comprehensive Exam

Polachek/Wong

Part I Answer each of the following 6 questions as succinctly, yet rigorously, as you can.

1. a) Which of the following three human capital production functions exhibit the steepest marginal cost curve for the production of human capital

   i) $Q(t) = s(t)^{\frac{1}{2}} K(t)^{\frac{1}{2}}$

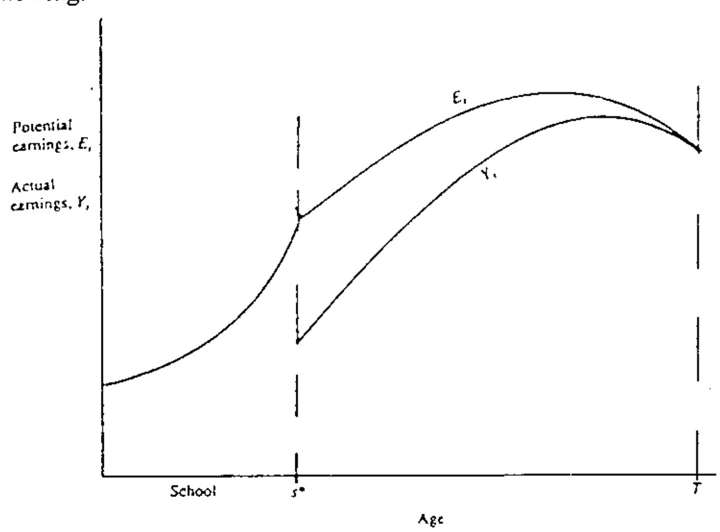
   ii) $Q(t) = [s(t)K(t)]^{\frac{1}{4}}$

   iii) $Q(t) = s(t)K(t)$

   where Q(t) is the human capital produced at age t, s(t) is the proportion of time spent investing in human capital at age t, and K(t) is one's stock of human capital at age t? *Mathematically* justify your answer.

   b) Which of the above three human capital production functions result in the *flattest* age-earnings profile? Justify your answer.

2. If one plots potential and observed earnings over the life cycle, one obtains a graph something like the following:



   Where s^* is the optimal years of school obtained.

   a) Rigorously explain why optimal control theory predicts that the potential earnings profile prior to s^* is convex, whereas it is concave following s^*.

   b) What explanation does Tom Johnson, Dudley Wallace, and others give for the discontinuity in s(t) before and after s^*.

3. Justify theoretically and econometrically the Mincer log-linear empirical age-earnings profile specification.

4. a) Distinguish between heterogeneity and selectivity.

   b) What advantages or disadvantages would there be to running the following "mean deviation" regression model using panel data compared a simple OLS equation using the same data if one were interested in the union-nonunion wage differential:

$$\ln(\widetilde{Y}_{it}) = \alpha_1 + \alpha_2 \widetilde{S}_{it} + \alpha_3 \widetilde{t}_{it} + \alpha_4 \widetilde{t}_{it}^{\,2} + \alpha_5 \widetilde{U}_{it} + \varepsilon_i$$

   where Y depicts earnings, S depicts years of schooling, t depicts years of labor market experience, and U denotes union membership. The tilda (~) above the variables denotes that the variables were transformed top "mean deviations" as follows (alternatively a first difference approach could have been used):

$$\widetilde{x}_{it} = x_{it} - \frac{1}{T}\sum_{t-1}^{T} x_{it}$$

   where i depicts each variable denoted above (s, t, and U), t depicts the particular year of the panel, and T is the number of time periods in the panel.

5. Assume the regression below was performed with data on females in the US economy:

$$w = 6000 + 600S + 120e - 60h$$

   where, w equals earnings in dollars per year, S equals years of schooling, e equals years of experience, and h equals years out of the labor force. Further assume that the variable mean values for the population is as follows:

	Males	Females
W	$18,240	$13,200
S	12 years	12 years
E	22 years	8 years
H	2 years	16 years

   a) Compute a discrimination coefficent from the above data.
   b) Explain why this estimate of discrimination is biased upward due to the theoretical specification of the above wage equation.

6. a) What type workers (skilled or unskilled) are most likely to receive efficiency wages? Justify.
   b) Briefly explain whether and/or how efficiency wage models induce unemployment. Explain.
   c) Are observed unemployment rates of skilled versus unskilled workers consistent with the efficiency wage model? Justify your answer.

Part II

Answer all.

1. There has been growing female/male wage ratio and wage inequality among men (90/50 centile). To explain these two trends, consider a simple two factor model of wage determination. Suppose wage (w) is determined by the sum of the returns from two skills: x1 (intelligence) and x2 (strength), with prices p1 and p2 respectively. The factor shares are k1=p1*x1/w and k2=p2*x2/w. Show how such a model can explain the two wage trends.

2. Some suggest that an increase in female labor force participation raises male wage inequality and reduces the wages of unskilled males. Consider a competitive labor market using 3 factors. The output is made up of a nested CES production function that takes the following form:

Y=(CES(u, CES(s,f)),

where u represents unskilled males, s skilled males, and f females. Let b(u), b(s), and b(h) be the factor-augmenting productivity terms. Does an increase in female labor supply reduce female wages? Does it reduce unskilled male wages? Does it impact college premium among males? Show all works.

3. Suppose time is continuous and the horizon is infinite. The marriage market is in steady state. There are two groups of infinite-lived agents, men and women (m, w), looking for long-term partners. Men and women on each side differ among themselves with respect to types, x and y, respectively. There are two states: single and married.

Individuals are imperfectly informed about the location of partners. The arrival of partners follows a Poisson process λ_i, i=m, w. Because partner does not arrive instantaneously, it is possible that agents' would accept a range of potential partners. Agents have their reservation-partner-type.

Meeting is random so that agents of different types have the same likelihood of meeting other agents. When 2 agents meet, their quality is revealed. A match occurs when a man and a woman find each other acceptable. Otherwise, they part and wait for the next meeting to occur. Only single agents search for marriage partners.

Matching is monogamous. If a match is formed, the partners share the match rents. A match dissolves exogenously at rate δ.

An agent is productive regardless of which state the agent is in. While an individual is single, an agent's output (or utility) is his or her own type. The match output is the product of partners' types. Match utility is assumed to be non-transferable. Assume for now it is an equal split of agents' match output.

An individual chooses a range of acceptable types with the objective of maximizing her expected present value of the future income stream. The optimal policy for a type x agent is to choose a reservation-partner-type such that the agent is indifferent between marrying and not marrying. (optimal reservation policy)

a. Formulate agents' decision problem using Bellman equations.
b. Define the equilibrium.
c. Characterize the equilibrium.
d. How does an increase in the arrival rate of partner affect the reservation type and the equilibrium allocation? What about an increase in the separation rate?