cover page for a written examination/test

Name of subject: Competition Policy and Regulation

Subject code: 30L303

Date of examination: 30-06-2015

Length of examination: 3 hours

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Students are expected to conduct themselves properly during examinations and to obey any instructions given to them by examiners and invigilators. Firm action will be taken in the event that academic fraud is discovered.

Each question should be answered on TU exampaper, each furnished with the candidate's name and ANR number. If candidates are unable or unwilling to answer a question, they must nevertheless submit a sheet of paper containing details of their name and ANR, together with the number of the question concerned. The 6 digit ANR number is printed on the TU card.

- Candidates are allowed to use a calculator, but no books.
- Candidates are allowed to have 1 (one) page of handwritten notes
- This exam consists of 1 question.
- Candidates must write clearly.
- Candidates must convince us that they understand the material of this course. Motivate your answers!
- There is no reason to panic! If you feel that you miss relevant information to answer a question, state this explicitly and assume the information that you need. Then we can see whether we can give points for this.
- If you don't write anything, we cannot give you any points!

Question 1 (25 points)

Consider a market with three symmetric firms producing a homogeneous good. The firms face demand of the form $p = 1 - Q$ where Q equals total output: $Q = q_1 + q_2 + q_3$. Each firm produces with constant marginal costs equal to 0.2. Further, there is a fixed cost $f \in [0, 0.03\rangle$ for each firm. We first consider the case where firms compete in quantities (Cournot equilibrium).

(a) (2 points) Show that equilibrium output for each firm equals $q_i = 0.2$ for $i = 1, 2, 3$. And the equilibrium price equals $p = 0.4$.

(b) (1 point) Show that each firm makes profits equal to $\pi_i = 0.04 - f$.

Firms 2 and 3 want to merge and form company "23" producing output q_{23}. Hence, now we have $Q = q_1 + q_{23}$. We first assume that this merger does not affect costs. That is, firm 23 has marginal costs equal to 0.2 and fixed costs equal to $2f$ (e.g. each plant has its own fixed cost).

(c) (2 points) Show that $q_1 = q_{23} = \frac{4}{15}$ and $p = \frac{7}{15}$.

(d) (2 points) Assume $f = 0$. Which firms gained from the merger in terms of profits?

(e) (2 points) Give the intuition for the result under (d).

(f) (1 point) Do consumers gain from the merger?

(g) (2 points) Assume that $f > 0$ and the merging parties claim that their merger reduces their fixed cost below $2f$. Should a competition authority accept the merger in this case? Discuss the relation with the competition authority's objective function.

From here onwards, we assume that $f = 0$ for each of the firms. Further, we assume that the merger leads to marginal costs $c_1 = 0.2$ (as above) and $c_{23} = c \leq 0.2$.

(h) (2 points) Show that output in Cournot equilibrium is determined by the following two equations

$$2q_1 + q_{23} = 0.8 \tag{1}$$
$$q_1 + 2q_{23} = 1 - c \tag{2}$$

(i) (3 points) Using linear algebra (or otherwise) show that

$$q_1 = \frac{0.6 + c}{3} \tag{3}$$
$$q_{23} = \frac{1.2 - 2c}{3} \tag{4}$$
$$p = \frac{1.2 + c}{3} \tag{5}$$

(j) (2 points) What should be the benchmark value $\bar{c}_{cw}$ such that the merger does not reduce consumer welfare? That is, what is the highest value $\bar{c}_{cw}$ such that a merger with $c \leq \bar{c}_{cw}$ does not lead to a reduction in consumer welfare?

(k) (2 points) Let $\bar{c}_{tw}$ denote the benchmark value such that a merger with $c \leq \bar{c}_{tw}$ does not reduce total welfare. How do $\bar{c}_{tw}$ and $\bar{c}_{cw}$ compare? That is, are they equal, is one bigger than the other? [hint: although you can calculate the answer here, you do not have to; if you give the intuition of how $\bar{c}_{tw}$ and $\bar{c}_{cw}$ compare, this is fine.]

Above we assumed that firms compete in output levels. From now on, we assume that firms compete in price (Bertrand competition).

(l) (1 point) Suppose that the merger does not affect marginal costs ($c_{23} = c = 0.2$). How does the merger affect consumer welfare under Bertrand competition?

Some competition authorities rely on pre-merger concentration measures to decide whether or not to allow a merger (i.e. the concentration observed before the merger takes place).

(m) (1 point) Choose your favourite concentration measure (e.g. the Herfindahl index, but another concentration measure is fine as well). Calculate this measure before the merger both under Cournot and under Bertrand competition.

(n) (2 points) Discuss the usefulness of pre-merger concentration measures as a decision tool whether to allow the merger or not.