ECON 381 Practice Midterm #2

Prof. Krauth, Spring 2012

Please answer the question asked. You will be graded exclusively on your answer – you will receive no credit for extraneous information or almost getting it right and you will receive no penalty for failing to "show your work." Answers written in pencil will not be eligible for regrade.

True, false or uncertain (7 points each)

For each of these statements please indicate whether the statement is true, false, or uncertain, and briefly (1-3 sentences should do) explain why. Your grade will depend primarily on the quality of your explanation.

1. The proportion of a payroll tax that falls on workers is increasing in the elasticity of labour supply.
2. Increasing the minimum wage will always reduce employment in a competitive labour market.
3. Monopsonistic labour markets are more likely in the short run than in the long run.
4. A finding that workers with higher schooling earn higher wages proves the human capital hypothesis.
5. Theory predicts that workers will be willing to invest in general human capital, but not firm-specific human capital.
6. Firms will not discriminate, because competitors who don't discriminate will drive them out of business.
7. Statistical discrimination is legal as long as it is based on accurate beliefs.

Problems

1. **(25 points)** Consider the labour market for high school students. Suppose that labour supply and demand are given by:

   $$n^D = \alpha + \beta w + \delta X$$
   $$n^S = \lambda + \eta w$$

   where *n* is log hours worked per week (per person), *w* is log wage, and *X* is a binary variable (meaning it is always equal to either zero or one) affecting labour demand. To make things concrete, suppose that *X* is used to indicate opening of an amusement park for small kids that employs lots of high school students, i.e., *X=0* before the park opens and *X=1* after it opens.

   a. Solve for the reduced form of the model.

b. Let n_0 and w_0 be the value of n and w before the park opened (when $X=0$), and let n_1 and w_1 be the value of n and w after it opened (when $X=1$). Find (n_0,n_1,w_0,w_1).
c. Show that $(n_1-n_0)/(w_1-w_0)=\eta$.
d. Suppose that you have the following data:

	Before park opens	**After park opens**
Employment	15 hrs/week	16 hrs/week
Wage	\$10/hr	\$11/hr

Use this data to find η. Be careful to distinguish between logs and levels.
e. If wages go up by 1%, by how much will labour supply go up?

2. **(26 points)** Suppose that there are two types of workers, high-ability and low-ability, and two types of firms, high-tech and low-tech. In low-tech firms, a worker can produce one unit of output. In high-tech firms, high-ability workers can produce 1.6 units of output, and low-ability workers produce nothing. Suppose that half of workers are high-ability and half are low-ability.

All markets are competitive. Let w_a^b be the wage offered to workers of type a by firms in sector b, let n_a^b be the proportion of type a workers who work for firms in sector b, and let w_a be the actual wage earned by type a workers.

a. Suppose that firms can tell a worker's ability. Find $(w_H^H, w_L^H, w_H^L, w_L^L, w_H, w_L, n_L^H, n_H^H)$.
b. Suppose that firms cannot tell a worker's ability. Find $(w_H^H, w_L^H, w_H^L, w_L^L, w_H, w_L, n_L^H, n_H^H)$.
c. Now suppose that workers can pay a cost to obtain an intrinsically worthless piece of paper called a Bachelor's degree. The cost to obtain a Bachelor's degree is c_H for high-ability workers and c_L for low-ability workers. Firms assume that everyone with a Bachelor's degree is high-ability, and so pay them a wage of 1.6. They assume everyone without a Bachelor's degree is low-ability, and so pay them a wage of 1. This is rational if and only if their assumption turns out to be correct. What conditions on c_H and c_L imply that the firms' assumption is correct?
d. Suppose that initially $c_H=0.5$ and $c_L = 1$, but that the government introduces a tuition subsidy sufficient to reduce both costs by 0.5. If the wage structure doesn't change, who will choose to obtain Bachelor's degrees? If this is the case, how will the firm change its wage structure?

Answer Key

True, false or uncertain

1. False. The proportion of a payroll tax that falls on workers is *decreasing* in the elasticity of labour supply.
2. False. It will only reduce employment if the minimum wage is above the market wage.
3. True. In the long run, a labour market with low wages will experience out-migration, pushing labour supply down. In the long run the monopsonist's labour supply curve will be perfectly elastic and so the monopsonist will pay the competitive wage.
4. False. Workers with higher schooling earn also higher wages under the signalling and selection hypotheses.
5. False. Firm-specific human capital creates a surplus to the worker-firm relationship. This surplus will be divided by bargaining, and there is no reason to think that the firm will have all of the bargaining power.
6. False. Deviations from perfect competition will allow discrimination to survive, as will statistical discrimination based on correct beliefs or customer preferences.
7. False. It is still illegal.

Problems

1.

a. The reduced form is:

$$w = \frac{\alpha - \lambda}{\eta - \beta} + \frac{\delta}{\eta - \beta} X$$

$$n = \frac{\eta\alpha - \lambda\beta}{\eta - \beta} + \frac{\eta\delta}{\eta - \beta} X$$

b. Labour supply and wages before and after the park opens are:

$$w_0 = \frac{\alpha - \lambda}{\eta - \beta}$$

,

$$n_0 = \frac{\eta\alpha - \lambda\beta}{\eta - \beta}$$

$$w_1 = \frac{\alpha - \lambda}{\eta - \beta} + \frac{\delta}{\eta - \beta}$$

$$n_1 = \frac{\eta\alpha - \lambda\beta}{\eta - \beta} + \frac{\eta\delta}{\eta - \beta}$$

c. Substituting in the results from part (b), we get:

$$\frac{n_1 - n_0}{w_1 - w_0} = \frac{\left(\left(\frac{\eta\alpha - \lambda\beta}{\eta - \beta} + \frac{\eta\delta}{\eta - \beta}\right) - \frac{\eta\alpha - \lambda\beta}{\eta - \beta}\right)}{\left(\left(\frac{\alpha - \lambda}{\eta - \beta} + \frac{\delta}{\eta - \beta}\right) - \frac{\alpha - \lambda}{\eta - \beta}\right)} = \frac{\frac{\eta\delta}{\eta - \beta}}{\frac{\eta}{\eta - \beta}} = \eta$$

d. We get:

$$\eta = \frac{\ln 16 - \ln 15}{\ln 11 - \ln 10} = 0.677$$

e. Labour supply will go up by 0.677%.

2. This problem is an example of a signaling model.
   a. Each worker type will be paid his or her marginal product, and workers will work in whatever sector pays more. As a result, the high-skill workers will work in the high-tech sector and the low-skill workers in the low-tech sector.

$$w_L = w_L^L = w_H^L = 1$$
$$w_L^H = 0$$
$$w_H = w_H^H = 1.6$$
$$n_L^H = 0$$
$$n_H^H = 1$$

   b. Because firms can't tell the skill level of workers, each worker type will be paid the average marginal product across workers. Since this is lower in the high-tech sector, all workers will work in the low-tech sector:

$$w_L = w_H = w_L^L = w_H^L = 1$$
$$w_L^H = w_H^H = 0.8$$
$$n_L^H = n_H^H = 0$$

   c. High-ability workers will get a Bachelor's degree if $c_H < 0.6$. Low ability workers will not get a bachelor's degree if $c_L > 0.6$. So the condition is $c_H < 0.6 < c_L$.
   d. Both low-ability and high-ability workers will obtain Bachelor's degrees. As a result the firm will no longer be willing to pay more for workers with Bachelor's degrees.