

Final Exam, Labor Economics, Fall 2006, Wiswall

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. (95 total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct.

1) Using a signaling model of human capital investments, explain why a college educated worker and a non-college educated worker receive different wages. (5 points)

2) Define the 90-10 wage differential D_{90-10} . What is D_{90-10} for the US economy today? What value is D_{90-10} if there is no inequality in an economy? (5 points)

3) In general, what is omitted variable bias? What is the omitted variable bias in the “return” to schooling regression. Explain why randomization in a controlled experiment could solve the omitted variable bias problem. (5 points)

4) In the signalling model of human capital investments, define the no signalling equilibrium. Explain why the low productivity types would prefer the no signalling equilibrium. (5 points)

5) Explain how the magnitude of the employment effects of the minimum wage are related to the elasticity of labor demand with respect to the wage rate ϵ . (5 points)

6) Discuss two labor market frictions which explain why construction workers in India earn lower wages than construction workers in the United States. (5 points)

7) Explain at least two separate government policies which would reduce the level of inequality in an economy. (5 points)

8) What survey is the main source of labor force statistics for the United States? Describe briefly how this survey is collected and what information it contains. (5 points)

9) In words, explain the difference between real and nominal wages. (5 points)

10) What are efficiency wages? Why would a firm pay efficiency wages? (5 points)

11) What is the “skill premium”? Explain two separate reasons why the “skill premium” might increase over time. (5 points)

12) Explain the difference between taste and statistical discrimination. (5 points)

Problems

Instructions: For each problem, write your answer on the separate answer sheet. Show at least some work for each problem.

13) There are three periods: 1 (today), 2, and 3. Calculate the present value of utility for each of the following two streams of utility.

Stream 1:

$$u_1 = 1, u_2 = 1, u_3 = 1$$

Stream 2:

$$u_1 = 0, u_2 = 0, u_3 = 12$$

Assume the discount rate is $\delta = 1/3$.

Which of the two streams of utility provides the highest present value of utility? (7 points)

14) Assume an individual has a utility function of this form

$$u(c, l) = 3 + c^{1/2}l^{1/2}$$

The individual has an endowment of V in non-labor income and $T = 16$ hours to either work (h) or use for leisure (l).

a) How much utility does the individual receive if she consumes $c = 4$ and works $h = 0$ hours? (3 points)

b) Assume $p = 2$, $w = 1$, and $V = 4$. What is the optimal labor supply of this individual (h^*)? (Your answer should be number.) (6 points)

15) Our regression model is

$$\ln W_i = \alpha_0 + \alpha_1 S_i + \epsilon_i,$$

where $\ln W_i$ is individual i 's log wage, S_i is years of schooling. α_0 and α_1 are population parameters.

We estimate this regression model using OLS. Here are the parameter estimates (standard errors in parentheses):

$$\hat{\alpha}_0 = 2.5 (0.4)$$

$$\hat{\alpha}_1 = 0.1 (0.05)$$

a) What is the “return” to schooling (as a percent)? (3 points)

b) Construct the 95 percent confidence interval for α_1 . (Assume the critical value for this confidence interval is 2). (4 points)

c) Can we reject the hypothesis at the 95 percent confidence level that α_1 is 0.25? Explain your answer. (3 points)

16) We have a survey of three people. Each survey respondent reported

their hourly wage last week. Here is our data: Person 1: $w_1 = \$3$, Person 2: $w_2 = \$2$, Person 3: $w_3 = \$4$.

Calculate the following:

- a) sample mean (3 points)
- b) sample variance (3 points)
- c) standard error of the sample mean (3 points)

Answers to Final Exam, Labor Economics, Fall 2006, Wiswall

Instructions: Write all answers on the separate answer sheet. Make sure you write your name on every page of your answer sheet. (XX total points)

Short Answer

Instructions: For each question, write a brief response on the separate answer sheet. Your answers should be concise and direct.

1) Using a signaling model of human capital investments, explain why a college educated worker and a non-college educated worker receive different wages. (5 points)

In a signalling model, college education signals to an employer that the individual has higher unobserved skills or productivity than a non-college educated individual. The key point is that the college education or formal human capital does not increase productivity itself. College education can be completely non-productive, but only serves to signal other (unobserved) productive forms of human capital.

2) Define the 90-10 wage differential D_{90-10} . What is D_{90-10} for the US economy today? What value is D_{90-10} if there is no inequality in an economy? (5 points)

$$D_{90-10} = \frac{W_{90}}{W_{10}},$$

In words, the 90-10 differential is the ratio of wages at the 90th percentile to the wages at the 10th percentile of the wage distribution.

In the United States today, D_{90-10} is about 4.6. This indicates that earnings at the 90th percentile are about 4.6 times higher than the earnings at the 10th percentile.

$D_{90-10} = 1$ indicates no inequality as the earnings at the 90th and 10th percentiles are the same.

3) In general, what is omitted variable bias? What is the omitted variable bias in the “return” to schooling regression. Explain why randomization in a controlled experiment could solve the omitted variable bias problem. (5 points)

Omitted variable bias is due to the fact that there are omitted variables in the ϵ term which we do not observe. Because these omitted variables are thought to be correlated with wages and schooling, the OLS estimator is biased.

More formally:

Consider the regression model,

$$\ln W_i = \beta_0 + \beta_1 S_i + \alpha A_i + \eta_i,$$

With A_i unobserved, we can only estimate

$$\ln W_i = \beta_0 + \beta_1 S_i + \epsilon_i,$$

where $\epsilon_i = \alpha A_i + \eta_i$.

Randomization of schooling in a controlled experiment does NOT allow us to observe A_i , but it does allow us to eliminate the omitted variable bias. If we randomly assign individuals a level of schooling S_i , then S_i is independent of ϵ_i (and A_i). The randomization has then broken the correlation between schooling and ability, and the OLS estimator is unbiased.

4) In the signalling model of human capital investments, define the no signalling equilibrium. Explain why the low productivity types would prefer the no signalling equilibrium. (5 points)

A no signalling equilibrium is one in which there are no productivity signals, i.e. schooling does not signal productivity or ability. In this model, firms cannot distinguish between low and high productive workers. Low productive workers would then receive higher wages since all workers would be paid the same wage based on average productivity. The average is boosted by the presence of high productivity workers.

5) Explain how the magnitude of the employment effects of the minimum wage are related to the elasticity of labor demand with respect to the wage rate ϵ . (5 points)

The elasticity of labor demand with respect to the wage rate indicates how responsive firms are to changes in the wage rate. In general, higher ϵ (in absolute value) indicates larger employment effects of the minimum wage.

Consider the extreme cases. If $\epsilon = 0$, then firms do not change their labor demand in response to a higher minimum wage. If ϵ is close to $-\infty$, then firms respond to a higher minimum wage by lowering their labor demand to near 0.

6) Discuss two labor market frictions which explain why construction workers in India earn lower wages than construction workers in the United States. (5 points)

Wages would be equalized as Indian workers move to the higher wage US labor market, and US firms move to the lower wage Indian labor market. Frictions explain why this hasn't fully happened.

Any of these are fine:

1) Mobility Costs: These are the costs of physically moving production to a new location. In this case, it may be the cost of US firms moving construction jobs to India. Or the costs (travel, psychic) for Indian workers to move to the US labor market.

2) Search Costs: These are the costs borne by US firms in finding new workers in India or the costs borne by Indian workers in finding new employers in the US.

3) Cost of Human Capital Investment: Both US firms and Indian workers may need to pay for the cost of new human capital as firms and workers enter new labor markets.

4) Institutional Rules: Regulations that prevent movement of Indian

workers to the higher wage US labor market, or US firms from moving to the Indian labor market and employing Indian labor.

7) Explain at least two separate government policies which would reduce the level of inequality in an economy. (5 points)

Here are some examples:

1) Affirmative action: Provides preferential treatment for discriminated against women and minorities. May help close earnings gaps for these groups and reduce overall level of inequality.

2) Taxes and Transfers: Taxing the earnings of richer individuals and transferring that money to poorer individuals (through social programs) can directly lower inequality.

3) Laws against Discrimination: Laws which ban discrimination if enforced can lower taste discrimination and help close earnings gaps for discriminated against groups.

4) Subsidies for human capital: To the extent that some individuals are credit constrained from investing in human capital and differences in human capital in the population are a reason for inequality, any policies that subsidize human capital or otherwise decrease credit constraints (e.g. loans and grants for college) can reduce inequality.

5) Subsidize industries or occupations which employ low wage workers: By increasing output prices in those industries which employ low wage workers, we can increase their wages. We could also accomplish this by taxing the

industries or occupations which employ high wage workers. International trade restrictions on these industries can accomplish the same effect.

8) What survey is the main source of labor force statistics for the United States? Describe briefly how this survey is collected and what information it contains. (5 points)

The main labor force survey is called the Current Population Survey (CPS). It is a random sample collected mainly by phone interviews. It asks respondents for information on the whether they are employed, out of the labor force, hours worked, wages, and education level.

9) In words, explain the difference between real and nominal wages. (5 points)

Real wages are wages adjusted for price changes. Since prices have generally been increasing over time in the recent history, real wages are adjusted for inflation. *Nominal wages* are the actual wage paid in any given period of time.

10) What are efficiency wages? Why would a firm pay efficiency wages? (5 points)

When firms pay their own workers more than worker could receive at other firms, these wages are called efficiency wages. The rationale for efficiency wages is that a firm wants to make itself the most desirable employer.

Workers want to provide a high level of effort because they do not want to be fired from their current, more desirable, firm. If all other firms provided the same wage as a worker's current firm, the costs of being fired are low and the worker may provide low effort.

11) What is the "skill premium"? Explain two separate reasons why the "skill premium" might increase over time. (5 points)

The skill premium is the higher wages given to more skilled labor. In our class, we defined skill groups by formal schooling (college educated vs. high school educated). Therefore, the skill premium is the ratio of average wages paid to college educated workers to the average wages of high school educated workers: $\frac{W_C}{W_H}$.

In the context of our supply and demand model for relative skill, the skill premium could change for a number of reasons:

Supply side:

- i) the size of previous birth cohorts (flow of new workers)
- ii) the fraction of individuals from each birth cohort who graduated from college (flow of new college educated workers)
- iii) the number of college and non-college educated immigrants.

Demand side:

- i) a relative reduction in the output price for goods produced by firms that employ relatively more unskilled labor

ii) an increase in the relative productivity of skilled labor versus unskilled labor (*skill biased technological change*).

12) Explain the difference between taste and statistical discrimination. (5 points)

Taste discrimination is based on preferences for certain types of workers by employers, other workers, or customers. Taste discrimination acts as a “tax” on the wages of the discriminated against group. The discriminated against must offer lower wages relative to the non-discriminated against in order to “bribe” employers to hire them.

Statistical discrimination does not require any differential preferences or tastes across groups. Instead, employers base wages on stereotypes or group statistics because they lack perfect information about worker productivity. We observe lower wages being paid to discriminated against groups because they belong to a group which employers believe have lower average productivity than the non-discriminated against group.

Problems

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Stream 1:

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Stream 2:

$$u_1 = 0, u_2 = 0, u_3 = 12$$

Assume the discount rate is $\delta = 1/3$.

Which of the two streams of utility provides the highest present value of utility? (7 points)

Present value of stream 1:

$$1 + 1/3 * 1 + (1/3)^2 * 1 = 1 + 1/3 + 1/9 = 13/9$$

Present value of stream 2:

$$0 + 1/3 * 0 + (1/3)^2 * 12 = 12/9$$

Stream 1 provides the highest present value of utility since $13/9 > 12/9$.

14) Assume an individual has a utility function of this form

$$u(c, l) = 3 + c^{1/2}l^{1/2}$$

The individual has an endowment of V in non-labor income and $T = 16$ hours to either work (h) or use for leisure (l).

a) How much utility does the individual receive if she consumes $c = 4$ and works $h = 0$ hours? (3 points)

$$l = 16 - h = 16$$

$$u = 3 + 4^{1/2}16^{1/2} = 3 + 2 * 4 = 11$$

b) Assume $p = 2$, $w = 1$, and $V = 4$. What is the optimal labor supply of this individual (h^*)? (Your answer should be number.) (6 points)

$$MRS = \frac{w}{p}$$

$$\frac{1/2c^{1/2}l^{-1/2}}{1/2c^{-1/2}l^{1/2}} = \frac{w}{p}$$

$$\frac{c}{l} = \frac{w}{p}$$

$$\frac{1}{l} = \frac{w}{pc}$$

$$l = \frac{pc}{w}$$

$$c = V/p + w/p(T - l)$$

$$l = \frac{V + w(T - l)}{w}$$

$$l = V/w + T - l$$

$$l^* = 1/2(V/w + T)$$

$$h^* = T - l^* = T - 1/2(V/w + T)$$

$$= 16 - 1/2(4/1 + 16) = 6$$

15) Our regression model is

$$\ln W_i = \alpha_0 + \alpha_1 S_i + \epsilon_i,$$

where $\ln W_i$ is individual i 's log wage, S_i is years of schooling. α_0 and α_1 are population parameters.

We estimate this regression model using OLS. Here are the parameter estimates (standard errors in parentheses):

$$\hat{\alpha}_0 = 2.5 (0.4)$$

$$\hat{\alpha}_1 = 0.1 (0.05)$$

a) What is the “return” to schooling (as a percent)? (3 points)

$$\hat{\alpha}_1 * 100 \text{ percent} = 10 \text{ percent.}$$

b) Construct the 95 percent confidence interval for α_1 . (Assume the

critical value for this confidence interval is 2). (4 points)

$$0.1 - 0.05 * 2 \leq \alpha_1 \leq 0.1 + 0.05 * 2$$

$$0 \leq \alpha_1 \leq 0.2$$

c) Can we reject the hypothesis at the 95 percent confidence level that α_1 is 0.25? Explain your answer. (3 points)

Yes. We reject the hypothesis at the 95 percent confidence level that $\alpha_1 = 0.25$. 0.25 is not in the 95 percent confidence interval.

16) We have a survey of three people. Each survey respondent reported their hourly wage last week. Here is our data: Person 1: $w_1 = \$3$, Person 2: $w_2 = \$2$, Person 3: $w_3 = \$4$.

Calculate the following:

a) sample mean (3 points)

$$\bar{Y} = 1/3 * (3 + 2 + 4) = 9/3 = 3$$

b) sample variance (3 points)

$$S_Y^2 = 1/3 * [(3 - 3)^2 + (2 - 3)^2 + (4 - 3)^2] = 1/3[0 + 1 + 1] = 2/3$$

c) standard error of the sample mean (3 points)

$$1/\sqrt{3} * \sqrt{2/3}$$