Econ5026 – Strategic Business Relationships.

Midterm – 19 September 2018

SOLUTIONS

Answer all questions in the answer booklets provided.

Time allowed: 1 hour 20 minutes (80 minutes).

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.

Student number: _____

1. 5 marks

(i) Describe what is meant by transaction costs. Give some examples of transaction costs and describe how transaction costs help explain the existence and boundaries of firms.

Solution: Transaction costs are the costs of interacting with other economic agents (see lecture notes 6, p. 4).

Transaction costs can include:

- *Search costs for consumers*
- *Transport costs for buyers*
- *Cost of learning product characteristics*
- *Costs of negotiating and enforcing contracts.*
- *There are many other and I would refer you to the discussion in McAfee pp. 163-64.*

TC's help explain the existence of firms because they are often (though not always) associated with market transactions. These are effectively suspended in firms though other TCs might arise within firms. By economising on TCs, firms can exist rather than relying on market transactions to allocate resources and organise production.

Boundaries of the firm defined in part by the point where TCs of organising production within the firms rather than in a market are equated at the margin (this is discussed in lecture notes 7).

2. 3 marks

(i) Identify at least four advantages that an incumbent in an industry might have and which provide a barrier to entry for potential entrants. How do these advantages provide a barrier to entry.

Solution: Incumbent advantages include (see p. 16 Lecture notes 3):

- *Precommitment contracts -these tie-up existing suppliers or distribution networks and make it more costly for new entrants.*
- *Licenses and patents – these are legal barriers to entry that make it more costly or in some cases impossible to a particular product or service to be provided.*
- *Pioneering brand advantages – mean that an incumbent already has a loyal customer base that might find it costly to switch to a new competitor.*
- *Learning curve effects – lower costs associated with the accumulated level of output.*

In each case what these mean is that an incumbent is at an advantage relative to a potential entrant.

3. 7 marks

(i) Describe how repeated interaction between players in a game might help resolve problems associated with a non-cooperative outcome that does not maximise total surplus.

Solution: There are a number of ways to answer this question. Ideally the answer begins with a with a discussion of what happens in a single shot game such as a Prisoner's dilemma. In this case players maximise their own utility (or maximise their own profit) and act in their own self-interest. As a result, in games such as these, the surplus is not maximized. The Boeing/ Airbus game discussed in Lecture notes 3 is a good example of this. Note too the advertising game (between BAT and Imperial) we discussed in Lecture 2.

When a game is played repeatedly there is an opportunity to punish another player if they deviate or cheat. The idea is that in the case of the advertising game (for example), both players might agree to 'Not advertise'. Though there is a clear incentive to deviate from the agreed strategy if you play only once, if the game is played repeatedly there may be an incentive to continue to cooperate and 'Not advertise'. The reason is because of the opportunity to punish a player if they cheat. If you are punished, then in general you get a lower payoff in the future from cheating rather than cooperating. Hence it is possible that it will be in the interest of the players to continue to keep cooperating over time. Effectively cheating gives you a short term payoff but at the expense of a higher payoff overt he long term. Of course for this to work it must be the case that the net present value of continued cooperation is greater than the net present value of cheating and punishment.

A final note – what we have said above really only applies in an infinitely repeated game or when the players do not know when the game will end.

Note that an alternative way to answer this question was to discuss the interaction between Anne and Bert (discussed in the lecture and also tutorial 3). The same points as those described above would need to have been referred to and explained.

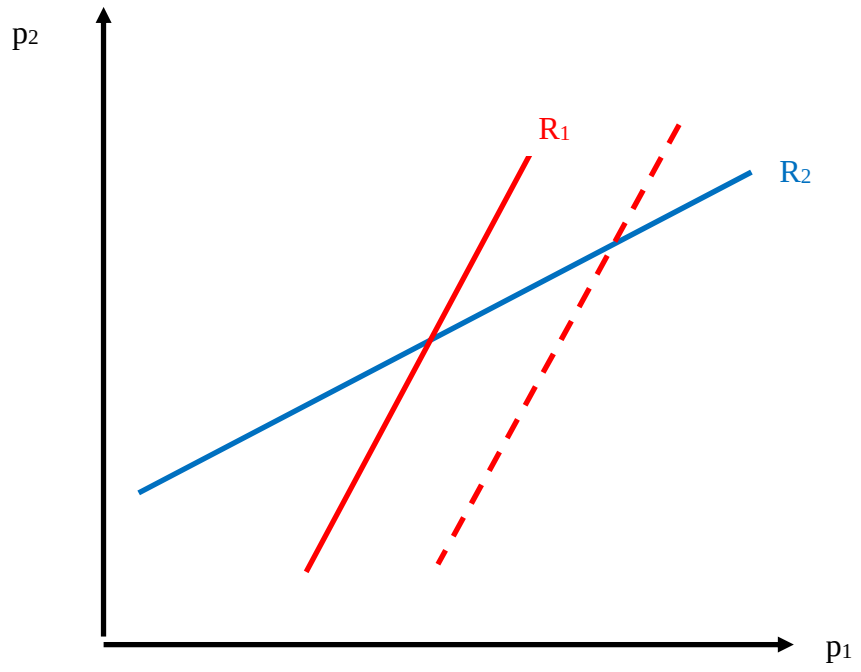
4. 6 marks in total

(i) In a Bertrand model of competition when firms produce identical products, describe what the market outcome looks like. Explain. (2 marks)

(ii) . Describe what is meant by a reaction function. Draw the reaction functions for firms in a Bertrand model with differentiated products. Describe what would happen if one of the firms in this market made a soft commitment. Discuss the direct and indirect or strategic impact of a soft commitment and why it is important for understanding whether to make a commitment. (4 marks)

Solution: For (i), the answer was simply that in such a model price would be driven down to marginal cost as the best response to a drop in your rival's price would be to reduce your price just below theirs. See p. 43 of Lecture notes 3.

For (ii) I would refer you to the detailed discussion given in tutorial 3. In particular, we could think about a soft commitment in this type of model as being depicted in the diagram below. Note of course that the reaction functions slope upwards in this model as discussed in Lecture notes 3, pp. 48-50. Reaction functions of course are simply a representation of a players best response given the behavior or choice of the other player. Hence in the Bertrand model with differentiated products, if your rival charges more your best response is to also charge more.



In the diagram above the soft commitment by Firm 1 leads to a rightward shift in the RF for 1. That is, for any given price that your rival is choosing, you are choosing a higher price. Generally, we expect this to be costly for you – when you set a higher price you lose customers to your rival. Think about this as a negative direct effect of the commitment here. But, the strategic effect here means that when you choose a higher price you rival responds by doing likewise. This strategic effect is beneficial for you.

Hence the negative direct effect is offset, at least partially, by the positive strategic effect and this may make the commitment worthwhile or profitable.

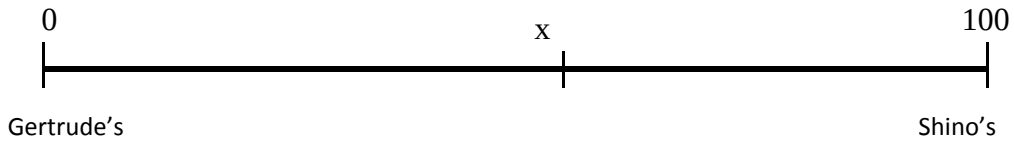
5. 6 marks.

Suppose that we have two restaurants located at either end of a road that is 100 kilometers long. Gertrude's German restaurant is located at kilometer zero, and Shino's Sushi Bar is located at kilometer 100. In each case the location of the firm is fixed and the only choice they have is over price. There are 100 consumers spaced equally along the road. Assume that for customers the cost of travelling each kilometer is $2.

If meals at Gertrudes cost $20, and meals at Shinos cost $40, where will the marginal consumer be located?

Assume now that Getrudes begins to use a new delivery service called Foodtoyou. For customers of Gertrude's, the cost of delivery is $1 for every kilometer. Where is the marginal customer located now? Explain.

Solution: This is just like the problem we solved in lecture 3 when we discussed Esme's and Getrudes shop. The marginal customer is that for whm the total cost of of buying Sushi from Shino's or a Bratwurst (or something equally unhealthy but nonetheless delicious) from Getrudes is equal.



The indifferent consumer is located at kilometer x. For that person, the cost of going to Annie's or Masako's should be equal. That person will have to travel x kilometres to go to Getrudes and (100-x) kilometres to go to Shino's. Hence, the following expression should hold given the price of a meal at both restaurants:

$$20 + 2x = 40 + 2(100-x)$$

$$x = 55$$

Hence, the indifferent consumer is located at kilometer x.

With Foodtyou it is now the case that the travel cost to Getrude's is cheaper - $1 per kilometer rather than $2. Hence the calculation becomes:

$$20 + y = 40 + 2(100-y)$$

$$y = 220/3 \text{ or approx.. } 73 \text{ kilometres}$$

Effectively Gertrude has decreased the transaction cost (total cost including transport costs) of buying from her and this means the marginal customer moves further along the road. That is, Gertrude gets a larger share of the market.

6. 8 marks

Consider two competing television networks (Foxtel and SportsTV) that are trying to win over audiences. The firms have two strategies available to them in terms of advertising, they advertise a high amount or a low amount. The payoffs for each of the networks is shown in the payoff matrix below.

		SportsTV	
		Low	**High**
Foxtel	*Low*	(*60*, **-60**)	(*-60*, **60**)
	High	(*-60*, **60**)	(*60*, **-60**)

Find any Nash Equilibrium (or Nash Equilibria) in this game if the players make their choices simultaneously.

Suppose that SportsTV decides that they will choose a low strategy once every three weeks, and the other two weeks choose a high strategy. Find the payoff for Foxtel if they always choose a low strategy. Find the payoff for Foxtel if they always choose to play High. Is the choice of SportsTv a Nash Equilibrium? Why? Can you identify the Nash Equilibrium?

Suppose that following a change in the way that Foxtel decides to advertise, they now make their choice after SportsTV. Draw the game tree and find the Nash Equilibrium of this game. Does SportsTV have a first mover advantage? Explain.

Solution:

First note the best responses (circled) in the payoff matrix below when the game is played simultaneously:

		SportsTV	
		Low	**High**
Foxtel	*Low*	(*60*, **-60**)	(*-60*, **60**)
	High	(*-60*, **60**)	(*60*, **-60**)

Clearly in this case there is no NE in pure strategies.

The second part of the question asked what would the payoff for Fox be if they played 'low' all the time whereas Sports played 'low' once every three weeks and high the other two weeks. In that case the payoff for Fox is as follows:

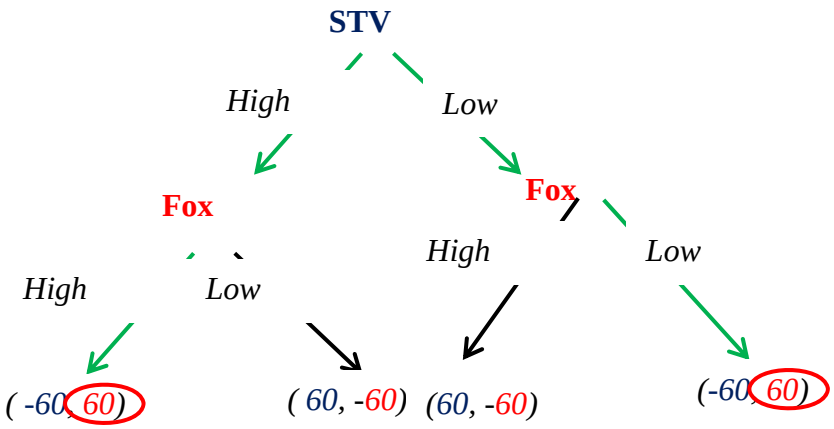
$$P_{Fox}^{L} = \frac{1}{3}(60) + \frac{2}{3}(-60) = -20$$

Similarly, if they play high all the time:

$$P_{Fox}^{L} = \frac{1}{3}(-60) + \frac{2}{3}(60) = 20$$

Clearly this cannot be a NE. In this case Fox would always play high (and on average win). Hence, for Sports they would have an incentive to change their strategy. Now the challenging part of this is to identify what the NE would be. In fact, it is the same as that we discussed in class when we considered the behaviour of Airbus and Boeing (Lecture 4 pp. 21-25). Each would play high and low ½ of the time. Only if this was the case would they have no incentive to change their behaviour unilaterally.

Now consider what happens if the game is played sequentially. The extensive form of the game is shown below:



Note what happens here. The best response of Fox is shown using the circle. They will always match what STV has done. That is, if STV chooses high (low) then Fox will also choose high (low). Hence, this way Fox guanrantees they always get a payoff of 60. There are actually two NE here, (STV – high; Fox – high), (STV – low; Fox – low). It is Fox that has the second mover advantage in this game.

7. 8 marks.

(a) Describe what is required to practice first, second and third degree price discrimination. Give one example of each type of price discrimination.

(b) Consider the following valuations placed on two different versions of a movie (HD and low definition) that can downloaded from Apple TV by pensioners and students. Assume that buyers purchase one version of the movie and choose the version that provides the highest consumer surplus.

	High definition	Low definition
Pensioners	12.50	9.50
Students	8.00	6.00

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Assume that the cost of producing and selling a movie is $1 for both the high and low definition versions. Suppose that initially Apple can verify who is buying the movie by asking for buyers to identify themselves using a concession card (student or pensioner) number. If so, what is the optimal pricing strategy for Apple and what are its profits?

Following a recent High Court associated that dealt with privacy over the internet, assume that it is no longer possible for Apple to ask buyers to identify themselves using their concession cards. What is the optimal pricing strategy now and what are the profits of Apple equal to?

Solution: First degree PD requires that the firm charge every buyer their willingness to pay. This obviously requires market power, but also knowledge of willingness to pay. The classic example is something like the Panama Canal, though it is becoming increasingly possible that firms that sell overt he internet can profile buyers and identify their willingness to pay.

Second degree PD could occur through quantity discounts. Alternatively, as discussed in class the seller presents buyers with a menu of options and let's them choose the one that suits them best. We discussed a software example in class and a magazine example in the tutorial. The key issue is that you cannot raise the price too high for some items otherwise buyers switch as is observed in the magazine example.

Third degree price discrimination requires market power, that firms can distinguish different types of buyers and sell them the same product at different prices (strictly speaking it requires the sale of goods/ services at different prices where the difference in price does not reflect the difference in cost). Firms must also be able to prevent arbitrage or resale. Classic cases include haircuts where a different price is charged for males and females (and resale is obviously not feasible) or movie tickets where resale is prohibited.

For the second part of the question the ideal outcome would be to undertake first degree price discrimination. That is, set the following prices:

$$P_{Sen}^{HD} = P_{Sen}^{LD} = \$12.50$$

$$P^{HD}_{Student} = P^{LD}_{Student} = \$8.00$$

Both types of buyers would purchase the HD version and profits would be $18.50 given the cost of each movie is $1.

If it was impossible to distinguish who was buying, then the firm must adopt second degree PD by offering a menu. One option would be to set a price of $6.00 for the LD version of the movie – clearly students would buy this. If seniors were to buy it they would get surplus of $3.50. Hence, the price that is charged for the HD version must offer at least $3.50 surplus for the seniors. Hence, the maximum price they could set for the HD movie and still sell it to seniors is $9.00. This would give total profits of $13.

One student did point out that an even better option exists if the menu only has one option. In particular, suppose the firm offers only the HD movie at a price of $8. In that case both students and seniors buy it and total profits are actually $14!

8. 7 marks.

The producers of the Book of Mormon, a popular stage show have teamed up with a nearby restaurant to offer meal and show packages. Assume that the cost of producing the meal and the stage show are zero. Further, assume that there are three types of consumers (A, B and C) each of whom place the following valuation on the stage show and a restaurant meal.

	Meal	Stage Show
A	60	50
B	50	125
C	25	140

What are profits if the charge for the restaurant meal is $25 and $50 for the stage show?

If there is no bundling, is there a set of prices that generates higher profits?

What are profits equal to if a bundle (which includes a meal and a ticket to the show) is priced at $110? Will this price of the bundle maximise profits? Why?

If the firm adopts a mixed bundling strategy, what price should it set the bundle at, and what price should it set the individual prices of the meal and stage show to maximise profits?

Solution: If the prices for a restaurant meal and show are $25 and $50 respectively, then each of the buyers purchases both the meal and the show ticket. Hence, total profit equals $225 (=(3 x $25) +(3 x $50)).

Clearly, if the prices are set as follows, profits will be higher: meal = $50 and show =$125. Now, A buys the meal, B buys both and C buys the show. This should be clear from the fact that setting a price greater than $25 for the meal is fine as long as it is

$50. Then you get an extra $25 from A and B even though you lose the sale to C. Similarly, for the price of the show. It is worthwhile losing the sale to A as long as you maximise revenue from A and B. This pricing gives profit of $350.

A bundle ata price of $110 is purchased by all three buyers and generates revenue/ profit of $330. This is the best you can do – even with a bundle price of $165 (so that you sell to B and C) leaves you with the same revenue/ profit.

As for the mixed bundle, the optimal prices are a bundle price of $165, the price of a meal of $60 and the price of a show of $125. With this set of prices, B and C buy the bundle and A buys the meal only. This generates profits of $390. Note that you need to avoid two things. First, setting the price of the meal lower than $60 in which case you forgo revenue on the sale to A. Second, prices should not be such that it is cheaper to buy the goods individually rather than as part of a bundle. Remember with mixed bundling it is always possible for the buyer to choose to buy any given item individually or buy the bundle.