

# Written Exam Economics Summer 2016

## Labour Economics

June 4, 2016

8 am – 8 pm

This exam question consists of 6 pages in total (including the title page).

Please note that you need to write your exam answer in English.

***The paper must be uploaded as one PDF document. The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Digital Exam.***

### Focus on Exam Cheating

In case of presumed exam cheating, which is observed by either the examination registration of the respective study programmes, the invigilation or the course lecturer, the Head of Studies will make a preliminary inquiry into the matter, requesting a statement from the course lecturer and possibly the invigilation, too. Furthermore, the Head of Studies will interview the student. If the Head of Studies finds that there are reasonable grounds to suspect exam cheating, the issue will be reported to the Rector. In the course of the study and during examinations, the student is expected to conform to the rules and regulations governing academic integrity. Academic dishonesty includes falsification, plagiarism, failure to disclose information, and any other kind of misrepresentation of the student's own performance and results or assisting another student herewith. For example failure to indicate sources in written assignments is regarded as failure to disclose information. Attempts to cheat at examinations are dealt with in the same manner as exam cheating which has been carried through. In case of exam cheating, the following sanctions may be imposed by the Rector:

- 1. A warning
- 2. Expulsion from the examination
- 3. Suspension from the University for at limited period or permanent expulsion.

The Faculty of Social Sciences  
The Study and Examination Office  
October 2006

The exam has two parts. For the purpose of grading, each part has the same weight.

## Part I

Consider a country which consists of two non-overlapping local labor markets. Due to matching frictions, matching takes time. Workers and firms search for a match within each local labor market, but not across labor markets. Assume that the matching in each local labor market  $j = 1, 2$  is random and is governed by the matching function  $M(V_j, U_j)$ , where  $V_j$  and  $U_j$  are respectively the number of vacancies and the number of unemployed in each local labor market  $j$ . To simplify, we assume that the labor force is the same size in both local labor markets, that is  $N_1 = N_2$ . Furthermore, the size of the workforce is fixed in both local labor markets. For questions 1-5, we will assume that the number of vacancies  $V_j$  is exogenous in both local labor markets  $j = 1, 2$ .

The Bellman equation for an unemployed worker is given by

$$rV_{u,j} = z_j + \lambda_j [V_{e,j} - V_{u,j}]$$

where  $V_{u,j}$  and  $V_{e,j}$  are, respectively, the value of being unemployed and employed in labor market  $j$ ,  $z_j$  is the flow value of leisure net of search costs in labor market  $j$ ,  $\lambda_j$  is the job arrival rate in labor market  $j$ , and  $r$  is the common discount rate.

The Bellman equation for an employed worker is given by

$$rV_{e,j} = w_j + q_j [V_{u,j} - V_{e,j}]$$

where  $w_j$  is the wage in local labor market  $j$  and  $q_j$  is the job destruction rate in labor market  $j$ .

The firms' flow costs of having a vacancy is constant across local labor market and is given by  $h$  whereas we allow for the productivity of a match,  $y_j$ , to differ between the two local labor markets.

1. Write up the probability that an unemployed worker in labor market  $j$  will be matched, i.e.  $\lambda_j$ , as a function of the labor market tightness in the local labor market,  $\theta_j = \frac{V_j}{U_j}$ .
2. Derive the Beveridge curve and show that there is a negative relationship between the vacancy rate and the unemployment rate. [Hint: For this derivation it is useful to work with the aggregate matching function.]
3. Show that the social welfare function (when  $r = 0$ ) for each local labor market can be written as

$$\omega_j = y_j + (z_j - y_j) \frac{q_j}{q_j + \theta_j m(\theta_j)} - hv_j \tag{1}$$

where  $m(\theta_j)$  is the number of matches divided by the number of vacancies.

4. The social planner cares equally about the social welfare in each of the two local labor markets. Suppose now that the social planner can move vacancies across local labor markets, but that the nationwide number of vacancies  $V = V_1 + V_2$  is fixed. Maximize the social planner's nationwide welfare with respect to  $V_1$  and  $V_2$  (while keeping  $V$  fixed) using equation (1) in order to derive the optimal ratio of unemployment rates for the two labor markets. Show that the optimal ratio of unemployment rates depend on the following ratios a)  $(y_1 - z_1) / (y_2 - z_2)$ , b)  $M'_V(V_1, U_1) / M'_V(V_2, U_2)$ , and c)  $q_1/q_2$ . [Hint: You may need a few substitutions to obtain the mentioned ratios. Furthermore, it is useful to keep in mind that labor forces have the same size in the two local labor markets.]
5. In the optimality condition derived in the previous question, provide intuition for the roles of the ratios a)  $(y_1 - z_1) / (y_2 - z_2)$ , b)  $M'_V(V_1, U_1) / M'_V(V_2, U_2)$ , and c)  $q_1/q_2$ . If your version of the optimality condition does not include these ratios, then write how you would think that the mentioned variables would affect the optimal ratio of  $u_1/u_2$ .
6. Now, suppose instead that there is free-entry in vacancy creation. The Bellman equation for a vacancy is then given by

$$r\Pi_{v,j} = -h + m(\theta_j)(\Pi_{e,j} - \Pi_{v,j})$$

where  $\Pi_{v,j}$  is the discounted value of a vacancy in labor market  $j$  and  $\Pi_{e,j}$  is the discounted value of having a filled job in labor market  $j$ . The Bellman equation for a filled job is given by

$$r\Pi_{e,j} = (y_j - w_j) + q_j(\Pi_{v,j} - \Pi_{e,j})$$

Derive the firm's vacancy creation condition. Explain the intuition for this condition.

7. On an intuitive level, will the decentralized equilibrium with free entry in vacancy creation be less efficient than the case where equation (1) is maximized subject to the overall vacancy level being fixed? It is not expected that you can answer this question using mathematical derivations.

## Part II

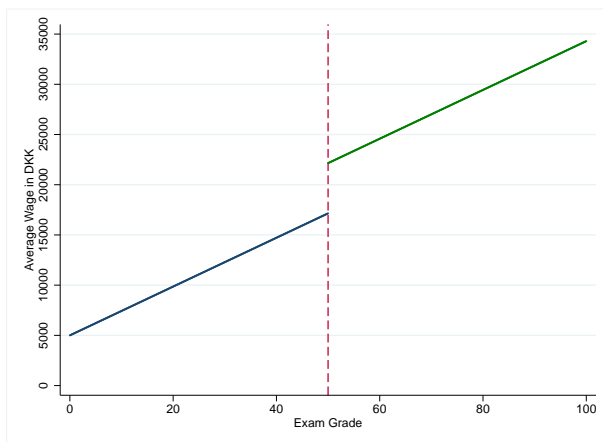
1. [200 words should be enough to answer each of the subquestions 1a, 1b, and 1c].

Imagine a country that wants to give work permits to 1000 immigrants. More specifically, they want to give 500 work permits to high-skilled immigrants and 500 to low-skilled immigrants. To classify immigrants in high- and low-skilled groups, the government makes them take an exam and everybody who scores below 50% will be low-skilled while everybody who scores above 50% will be high-skilled. Since for each category of immigrant there will be more applicants than work permits, the government runs a lottery within each skill group. Therefore, each individual has some chance of receiving a work permit, no matter what they score in the exam. Work permits for high-skilled immigrants give them the same rights as any native worker, whereas work permits for low-skilled immigrants do not allow them to change employers. Assume that every individual who wins the lottery moves to the new country.

a. The setting described above would provide an opportunity to understand the effects of giving high-skilled immigrants the same rights as native workers -to summarize, we will call this the “citizenship treatment”. Answer the following points:

- What empirical method would you use to explore this question? Explain the basic intuition of this method.
- Write down the empirical specification you would use and explain its variables.
- What are the main assumptions of this method?
- If you had data on the exam grade of each individual, as well as data on the country of origin and gender for each immigrant, how would you test the assumptions of this method? Draw graphs to illustrate your explanation.

b. After a few explorations, you confirm that the assumptions for the empirical method hold. Next, you analyze the effect of the “citizenship treatment” on wages and you plot the following graph:



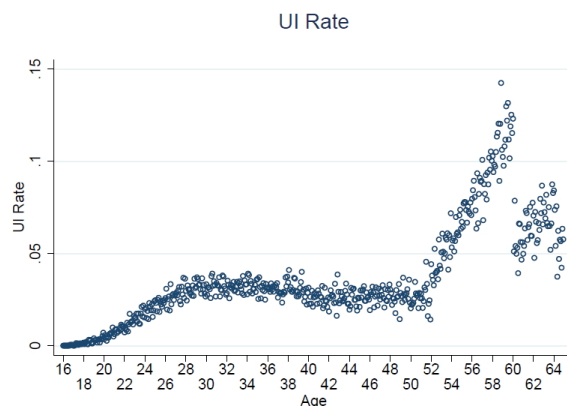
Rationalize the graph above using perfect competition and monopsonistic theories of the labor market.

c. After the implementation of this policy, the government decides to set a minimum wage at 10000 DKK and to allow firms to bring as many low-skilled immigrants as they need (therefore, there is no cap of 500 low-skilled immigrants any more). Before, there was no minimum wage. What would be the effect of such policy on employment and earnings of low-skilled immigrants? Would your answer be any different if the minimum wage was set at 15000 DKK?

2. [400 words should be enough to answer the question].

In Spain, there is a discontinuity in the unemployment insurance (UI) system at the age of 52. For our purposes, it is enough to think about it as “everybody can claim UI” after the age of 52. Very importantly, you can get UI benefits until you reach the retirement age (60 being the earliest retirement age possible). The following figure shows the % of people claiming UI in Spain at each age in June 1999. There is an increase in the fraction of people claiming UI after age 52 and it

Figure 1: % Receiving UI in June 1999



increases until the age of 60, when many of them retire. Discuss what kind of effects you would need to measure to argue whether the UI discontinuity at age 52 is optimal. Explain the meaning of each of these effects and give examples for each of them. What effect should dominate to claim that the UI for workers older than 52 is not optimal? Note: you will get no points for just saying whether the UI discontinuity at 52 is optimal or not. Instead, focus on how you would construct such an argument.