EGT2

ENGINEERING TRIPOS PART IIA

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xxxx xx May 2022   9.30 to 11.10

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Module 3E1

BUSINESS ECONOMICS

*Answer not more than **two** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your candidate number **not** your name on the cover sheet.*

STATIONERY REQUIREMENTS
Single-sided script paper

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM
CUED approved calculator allowed

10 minutes reading time is allowed for this paper at the start of the exam.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.

You may not remove any stationery from the Examination Room.

1

(a) The demand for organic yogurt for a monopoly firm has been estimated according to the following linear regression model, where lnX stands for the natural logarithm of variable X. Q is quantity demanded of yogurt, P is price of yogurt, A is advertising and M is income. The marginal cost of producing the yogurt is £0.5. The standard errors for each estimate are given in parenthesis below each estimate. Interpret the results. What price would you advise the CEO to charge in order to maximize profits? What is the effect of raising price on Total Revenue?

$$lnQ = 7 \ - 1.4 \ lnP + 1.8 \ lnA + 0.1 \ lnM$$

$$(5.2) \ (0.45) \ \ (2.2) \ \ \ \ \ (0.04)$$

[15%]

This is a chance to discuss demand estimation and comment on the estimated model. The calculation of optimal price using the profit maximizing condition for monopoly, the coefficient on price and the marginal cost should be performed. Better answers would also interpret the elasticity and its implication for a monopolist. A diagram could be included to show this. Finally, establishing the relationship between elasticity and MR, TR while providing an interpretation.

(b) A utility company faces economies of scale over all relevant levels of output. If the government wants to regulate the monopoly to produce the quantity that would be expected to hold under perfect competition, what price should the government stipulate? Include a diagram in your answer.

[35%]

Since the production process exhibits economies of scale over all relevant levels of output, average costs fall with output and exceeds marginal cost everywhere. As, a result, if the regulator sets the price equal to marginal cost, the price is less than average cost, so the firm cannot profitably produce and shuts down. Unless, regulators are willing to subsidize the firm, the regulators must raise the price to a level where the firms at least breaks even. If the firm shuts down, society's DWL is the loss in total (potential) surplus. The regulator could set the price cap equal to the average cost so that the firm continues to operate. Here, both consumers and producers are better off under average cost pricing than if the firm is forced out of business. Better answers would discuss that the price-cap is demanding from an informational aspect as well and talk about antitrust rules.

(c) 'The invisible hand is an old fashioned idea of how markets should function'. Discuss.

[50%]

This a big picture question and many answers are possible. One direction would stress the virtues of the competitive market such as incentives, self-adjustment, free choice, allocative and productive efficiency, benchmark. Another direction may would explore the idea in critical view, emphasizing market failures arising from information asymmetry, market power and externalities. A more complete answer would emphasise these two views and include the view contestable markets.

2

The race for a coronavirus vaccine has stoked a debate on how much the doses will cost and who will pay for them, as prices range from US$3 to more than US$30 a dose and public health advocates including Bill Gates call for a price cap for poor countries.

The pricing of all vaccine deals has been shrouded in secrecy, with companies and public institutions defending their right to confidentiality. But people briefed on talks between drugmakers and the European Commission say that AstraZeneca Plc. has sold its jabs at about US$3 to US$4 per dose in deals with the EU, while the vaccines developed by Johnson & Johnson and Sanofi SA/GlaxoSmithKline Plc. have come in at about US$10 per dose. By contrast, Moderna Inc. — a newer and still loss-making company — has sought to pitch its vaccine at about US$50 to US$60 per course of two doses, after initially asking for almost double that amount. Other biotechnology businesses, such as CureVac BV, have said they would seek an "ethical margin" on their prices. One of China's vaccine front-runners, Sinovac Biotech Ltd., this week began selling its vaccine in selected cities at US$60 for two doses as part of an emergency use program with hundreds of thousands of participants. Some manufacturers in countries such as India, which has a large drug production industry, have criticized western drug companies that they see as trying to prop up prices, by failing to ramp up production to meet demand.

"They don't want to give it to the rest of the world because they'll have to compete with me at US$3 (a dose)," said Adar Poonawalla, chief executive of India's Serum Institute, the world's largest vaccine manufacturer. "We're making a small margin but that's just normal business," he said. He added that higher production costs in Europe did not justify the difference in price between his company's products and those of some western vaccine producers.

At the heart of the discussion lies a question both ethical and practical: whether pharmaceutical corporations should work with rich countries to ensure charges to poor nations are capped. "The price [of a covid vaccine dose] needs three tiers where rich countries are paying back a lot of the fixed costs, middle-income countries are paying back some of the fixed costs and the poorer countries are paying a true marginal cost." (Bill Gates). [Excerpts from *"How much will a COVID-19 vaccine cost? Pricing of all vaccine deals shrouded in secrecy" Financial Times, Financial Post. October, 22, 2020.]*

(a) Characterize this industry with respect to market structure, costs, barriers to entry and product characteristics.

[20%]

Few players, high fixed costs, barriers to entry technology, product may be viewed as homogeneous or highly differentiated (MRNA..Pfizer)

(b) Discuss models that could explain the pricing strategies adopted by firms in this industry.

[40%]

Most likely compete in prices. If homogeneous Bertrand, P=MC. If differentiated Bertrand P>MC include explanation. Or calculation.

Students may want to explain the Stackelberg model as leading to one firm charging higher prices and pre-committing to higher output levels.

Or students may view the market as firms competing in quantity. Higher and lower MCs costs leading to different prices.

(c) Evaluate Bill Gates proposal in terms of price discrimination including its feasibility, implementation and the impact of this pricing strategy for the firm, consumers and society.

[40%]

Answers would discuss the feasibility of implementing 3rd degree price discrimination (identification, arbitrage, market power). Arbitrage being challenging- as consumers may ship vaccines away or travel to get cheaper dose. Firms would price more inelastic markets higher. Discuss whether poor countries are more elastic. They are certainly at higher risk and more willing to pay, but have less capacity to pay. Comment on homogeneous pricing and compare to outcome under price discrimination. Price discrimination can open up markets that wouldn't be served before and therefore be welfare enhancing by increasing quantity.

3

(a) Two firms play Cournot game. The market demand is given by P = 260 - 2Q. Marginal cost is 20 to each firm. Construct a 2x2 normal form game matrix having the quantities that would prevail under cooperation and non-cooperation as strategies and profits as outcomes. Find the Nash Equilibrium and use your matrix to conciliate the following: (i) Cartels are highly unstable, (ii) Cartels exist. What would happen if Firm 1 played the game first instead?

[50%]

Answer will compute the profit entries of the 2x2 matrix. Cartel solution and Cournot Solution. Then, identification of the Cournot Nash Equilibrium. Answers will discuss the Prisoner's Dilemma aspect of the game and the conciliation coming from extending the game to be repeated and players adopting contingent strategies. Finally, a answers would compute the Stackelberg Nash Equilibrium and explain the source of competitive advantage and credibility.

(b) The COP 26 summit held in Glasgow in November last year brought parties together to accelerate actions towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. Explain why pollution is a challenging economic problem and discuss how bargaining and taxation would offer potential solutions. Include a diagram

in your answer.

<div align="right">[50%]</div>

Answers would explain the intuition behind the externality problem and consequent market failure and DWL. Explain the Coase Theory and the idea of creating a market for externality include a diagram. Better answers highlight the benefits and caveats from the solution.

END OF PAPER