# UNIVERSITY COLLEGE LONDON

## EXAMINATION FOR INTERNAL STUDENTS

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| MODULE CODE | : | **ECON3013** |
| ASSESSMENT PATTERN | : | **ECON3013A** |
| MODULE NAME | : | **Industrial Economics II: Dynamic Industrial Organisation** |
| DATE | : | **24 May 2016** |
| TIME | : | **10:00 am** |
| TIME ALLOWED | : | **2 hours** |

This paper is suitable for candidates who attended classes for this module in the following academic year(s):

**2014/15 and 2015/16**




**TURN OVER**

**SUMMER TERM 2016**

**ECON3013: Industrial Economics II, Dynamic Industrial Organization**

**TIME ALLOWANCE: 2 hours**

*Answer all questions from Part A1 and all questions from Part A2 and Answer 2 questions from Part B1, and 1 from Part B2.*

*Questions in Part A carry a maximum 75 per cent of the total mark. Questions in Part B carry 25 per cent of the total mark.*

*In cases where a student answers more questions than requested by the examination rubric, the policy of the Economics Department is that the student's first set of answers up to the required number will be the ones that count (not the best answers). All remaining answers will be ignored.*

# PART A

Answer all questions from this section: all from Part A.1 and all from PartA.2.

A.1 (35 points) An industry is composed of two firms that provide a product. One firm is located in country $A$, and the other in country $B$. The firms are new in the industry and they have to decide the specification of their product. They decide their product specification at the beginning and cannot change it any longer. Product choice is therefore endogenous and irreversible. Firms anticipate future events correctly. In particular, they know that the two countries have negotiated a trade liberalization agreement. In the first period, each firm is a monopolist in her own country. In the second period they compete in both countries. The interest rate is zero in this world, and hence the objective of the firms is to maximize the sum of profits in the two periods. Hence we can write the profits of firm $i$ as

$$V_i = \Pi_i^M(u_i) + \Pi_i^D(u_i, u_j) \tag{1}$$

where $\Pi_i^M$ represents the monopoly profit of firm $i$ and $\Pi_i^D$ the duopoly profit. The variable which denotes the product quality is $u_i$. Note that in monopoly the profits of firm $i$ are independent of the product chosen by firm $j$. There are two possible levels of quality, $u = 1$ and $u = 2$, and we assume it has no cost to choose either level. We assume that firms share the same technology and that no other costs are necessary to provide a market. In the two countries consumers have utility function $U = \theta u - p$, if they buy one unit of the differentiated good, and $U = 0$, if they do not buy. The symbols $u$ and $p$ denote quality and price of the good, while $\theta$ represents a taste parameter. The distribution of $\theta$ in the two countries is the same. We assume it is uniform and that $\theta \in [0, 1]$. The mass of consumers is given by $S_i$ in each country $i$ ($i = A, B$), with $S_A \geq S_B$ (country A has a higher population size than country B), and $S = S_A + S_B$. Firms decide on the quality they want to produce at the initial period $t = 0$. Firms choose prices in each period $t$. The game is solved backwards.

(a) (5 points) What is the demand and optimal price of firm $i$ as a monopolist, taking as given the quality level chosen, $u_i$?

(b) (10 points) Suppose the two firms are in the duopoly situation, and one of them has chosen the same level of quality as the other, $u_A = u_B$. Taking these levels as given, what are the demands, equilibrium prices, and profits for the period, as well as the total intertemporal profits.

(c) (15 points)Suppose the two firms are in the duopoly situation, and one of them has chosen a larger level of quality than the other, denoted $u_1 = 2 > u_2 = 1$, so that $u_2 - u_1 = 1$ Taking these levels as given, what are the demands, equilibrium prices, and profits for the period, as well as the total intertemporal profits. Take care not to specify which country ends up with the higher quality $u_1$

(d) (5 points) Find the pure-strategy equilibria for the first stage of the game in which firms choose the quality levels $u_A$ and $u_B$.

A.2 (40 points) Assume there are two equally likely types of consumers ($A$ and $B$), for the cloud computing services of the firm Tagus. The utility of each type when they buy the standard package (50 Gb of storage) depends on the down time per year of the servers $D$ and on its price $P$:

$$U_A(P, D) = 100 - \theta_A P - D^2 \tag{2}$$

$$U_B(P, D) = 100 - \theta_B P - D^2 \tag{3}$$

where $0 < \theta_B < \theta_A < 2\theta_B$. That is, type $A$ users are more sensitive to $P$rice than type $B$ users. If they do not buy the package, the utility is zero for both types of buyers. Tagus is the only producer of this good, and its costs per unit depend (negatively) on the $D$own time of the server $C(D) = 100 - D$. Please answer the following questions. To answer any of them you can use the result of the previous ones even if you have not proved them

(a) (10 points) Suppose that there is complete information and Tagus can tell whether a user is type $A$ or type $B$ and there is no possibility of arbitrage, so that first-degree price discrimination is possible. What kind of contract would it offer to each type of buyer?

(b) (10 points) Suppose that Tagus could tell whether a user is type $A$ or type $B$, show the optimization problem that will determine the contracts it offers.

(c) (5 points) Show that one of the constraints is redundant.

(d) (15 points) Use the first order conditions to show that two other constraints are binding. Then assume the other constraint is not binding, and solve the problem (checking that the other constraint is indeed not binding).

## PART B

Answer 2 questions from Part B1 and 1 question from Part B2.

B.1 The following questions should be based on one of the research papers that you were assigned to read on the syllabus.

(a) (8 points) What are the key ingredients of the economic model in the paper you read?What is the solution concept? Please be as specific as possible.

(b) (8 points) Please summarise all key findings of the paper and evaluate their relevance for the economic question of the paper.

(c) (8 points) What assumptions play a key role in the analysis? Which are secondary? Please substantiate your answer thoroughly.

(d) (8 points) Which findings of the paper are robust to alternative formulations? If someone asked you to write a model to capture the key economic question in the paper, what are the key economic forces that you would try to capture with your model and that are missing from the paper you read?

B.2 Conceptual questions.

(a) (9 points) Why do we say that deposit insurance and other firms to create financial stability create a moral hazard problem in the banking sector? What can be done to deal with this problem? Would you recommend to do away with deposit insurance to avoid moral hazard in banking? Please substantiate your answer.

(b) (9 points) What is a key problem caused by time inconsistent agents in markets? Would competition help to solve the problem? Can you name a policy that has been proposed in real life to deal with this problem?