Written Exam for the B.Sc. or M.Sc. in Economics Summer 2015

Labour Economics

Final Exam/ Elective Course/ Master's Course

May 30, 2015, 10.00-22.00

This exam question consists of 6 pages in total

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

The paper must be uploaded as <u>one PDF document</u> (including the standard cover and the appendices). The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Absalon.

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

Part I - Food, robots and the demand for labor (max 1200 words)

Imagine that in 2016 the following two things happen at once: 1) An exceptionally good harvest causes food prices to drop by one percent worldwide. 2) A new, Chinese robot rental firm enters the world market causing rental prices for fully-automatic, computer-controlled robots to drop by one percent worldwide.

Using data on the mining and restaurant industries, you then observe the following:

- In 2015 employee salaries made up about 40 % restaurants' total costs, while the other 60 % were made up of food (ingredient) costs.
- In 2015 employee salaries made up about 40 % of mining firms' total costs, while the other 60 % were made up of rental costs for fully-automatic robots.
- In 2016 the total number of meals sold at restaurants is the same as in 2015.
- In 2016 the total number of raw materials sold by mining firms is also the same as in 2015.

A

Based on material covered in this class, how do you think the demand for restaurant employees has changed in 2016? How do you think the demand for mining employees has changed in 2016? Which industry do you think experienced the biggest percentage change in labor demand? Make sure to explain your answer and the intuition behind it.

B

How would your answer in question A change if restaurants had sold more meals in 2016 than in 2015?

Part II - Job Search and hiring costs (max 1000 words)

Consider the (Diamond-Mortensen-)Pissarides model. Assume that there exist two types of hiring costs. Whereas h_1 is the flow costs of having a vacancy, h_2 is a one-off fixed cost which is paid immediately when the employment spell begins. This implies that the value of an employed job, Π_e, and the value of a vacant job, Π_v, are given by

$$r\Pi_e = y - w + q\left(\Pi_v - \Pi_e\right) \tag{1}$$

and

$$r\Pi_v = -h_1 + m\left(\theta\right)\left(\Pi_e - h_2 - \Pi_v\right) \tag{2}$$

where y denotes the productivity, w the wage, q the job destruction rate, and $m\left(\theta\right)$ is the rate at which vacancies are filled. This rate depends on the labor market tightness, θ. There is free-entry in vacancy-creation.

The fixed hiring costs do not alter the Bellman equations for an unemployed worker and employed worker and they are given by, respectively,

$$rV_u = z + \theta m\left(\theta\right)\left(V_e - V_u\right) \tag{3}$$

and

$$rV_e = w + q\left(V_u - V_e\right) \tag{4}$$

where z is the value of leisure and unemployment benefits net of search costs and $\theta m\left(\theta\right)$ is the job arrival rate.

The fixed hiring cost has the implication that the surplus is given by

$$S = V_e - V_u + \Pi_e - \Pi_v - h_2 \tag{5}$$

Finally, the equilibrium unemployment, u, is given by

$$u = \frac{n + q}{n + q + \theta m\left(\theta\right)}$$

where n is the growth rate of the labor force.

A

Derive the labor demand curve (or vacancy supply curve). Explain the direction of the effect of increasing each of the two hiring costs on the labor market tightness (holding the wage fixed).

B

Looking at the equation for the labor demand curve, how do the expected costs of hiring a worker vary over the business cycle? How does this compare to the model without fixed hiring costs ($h_2 = 0$)?

C

Derive the wage as a function of θ, y and other model parameters [Hint: At some point in the derivations, you may be able to see how the usual wage equation is altered and you do not need to show all the steps leading to the final result].

D

Explain why the fixed cost, h_2, affects the wage directly but the flow cost, h_1, does not.

E

Examine and explain how changes in each of the two types of hiring costs affect the equilibrium values of (w, θ, u). Illustrate graphically.

F

Using the equation for the labor demand curve, show that the elasticity of labor market tightness θ with respect to productivity y, i.e. η_y^θ, is given by

$$\eta_y^\theta = \frac{1}{\eta_\theta^{m(\theta)}} \frac{y - w\eta_y^w}{y - w - (r+q)\, h_2}$$

where $\eta_\theta^{m(\theta)} \equiv \frac{m'(\theta)\theta}{m(\theta)}$ and $\eta_y^w \equiv \frac{dw}{dy}\frac{y}{w}$.

G

What is the effect of fixed hiring costs, h_2, on the elasticity of labor market tightness θ with respect to productivity y. What is the implication of this result when using the search model to match the business cycle fluctuations in unemployment and labor market tightness we observe in data? What is the intuition for this result?

Part III - Beer and compensating differentials (max 1500 words)

In the imaginary country of Harmonix, beer brewing is a very important export industry.

Among the breweries in Harmonix, by far the most important step in beer production is the fermentation of the beer, which is done by leaving the beer inside big storage rooms for 4 weeks. During this time, brewery workers go around inside the storage rooms and take care of the beer (checking that it develops correctly, adding additional ingredients at various points, etc.).

Historically, the breweries in Harmonix have brewed three different types of beers: Ales, lagers and saisons. The main difference between these is the temperature that they need to be stored at during fermentation. For ales, the storage rooms need to be kept at a pleasant 21 $^{\circ}C$. All inhabitants in Harmonix always prefer the ambient temperature to be exactly 21 $^{\circ}C$ so all living rooms are kept at 21 $^{\circ}C$ and this is also known as room temperature.

For lagers, the storage rooms need to be kept significantly cooler than room temperate, around 12 $^{\circ}C$. This unpleasantly cold environment makes the yeast work in a way that results in a very neutral or clean taste.

Finally, for saisons, the storage rooms need to be kept much warmer than room temperature, at around 30 $^{\circ}C$. This unpleasantly warm environment gives the yeast the possibility of adding more complex, interesting flavors to the beer.

When breweries in Harmonix export their beer, the prices they can charge vary depending on the type. Lagers are very popular internationally so sell for 1 dollar per bottle. Ales are also reasonably popular so sell for 0.80 dollars per bottle. Saisons, however, are not so well-known or popular so only sell for 0.50 dollars per bottle.

A

Based on the theory of compensating differentials, what would you expect regarding the relative wages paid to brewery workers producing different kinds of beer as well as the number of brewery workers employed to produce different kinds of beer? Make sure to explain your answer and the intuition behind it. [Hint: To provide an answer to this question, you will need to make additional assumptions. When deciding which assumptions to make, you should keep in mind the description above, the ideas and concepts underlying the theory of compensating differentials and the word constraint of this question.]

B

Does your answer in A depend on whether workers all have the same preferences? If yes, briefly explain how.

C

Does your answer in A depend how many bottles of beer a worker is able to produce per month? If yes, how so?

D

Imagine that suddenly people world-wide realize how wonderful saison beer is and that this causes the export price for a bottle of saison to increase to 1.10 dollars. In this alternative scenario, what would you expect regarding the relative wages paid to brewery workers producing different kinds of beers as well as the number of brewery workers employed to produce the different kinds of beers?