

## i Candidate instructions

### ECON3715/4715

This is some important information about the exam in ECON3715/4715. Please read this carefully before you start answering the exam.

**Date of exam:** Monday, November 25, 2019

**Time for exam:** 09.00 a.m. - 12.00 noon

**The problem set:** The problem set consists of five questions, with 16 sub-questions. Each sub-question counts equally. When answering the questions on the exam you should be brief and to the point! Make sure to write clearly. Difficult to decipher answers will not be counted. They will be given equal weight in the evaluation.

**Sketches:** You may use sketches on all questions. You are to use the sketching sheets handed to you. You can use more than one sketching sheet per question. See instructions for filling out sketching sheets on your desk. It is very important that you make sure to allocate time to fill in the headings (the code for each problem, candidate number, course code, date etc.) on the sheets that you will use to add to your answer. You will find the code for each problem under the problem text. You will NOT be given extra time to fill out the "general information" on the sketching.

**Access:** You will not have access to your exam right after submission. The reason is that the sketches with equations and graphs must be scanned in to your exam. You will get access to your exam within 2-3 days.

**Resources allowed:** No written or printed resources - or calculator - is allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences).

**Grading:** The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

**Grades are given:** Monday, December 16.

## 1 Question 1

### Question 1

In this question you have to indicate whether you think the statement is true or false and explain why. You do not get any points if you only state whether the statement is true or false.

- (a) Theory of compensating differentials assumes that workers select jobs based on their skills.
- (b) Becker's model of taste-based discrimination predicts that employer discrimination is unlikely to persist in the long run.
- (c) Any allocation on an efficient contract curve satisfies allocative efficiency.
- (d) Sequential job search theory predicts that a higher cost of job search increases unemployment duration.
- (e) The principal-agent model predicts that workers with higher risk aversion are paid a lower performance-related pay.

**Fill in your answer here and/or on sketching paper**

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Maximum marks: 0

## 2 Question 2

### Question 2

This question is about: Parey, M., Ruhose, J, Waldinger, F., and N. Netz. (2017). The Selection of High-Skilled Emigrants. *Review of Economics and Statistics* 99(5): 776–792. The authors consider the following Roy model of migration:

- (1)  $\log w_0 = \theta_0 + \epsilon_0$ ,
- (2)  $\log w_1 = \theta_1 + \epsilon_1$ ,
- (3)  $Migrate = 1$  if  $\theta_1 + \epsilon_1 > \theta_0 + \epsilon_0 + c$ ,

where  $w_1$  are earnings abroad,  $w_0$  are earnings at home,  $c$  are migration costs, and log-earnings further consist of an observed ( $\theta_j$ ) and an unobserved ( $\epsilon_j$ ) component for  $j = \{0, 1\}$ .

(a) Explain how migration costs and differences in earnings at home and abroad affect workers' migration choices in this model.

(b) The authors assume that the vector  $(\theta_0, \theta_1, \epsilon_0, \epsilon_1)$  is jointly normally distributed with means  $(\mu_0, \mu_1, 0, 0)$ , variances  $(\sigma_{\theta_0}^2, \sigma_{\theta_1}^2, \sigma_{\epsilon_0}^2, \sigma_{\epsilon_1}^2)$  and the correlation between  $\theta_0$  and  $\theta_1$  is  $\rho_\theta$ . Using the formula for a joint normal distribution, they derive an expression for  $E(\theta_0 \mid Migrate = 1)$  as follows:

$$(4) \quad E(\theta_0 \mid Migrate = 1) = E(\theta_0 \mid \theta_1 + \epsilon_1 > \theta_0 + \epsilon_0 + c) \\ = \mu_0 + \left(\rho_\theta - \frac{\sigma_{\theta_0}}{\sigma_{\theta_1}}\right)D,$$

where  $D$  is a positive term. Using  $E(\theta_0 \mid Migrate = 1)$ , the authors define positive and negative selection. Explain these terms.

(c) Consider that the correlation  $\rho_\theta$  between earnings at home  $\theta_0$  and earnings capacity abroad  $\theta_1$  is equal to 1, such that individuals that tend to have high earnings at home also tend to have high earnings abroad, and vice versa. Explain whether and if so how the direction of selection depends on  $\sigma_{\theta_0}$  and  $\sigma_{\theta_1}$ ?

(d) Imagine that there is a sudden increase in the migration cost  $c$ . How does this affect the direction of selection in this model?

Fill in your answer here and/or on sketching paper

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Maximum marks: 0

### 3 Question 3

#### Question 3

This question is about: Arcidiacono, P., P. Bayer, and A. Hizmo. (2010). Beyond Signaling and Human Capital: Education and the Revelation of Ability. *American Economic Journal: Applied Economics* 2(4): 76-104.

(a) What are the sources of returns to education in the human capital model and in the signaling model?

(b) Arcidiacono et al. (2010) discuss the concepts of *employer learning* and the *ability revelation* role of education. Explain these terms.

(c) To test for employer learning and ability revelation, the authors estimate a version of the following equation separately for high school and college graduates:

$$(5) \quad w_i = \beta_0 + \beta_{AFQT} AFQT_i + \beta_{AFQT,x} (AFQT_i \times x_i) + f(x_i) + \epsilon_i$$

where  $w_i$  are log-wages,  $AFQT_i$  is an ability test score and  $x_i$  is labor market experience. An extract from their main results is provided in Table 1. Discuss whether the results in columns (1)-(4) are consistent with employer learning and/or ability revelation for high school and college graduates, respectively.

Fill in your answer here and/or on sketching paper

Maximum marks: 0

### 4 Question 4

#### Question 4

Statistical discrimination. Consider a labor market that consists of two types of workers; majority workers (group A) and minority workers (group B). Suppose that employers in this labor market do not discriminate based on taste.

(a) Employers screen workers using an entrance test, and offer starting wages based on each worker's test score  $T_i$  and average test score  $\bar{T}_G$  in worker's group as:

$$(6) \quad w_i = \alpha_G T_i + (1 - \alpha_G) \bar{T}_G,$$

where  $\alpha_G$  is between 0 and 1 and  $G = \{A, B\}$ . Consider a worker  $k$  from group A and a worker  $j$  from group B. The two workers get identical scores on the entrance test, i.e.,  $T_k = T_j = T$ . Both workers are 'high-performers' in the sense that their test scores exceed the average test scores in their respective groups, so that an employer is considering to hire these workers. What are the two reasons for why these two workers could be offered different starting wages?

(b) Consider that workers  $k$  and  $j$  are hired by the same employer, wages are set annually at the start of each year and a noisy measure of workers' productivity is observed by the employer at the end of each year. Discuss whether differences in wages across the two workers are expected to persist in the long-run.

Fill in your answer here and/or on sketching paper

Maximum marks: 0

**5 Question 5****Question 5**

Efficiency wages. Consider an economy with identical, perfectly competitive firms, each possessing a short-run production function

$$(7) \quad Q = F(E(w) \cdot L)$$

where  $Q$  is output,  $L$  is the number of employed workers,  $E$  is the effort level of workers, and  $w$  is the real wage. The price of output equals 1. We allow workers' effort level to depend on the wage they are offered, such that  $E'(w) > 0$  and  $E(0) = 0$ . All workers are assumed to have identical wage-productivity relationships.

(a) Derive the first-order conditions for a profit-maximizing firm in this economy and provide an intuition for the efficiency wage  $w^e$  formula.

(b) The employers can not monitor the workers' effort. Explain the no-shirking labor supply curve and the equilibrium level of unemployment in this economy.

**Fill in your answer here and/or on sketching sheet**

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Maximum marks: 0

**Question 3**  
Attached



Table 1. The Effects of AFQT on Log Wages for High School and College Graduates.

Model	High school		College		Test: College=HS P-values	
	(1)	(2)	(3)	(4)	(5)	(6)
Standard. AFQT	0.0060 (0.0130)	0.0078 (0.0129)	0.1485** (0.0350)	0.1420** (0.0354)	0.000	0.000
AFQT × exper/10	0.1261** (0.0176)	0.1183** (0.0173)	0.0122 (0.0480)	0.0198 (0.0472)	0.026	0.050
R <sup>2</sup>	0.1631	0.1874	0.1678	0.1821		
Observations	11,795	11,772	4,112	4,112		
Additional controls	No	Yes	No	Yes	No	Yes
Experience measure: Years since left school for the first time < 13						

*Notes:* All specifications control for urban residence, a cubic in experience, and year effects. Specifications (2) and (4) also control for region of residence and for part-time versus full-time jobs. In specification (5), we report the *p*-values for the difference in the coefficients of specifications (1) and (3). Similarly, specification (6) compares (2) and (4). The White/Huber standard errors in parenthesis control for correlation at the individual level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.