Microeconomics – PPD M1

Problem set for Tutorial 2 – 31 January 2025

Problem 1 (10 points / 20). Exclusivity clauses, incentives and bargaining

This problem considers a variant of the model seen in class on the provision of incentives to invest through exclusivity requirements.

A single consumer is interested in purchasing one unit of a certain good: it has unit demand, in the sense that its demand is 0 or 1.

An incumbent firm produces that good at marginal cost c_I.

It is commonly known that many identical entrants are about to enter this market and be able to produce the exact same good at marginal cost $c_E > c_I$. Unlike in the model seen in class, c_E is not uncertain.

The value to the consumer of one unit of the good depends on the effort undertaken by the incumbent. If no effort is undertaken, then the consumer's utility is v_{min} ($v_{min} > c_E$), irrespective of whether the good is supplied by the incumbent or by an entrant.

Undertaking a certain *non-contractible* effort allows the incumbent to increase the value of the good it supplies to the consumer. But this effort also increases the value of the good supplied by entrants. More precisely, there exists an increasing function C (with $C(0) = 0$ and $C'' > 0$) such that, if the incumbent incurs cost $C(v)$, the utility of its product to the consumer increases by v (to $v_{min} + v$), and **the utility of the entrants' product increases by $\frac{v}{2}$ (to $\boldsymbol{v_{min} + \frac{v}{2}}$).**

1. Write the first-order condition determining the socially efficient level of effort $C(v^{opt})$.

2. We assume that the incumbent has incurred some effort cost $C(v)$ and is about to bargain with the consumer. The outcome of bargaining is a 50/50 division of the joint surplus from finding an agreement (allowing the consumer to trade with the incumbent rather than with an entrant). What is this joint surplus? What is the price paid by the consumer to the incumbent as the result of such bargaining?

3. Assuming that exclusivity requirements are impossible, write the first-order condition determining the level of effort $C(v^{no\ excl})$ chosen by the incumbent.

4. Assume now that exclusivity clauses are authorized, and that the incumbent and the consumer signed an exclusive contract before the incumbent chose its effort level. Answer question 2 under this modified assumption, and write the first-order condition determining the level of effort $C(v^{excl})$ chosen by the incumbent under this assumption.

5. Under these assumptions, should we expect an exclusive contract to be signed? What is the minimal transfer that the consumer would need to be offered in order to accept to sign one? Would social surplus be increased or decreased as a result of a law prohibiting exclusive contracts?

Problem 2 (10 points / 20). Competition with exclusive and non-exclusive contracts

The model. There are two firms (A and B) and one consumer.

Firms produce differentiated goods, at zero cost. The consumer can consume zero or one unit of each good. The utility she derives from consumption is equal to

- U_A (resp. U_B) if she consumes only one unit of Good A (resp. Good B). Without loss of generality, we assume that $U_A \geq U_B$.
- U_N if she consumes one unit of both goods. We assume that $U_N > U_A$.
- Zero otherwise.

Each firm sets two prices: Firm i sets prices p_i^n and p_i^e, which are the price for one unit of good i without (resp. with) an exclusivity commitment (i.e., a commitment not to purchase the other good). They are called, respectively, Firm i's non-exclusive and exclusive prices.

The timing of moves is as follows.

- In Stage 1, both firms simultaneously set their prices (four prices in total).
- In Stage 2, the consumer makes a choice among four possibilities: it can purchase nothing, one unit of good A (and pay the minimum of p_A^n and p_A^e), one unit of good B (and pay the minimum of p_B^n and p_B^e), or one unit of each good (and pay $p_A^n + p_B^n$).
- In Stage 3, payments and consumption take place. The consumer's utility is the utility from consumption (defined above) minus her payments.

1. Show that there exists a continuum of equilibria such that both firms set an infinite non-exclusive price and finite exclusive prices (p_A^e, p_B^e)=$(p + U_A\text{-}U_B, p)$ with $p \in (-(U_A - U_B), 0)$, and such that the consumer purchases only good A.
2. Show that out of all these equilibria, the one with prices (p_A^e, p_B^e)=$(U_A\text{-}U_B, 0)$ is weakly preferred over all others by the coalition formed by firms A and B. Weakly preferred means that at least one member of the coalition strongly prefers it over all others (with a strict inequality), and all members prefer it weakly (i.e., they may also be indifferent).
3. Show that there also exists an equilibrium such that
   - $p_A^e = p_A^n = U_n\text{-}U_B$
   - $p_B^e = p_B^n = U_n\text{-}U_A$
   - The consumer chooses both non-exclusive offers.
4. Show that this non-exclusive equilibrium yields greater profits to all firms and greater total surplus than the exclusive equilibrium highlighted in Question 2.