

Written Exam for the M.Sc. in Economics 2013-II

Advanced Industrial Organization

Final Exam

31. May, 2013

(3hours closed book exam)

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.

ALL QUESTIONS BELOW SHOULD BE ANSWERED

**Problem 1. Merger analysis in differentiated product markets**

i) When Carl Shapiro served as US Deputy Assistant Attorney General for Economics in 1995, he wrote about merger analysis: *"Roughly speaking, a valuable index of the potential anticompetitive unilateral effects is obtained by multiplying the Diversion Ratio by the Gross Margin. Any danger of a unilateral price increase may be alleviated by product repositioning, entry, or efficiencies. Nonetheless, the Diversion Ratio and the Gross Margin are the key variables in the demand-side portion of the analysis"*.

As you of course know (but just in case you forgot, you are now gently reminded): Shapiro refers to what has become known as the GUPPI (Gross Upward Price Pressure Index)

$$GUPPI = DM,$$

where  $D$  is the diversion ratio and  $M$  the gross margin also called the mark up

Explain the intuition behind the use of the GUPPI and Shapiro's statement.

ii) Now, we consider a differentiated Bertrand market. There are two firms 1 and 2, producing differentiated products. The firms are in a symmetric situation, both have marginal cost  $c$ , and the demand for firm  $i$ 's product,  $x_i$ , is

$$x_i = A - p_i + Dp_j$$

where  $j \neq i$ ,  $A > 0$  and  $0 < D < 1$ .  $D$  is the so called diversion ratio.

The firms set prices and seek to maximize profits in Bertrand competition.

Find the Bertrand equilibrium prices.

iii) For later use, find the mark up (also called the gross margin),  $M = \frac{\bar{p}-c}{\bar{p}}$  in the Bertrand equilibrium. Discuss the intuition behind how the mark up depends on the diversion ratio.

iv) Now suppose the firms wish to merge. A competition authority wishes to predict the post merger price and asks its economist - you - to come up with a prediction. Please help them and find it.

v) Carl Shapiro claims in his note on upward pricing pressure that in a market like the one we consider here, one can write the post merger percentage price increase as

$$\frac{p^* - \bar{p}}{\bar{p}} = \frac{DM}{2(1-D)}$$

where  $p^*$  is the symmetric post merger price and  $\bar{p}$  the symmetric pre-merger price. Verify Shapiro's claim and explain the intuition behind the fact that the merger leads to a higher price.

vi) In view of the result in v) discuss the applicability of the GUPPI index for merger analysis and assessment of the unilateral effects. Which is larger GUPPI or the percentage increase found? What is the explanation for this difference?

Does it specifically pertain to the linear structure of the model or is it a general phenomenon, and if so why?

vii) In a recent (fall 2012) Danish merger case, *ARCUS gruppen holding A/S' overtagelse af Pernod-Ricard Denmark A/S' (the Arcus group holding inc.'s acquisition of Pernod-Ricard Denmark inc.)* the firms were active in several markets, but the most important market was the market for aquavit in Denmark, which we now consider. The Danish Competition and Consumer Authority, DCCA, used consumer survey data to estimate the diversion ratio. When assessing the Diversion Ratio the DCCA used a questionnaire where the respondents were asked what they would have done if the aquavit they bought last time was out of stock. Of the 135 respondents, who recently had bought an aquavit from Arcus, 79 answered that they would buy a different aquavit. Of those 79, 42 responded that they would buy an aquavit from Pernod Ricard.

The DCCA used this information to estimate the diversion ratio, so that  $D = 42/79 = 0,53$ . They inserted this value in the formula, you derived above in question v) to estimate the price increase following a merger.

Discuss whether this is justified. Does the  $D$  so estimated correspond to the  $D$  in the model above? If not perfect, could the DCCA have done better or is their method in fact sensible?

Discuss whether you think that the market for aquavit in Denmark can be reasonably described by a differentiated Bertrand model.

viii) The DCCA found that  $D = 0.53$ , which we for ease of calculations will approximate by  $D = 1/2$ . The gross margin is considered a business secret and not disclosed, but the DCCA estimated the price increase as a result of the merger to be 4% if it was assumed that demand is linear and that the firms are in a symmetric situation. They used the formula you derived. What is the DCCA's assessment of the gross margin in the aquavit business?

ix) You suddenly hear a rumor that the aquavit market has been subject to tacit collusion. If the rumor is true what does it imply for the validity of the DCCA's analysis of the price effect of the merger?

**Problem 2:** Technology often requires tacit knowledge to be transferred alongside the more formal and codified parts of technology. As the name suggests, tacit knowledge represents those components of technology that are not codified into blueprints, manuals, patents and the like. For instance, transfer of chemical process technology through a license will typically involve training the licensee in a variety of issues such as how to handle and store chemicals, how to control the production process, and how to return it to operation after unscheduled breakdowns caused by accidents.

To analyse this situation, consider the following model: A licensor owns a patented technology that a licensee needs to be able to market its product. The licensee is the only firm that is able to produce for this market, and it faces the demand curve  $q = 4 - 2p$  where  $p$  is the price of the product and  $q$  is the quantity sold. If the licensor licenses the technology, but does not transfer the tacit knowledge needed to operate it efficiently, the licensee has constant marginal cost equal to  $c_H$ . If the technology is licensed, and the tacit knowledge is transferred, the licensee has constant marginal cost equal to  $c_L$  where  $c_L < c_H$ . Transferring the tacit knowledge involves a private cost  $T$  for the licensor.

A licensing contract specifies a royalty  $r$  per unit sold and a fixed fee  $F$ . The licensor has all the bargaining power and makes a take-it-or-leave-it offer to the licensee. If the licensee rejects the contract offered, both the (potential) licensor and the licensee earn zero profit.

Suppose first that licensing contracts are complete in the sense that it is possible to specify whether the tacit knowledge should be transferred or not (in addition to  $F$  and  $r$ ).

- (i) Assuming that licensing takes place, explain why the licensee sells a quantity  $q^* = 2 - r - c_i$  and earns profit  $\frac{(2-r-c_i)^2}{2} - F$  where  $c_i$  is the marginal cost,  $c_i \in \{c_L, c_H\}$ .
- (ii) Find the optimal contract that (a) maximizes the licensor's profit, and (b) is accepted by the licensee. In addition to specifying  $F$  and  $r$ , consider whether the tacit knowledge should be transferred or not and how this depends on  $T$ .

Assume from now on that it is not possible to verify in court whether the tacit knowledge is transferred or not. Therefore, the licensing contract specifies  $F$  and  $r$  but not whether the tacit knowledge is transferred.

- (iii) Explain why a royalty  $r > 0$  increases the licensor's incentive to transfer the tacit knowledge. Derive the optimal contract that (a) maximizes the licensor's profit, (b) induces the licensor to transfer the tacit knowledge to the licensee, and (c) is accepted by the licensee.

Suppose now that transferring the tacit knowledge makes the licensee able to imitate the technology at a cost  $I$ , thereby avoiding all royalty payments (but not the fixed fee).

- (iv) Write down the constraint that the contract must fulfill in order to prevent the licensee from imitating.
- (v) Suppose that licensor has some complementary input that the licensee needs and that is easy to monitor. Do think that this helps the licensor to sell its technology in a more efficient way?

### Problem 3

The following is an excerpt from an article brought in the Guardian, Monday 11<sup>th</sup> March, 2013:

## “Supermarket deals: how the price promises match up

Tesco is relaunching its loyalty scheme in a bid to reattract customers who have taken refuge at rivals Asda, Sainsbury's and Morrisons. Will it work?



Tesco has struggled in recent years, but hopes its Price Promise will recapture former customers from its main competitors. Photographs: Christopher Thomond; David Sillitoe; Helen Rimmell; Alamy

[Tesco](#) is taking on Sainsbury's and [Asda](#) with a Price Promise that aims to replicate its rivals' success in attracting cash-strapped consumers through its doors.

The [scheme, launched on 11 March 2013 across the UK](#), guarantees that Tesco will check shoppers' baskets against prices at Asda, Sainsbury's and [Morrisons](#). If the comparable basket would have been cheaper shoppers will get a voucher for the difference, up to £10.

Previously, Tesco had allowed shoppers to input the details of their receipt online to check whether their shop would have been cheaper at a rival, but now it will offer instant, at-till analysis.

So how does Tesco's service match-up to its rivals?

### Tesco Price Promise

**How it works** Shoppers must buy at least 10 different items, including one comparable grocery product, from any Tesco Metro, superstore or Extra store (and their attached petrol stations), as well as via the Tesco website. If you could have bought the same grocery shopping cheaper at Asda,

Sainsbury's and Morrisons, Tesco will issue you with a voucher for the difference, up to a maximum value of £10.

But the offer will not apply to Tesco Express stores, often more expensive than larger Tesco [supermarkets](#), or Tesco Homeplus purchases.

**Which products are included?** Tesco will compare branded groceries (Kellogg's Cornflakes, Ariel, Coca Cola etc) as well as its own-brand products (where an equivalent is sold at Asda, Sainsbury's or Morrisons). It will also compare price reductions and promotions such as multibuy purchases (buy one get one free etc), as well as price cuts, for example a discount from 99p to 50p.

**Which are excluded?** [For a full list of exclusions visit the Tesco website](#), and there are a lot. Tesco will not compare any electrical item, home and furniture items, CDs, DVDs, Blu-rays, DIY and car items, toys, baby and toddler accessories, gifts and jewellery, clothing, phones, opticians, beauty centre products, cafe items, fuel, photo-processing and associated services, newspapers, magazines, stamps, tobacco and cigarettes.

Tesco will also not include meal deals, combination offers such as buy-cheese-and-get-crackers-free, category-wide deals such as 5% off six bottles of wine, and multiple offers (when Tesco or a competitor has more than one offer on the same products running at the same time, such as buy two for £3 or buy five for £6).

**How do I claim?** You will be given a voucher at the till if your basket would have been cheaper elsewhere, or you'll be sent an email if you do an online shop. Shoppers must use their vouchers within 28 days and are not allowed to spend them on fuel, lottery tickets, tobacco, infant formula, pharmacy products, gift cards, E-top-ups, stamps, opticians and travel money. Nor can you use them in the Tesco bank or cafe or on entertainment or clothing, in the phone shop or through Tesco Direct.”

The other retailers immediately invoked roughly similar schemes. How would you think of the relevant market, is there full price transparency, is it differentiated etc? Discuss how you think this scheme is going to affect the competition in the market. Should a competition authority worry or will the schemes intensify competition?