# Econ5026 – Strategic Business Relationships.

# Midterm – 14 September 2016

## Solutions & Feedback

*Answer all questions in the answer booklets provided..*

*Time allowed: 1 hour 30 minutes (90 minutes) plus 5 minutes reading time.*

*Students are allowed to use non-programmable calculators.*

*Written answers should be done in pen, however diagrams may be drawn in pencil.*

*In your answers please show all working.*

**NOTE THAT THE EXAM IS WORTH 50 MARKS IN TOTAL. TAKE CARE TO NOTE HOW MANY MARKS ARE ALLOCATED FOR EACH QUESTION AND ALLOCATE YOUR TIME ACCORDINGLY.**

Name: _____

Student number: _____

Signature: _____

1. *9 marks in total*

(i) Describe what is meant by first degree price discrimination. Describe what is meant by third degree price discrimination. What challenges might a firm face in implementing either first degree price discrimination or third degree price discrimination? (3 marks)

*Solution: under FDPD individuals are charged their willingness to pay for each unit consumed. The main challenge for such an approach is that it is unlikely that firms will be able to identify the individual's willingness to pay as individuals will generally misreport this.*

*Under TDPD different groups of customers are charged different prices depending on their own price elasticity of demand. Hence, consumes with inelastic demand are generally charged a higher price. There are two challenges associated with this pricing strategy – first you must be able to distinguish between different customer groups (based on gender, student or pensioner status – for example using a concession card). Second, you must be able to prevent arbitrage or resale – this is easy with a service, though it may also require that a condition of sale is that the item is not resold.*

(ii) Consider a firm that sells two products, namely washing machines and tumble dryers. There are 4 customers each which as the valuation indicated in the table below:

| **Customer** | **Washing Machine** | **Dryer** |
|---|---|---|
| *Arnie* | 900 | 800 |
| *Beatrice* | 1100 | 600 |
| *Colm* | 1300 | 400 |
| *Doris* | 1500 | 200 |

The marginal and average cost of making a washing machine is \$1000, and the marginal and average cost of making a dryer is \$300.

Suppose the firm sells each tem individually. Which set of prices will maximize profit? (2 marks) *Note this is a multiple choice question but you need to show working to get full marks.*
(a) $P_W$=900; $P_D$=400;
(b) $P_W$=1300; $P_D$=600;
(c) $P_W$=1500; $P_D$=600;

*Solution: Here, the best option is (b). The working can be seen in the table below*

| *Prices* | *Sales of W* | *Sales of D* | *Revenue* | *Costs* | *Profit* |
|---|---|---|---|---|---|
| *$P_W$=900; $P_D$=400* | *4, one to each buyer* | *3, everyone but Doris)* | *3800* | *5200* | *-1400* |
| *$P_W$=1300; $P_D$=600* | *2 (Colm & Doris)* | *2 (Beatrice and Arnie* | *3800* | *2600* | *1200* |
| *$P_W$=1500; $P_D$=600* | *1 to Doris* | *2 (Beatrice and Arnie* | *2600* | *1600* | *1000* |

What is the profit maximizing price if a pure bundle is offered? (2 marks) *Note this is a multiple choice question but you need to show working to get full marks. The price of the bundle is given by $P_B$.*
(a) $P_B$=1500.
(b) $P_B$=1600.
(c) $P_B$=1700.

*Solution: Here, the best option is (c). The working can be seen in the table below*

| *Prices* | *Sales of bundle* | *Revenue* | *Costs* | *Profit* |
|---|---|---|---|---|
| *$P_B$=1500* | *4, one to each buyer* | *6000* | *5200* | *800* |
| *$P_B$=1600* | *4, one to each buyer* | *6400* | *5200* | *1200* |
| *$P_B$=1700* | *4, one to each buyer* | *6800* | *5200* | *1600* |

What is the monopolists profit maximizing strategy if a mixed bundling strategy is used? (2 marks) *Note this is a multiple choice question but you need to show working to get full marks. The price of the bundle is given by $P_B$.*
(a) $P_w$=1299; $P_D$=699; $P_B$=1000.
(b) $P_w$=1499; $P_D$=799; $P_B$=1700.
(c) $P_w$=1699; $P_D$=799; $P_B$=1700.
*Solution: Here, the best option is (b). The working can be seen in the table below*

| *Prices* | *Sales of W* | *Sales of D* | *Sales of bundle* | *Revenue* | *Costs* | *Profit* |
|---|---|---|---|---|---|---|
| *$P_w$=1299; $P_D$=699; $P_B$=1000* | | | | *3800* | *5200* | *-1400* |
| *$P_w$=1499; $P_D$=799; $P_B$=1700* | *1 (Doris)* | *1(Arnie)* | *2 (Beatrice & Colm)* | *5698* | *3900* | *1798* |
| *$P_w$=1699; $P_D$=799; $P_B$=1700* | | *1 (Arnie* | *3 (Beatrice & Colm & Doris)* | *5899* | *4200* | *1699* |

*2. 5 marks.*

Consider firms that can choose where to locate along a linear product space indicated by the line [0,1]. The total number of customers along the product space is equal to M and we assume that M=1. Assume that firms can enter a market but doing so incurs a fixed cost equal to $f$ where $f$=(1/6). These fixed costs are sunk and cannot be recovered once entry occurs. New firms enter the market if they expect positive economic profit. Finally, assume that the price of the good is fixed and equal to 1.

Show that if three firms enter the market and space themselves at 1/6, 3/6 and 5/6, no other firm can profitably enter the market. How much profit will each of the three firms earn?

*Solution: Here, the approach to use is similar to that for question 2 in tutorial 4. If you consider .*

*3. 8 marks*

Consider the following game played between Jetstar and Virgin. Each can make a decision about installing some navigation software on their planes. The two types of software are called Alpha and Omega. The payoffs from the choices made (in $ millions) are presented in the following payoff matrix. Note that Jetstar's payoff is shown first:

| | | **Virgin** | |
|---|---|---|---|
| | | Alpha | Omega |
| *Jetstar* | *Alpha* | (*1*, **16**) | (*4*, **6**) |
| | *Omega* | (*2*, **20**) | (*3*, **40**) |

Is there a pure strategy Nash Equilibrium in this game? (2 marks)

What is the mixed strategy Nash Equilibrium in this game? (4 marks)

Jointly, Virgin and Jetstar get higher payoffs when Jetstar chooses Omega. Why does Virgin not always choose Omega. How might such an outcome, Virgin choosing Omega, be achieved? (2 marks)

*Solution: In this game there is no equilibrium in pure strategies. In the matrix below I have indicated the best responses in red.*

| | | **Virgin** | |
|---|---|---|---|
| | | Alpha | Omega |
| *Jetstar* | *Alpha* | (*1*, **16**) | (*4*, **6**) |
| | *Omega* | (*2*, **20**) | (*3*, **40**) |

*In terms of the mixed strategy, recall how we solve these. Suppose that r is the probability that Jetstar plays Alpha. For a mixed strategy equilibrium what we need is for the payoff to Virgin being the same from the two pure strategy equilibria they can choose. That is, we require:*

$$\textit{Payoff for Virgin(alpha)} = \textit{Payoff for Virgin (Omega)}$$

$$R(16) + (1-r)(20) = r(6) + (1-r)(40)$$
$$r = 2/3$$

*You can go through exactly the same process for Jestar to show that c = probability that Virgin plays Alpha in the mixed strategy equilibria equals 0.5.*

*As for the final part of the question, what i was looking for was a statement around the line that both airlines are assumed to act in their own self interest – that is they look at their own payoff rather than how total payoffs can be maximised. With this, even though payoffs are maximised (in total) when both play Omega, when Jetstar plays Alpha it is in the interest of Virgin to play Alpha. How might such a cooperative outcome be achieved whereby total payoffs are maximised? We might need some agreement and precommitment between Virgin and Jetstar. Moreover, any precommitment would have to be credible for it to work.*

*4. 8 marks in total*

(i) Describe what is meant by a tough commitment by a firm. What might be an example of a tough commitment under Bertrand and Cournot competition? (4 marks)

(ii) Using a set of diagrams, show how a tough commitment might harm a competitor and whether or not it should be undertaken should depends on any direct effect and the strategic response on the part of the competitor. (4 marks)

*Solution: In the first instance I would direct you to lecture notes 6. In those lecture notes I discuss both tough commitments (those that are bad for competitors) and soft commitments (those that are good for competitors).*

*In the context of a Cournot model, we might think of a tough commitment as the expansion of production facilities – this represents a commitment to supply more to the market for any given level of output of your rival. Think of a rightward shift in the firms reaction function. In the context of a Betrand model, we might think of a tough commitment as investment in a new production facility – this represents a commitment to charge a lower price for any price charged by your rival. Think of a leftward shift in the firms reaction function. Note that i have not drawn the reaction functions (and the shifts in the curves) as they are presented in lecture 6 notes. For your answer, however, I was looking for a diagram.*

*So why do we need to weigh up the direct and strategic effects of such commitments. Consider the Cournot model – there is a negative direct effect because by producing more you will tend to decrease your own profits. For one, we would expect this to drive price down. However, this negative direct effect will be at least partly offset by the strategic response on the part of competitors to reduce their own output. Your action effectively softens competition and mitigates the negative impact on your own profits of increasing output.*

*Now consider the Bertrand model - – there is a positive direct effect because by lowering price you will tend to increase your own profits as you sell more. However, this positive direct effect will be at least partly offset by the strategic response on the part of competitors when they reduce their own price. Whether or not this is a good commitment to make depends on whether the positive direct effect outweighs the negative strategic effect.*

*5. Essay question (20 marks)*

Describe what is meant by the following:

- The neo-classical view of the firm.
- The transactions costs view of the firm.
- The property rights view of the firm.

What are the strengths and weaknesses of each theory of the firm?

Jensen and Meckling (1995) discuss general and specific knowledge. Describe what is meant by each of these and how they help explain the appropriate structure of a firm. What tradeoffs do firms face and how might they resolve them?

*Solution: Here what I was looking for was a clear logical discussion. Both papers should have been discussed (10 marks were allocated to a discussion of each). The main points to cover in the discussion of the Hart paper were the three theories of the firm. I have noted a few pertinent points below, namely:*

*(i) Neo-classical view of the firm – required a description of the firm as a set of production plans by which inputs were converted to outputs. The quantity produced was determined by prices in the spot market to maxmise profit. The model is useful for modelling exogenous changes in the environment and understanding strategic interaction between market players. However, it ignores how production is organized within the firm; doesn't explain resolution of conflicts and does not provide much insight into the boundaries of the firm, especially around mergers and splits.*

*(ii) TC view of the firm – arises out of the fact that transacting has costs – these TCs will sometimes be lower if the transaction occurs within rather than outside the firm (i.e. in the marketplace). TCs might include things such as the costs associated with learning and haggling. The TC view of the firm sees the tradeoff from the lower TCs as that the market mechanism is 'suspended' within the firm at the cost of increased rigidity around decision making and a greater likelihood of errors. There are a number of problems associated with this approach – for example, TCs remain somewhat nebulous. Moreover, it doesn't really help explain why bringing a transaction into the firm actually solves the problem at hand.*

*(iii) PR view of the firm – this views the firms as a set or PRs over the physical assets of the firm. Significantly, if there are gaps in contracts it's the owners of the assets who possess the residual rights and who choose to determine what happens. That is, decisions around the usage of assets lay with the owner of the firm. Viewing the firm in this way helps provide insight into the incentives around things such as putting in effort, investing, division of surplus etc. Moreover, the PR view of the firm helps explain how incentives change with integration of firms. One problem with this view of the firm is that it doesn't really shed light on what happens when there is separation of ownership and control.*

*The second paper to discuss was the Jensen and Mackling paper – recall that we covered this in lectures and tutorials. The first thing to do is to distinguish specific knowledge (which is costly to transfer) and general knowledge (which is relatively*

*cheap to transfer). As a result, within firms there is a need to delegate or decentralize decision making power. Of course, this presents two problems, namely:*

*(i) Assignment problem – who to delegate decision making power to.*

*(ii) The agency problem. You could list the agency costs here including costs of designing, implementing and maintaining appropriate incentives.*

*The problem is that within market settings the problem is solved through alienability – but this process is suppressed within the firm. Importantly, the argument is that alienability solves the rights assignment problem and the agency problem by providing appropriate signals (measures of performance) and rewards for those who hold decision rights.*

*The key tradeoff for the firm is that it needs to balance the level of decentralization to balance the benefits and costs associated with where decision rights are located and how they are used. Colocation of decision rights with the knowledge associated with making a good decision right will save information costs at the expense of higher agency costs. It would have been useful to present and discuss figure 1 from the article at this point. You will note that there is also a discussion in the article about the types of considerations that will influence the appropriate level of decision right decentralisation. For example, size of the organization, technology and government regulation*

*So how is the problem solved in the firm? One important aspect is the creation of control systems that provide measures of performance and incentivize agents through appropriate rewards and punishments. For example, there are job descriptions and policies within firms by which decision rights are allocated. This might occur, for example, through control over budgets (which can obviously vary in a wide variety of ways); rules that dictate how much discretion an employee/ manager can exercise. Furthermore, there are control systems which measure the performance of the employee and provide the basis for rewards or sanctions within the firm.*

*I have simply y=taken some key points from each of the articles –ideally your discussion would have set out a coherent argument that explored both papers in a logical manner.*