Information Economics, Spring 2018 (106-2)
Pre-lecture Problems 3

Instructor: Ling-Chieh Kung
Department of Information Management
National Taiwan University

Note 1. The deadline of submitting the pre-lecture problem is ***9:30 am, March 16, 2018***. Please submit a hard copy of your work to the instructor in class. Alternatively, you may submit a hard copy into the instructor's mailbox on the first floor of Management Building 2 by ***9:10 am*** of the same day. Late submissions will not be accepted. Each student must submit her/his individual work. Submit ONLY the problem that counts for grades.

Note 2. Please make your answer as clear (i.e., easy to read) as possible. We reserve the right to take away points when the correctness cannot be easily determined (e.g., when the writing is messy and cannot be easily understood).

1. (0 points) Recall the following Bertrand competition (for heterogeneous products): Two firms, 1 and 2, simultaneously set prices p_1 and p_2 for two substitutes. Given these prices, firm 1 sells $q_1 = a - p_1 + bp_2$ and firm 2 sells $q_2 = a - p_2 + bp_1$, where $a > 0$ and $b \in [0, 1]$. There is a unit production cost $c < a$ for both firms. Suppose that each firm wants to maximize its own profit.
   (a) Verify that the unique equilibrium is $p_1^* = p_2^* = \frac{a+c}{2-b}$.
   (b) Show that when $a = 1$ and $c = 0$, this result is the same as that in the I1 channel structure in McGuire and Staelin (1983).

2. (0 points) Consider the equilibrium wholesale prices w_i^* and retail prices p_i^* derived in pages 18 and 19 as functions of θ (cf. equations (4-29) and (4-30) in McGuire and Staelin (1983)). Determine how they change when θ changes. Make some economic interpretations.

3. (10 points; 5 points each) In lecture videos, we solved the static channel structure game

		M2: I	M2: D
M1	I	$\frac{1}{(2-\theta)^2}$ $\frac{1}{(2-\theta)^2}$	$\frac{2+\theta}{4(2-\theta)(2-\theta^2)}$ $\left[\frac{4+\theta-2\theta^2}{2(2-\theta)(2-\theta^2)}\right]^2$
	D	$\left[\frac{4+\theta-2\theta^2}{2(2-\theta)(2-\theta^2)}\right]^2$ $\frac{2+\theta}{4(2-\theta)(2-\theta^2)}$	$\frac{(2+\theta)(2-\theta^2)}{(2-\theta)(4-\theta-2\theta^2)^2}$ $\frac{(2+\theta)(2-\theta^2)}{(2-\theta)(4-\theta-2\theta^2)^2}$

   played by the two manufacturers. We showed that when $0.708 < \theta < 0.931$, this static game is actually a prisoners' dilemma: The two firms may be better off by choosing DD together, but II is the unique Nash equilibrium.
   (a) Set $\theta = 0.8$ show that this game is indeed a prisoners' dilemma.
   (b) Set $\theta = 0.95$ and show that there are two Nash equilibria.

References

McGuire, T. W., R. Staelin. 1983. An industry equilibrium analysis of downstream vertical integration. *Marketing Science* **2**(1) 115–130.