Information Economics, Spring 2013
Homework 2b

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

Note 1. This homework is due **5:00 pm, September 27, 2013**. Please submit a hard copy into the instructor's mail box. As each team only needs to submit one copy, please indicate the names and student IDs of all team members on the first page.

Note 2. Each team must have ***exactly three*** students unless a special approval is obtained.

1. (15 points; 5 points each) Consider the sales rebates problem discussed in class. Given a wholesale price w, a sales rebate s, a target T, and a retail price p, let $\pi_R(Q)$ be the retailer's expected profit function when he orders Q. Suppose the pdf and cdf of the demand are f and F, respectively.

   (a) Suppose $T = 0$, find the first-order derivative of $\pi_R(Q)$ with respect to Q. Then show that $\pi_R(Q)$ is concave in Q.

   (b) Suppose $T > 0$, find the first-order derivative of $\pi_R(Q)$ with respect to Q when $Q \geq T$.

   (c) Continue from Part (b), show that $\pi_R(Q)$ may be nonconcave when $T > 0$.

2. (15 points; 5 points each) Consider an indirect newsvendor channel with production cost c, retail price p, and random demand $D \sim f, F$. Suppose the manufacturer offers the retailer the following *two-part tariff* (q, t):[1] The manufacturer delivers q units of the product to the retailer in exchange of a fixed payment t from the retailer.[2] Note that the payment t is a *lump sum* payment, not a per unit payment. The retailer can only choose to accept or reject the contract.[3] If she accepts, she must pay t and get q units. Otherwise, both firms will earn no profit.

   (a) Formulate the retailer's expected profit if he accepts the contract. Then find a rule for the retailer to determine whether to accept the contract.

   (b) Formulate the manufacturer's problem of maximizing her expected profit.

   (c) Can two-part tariffs achieve channel coordination? If yes, can they achieve arbitrary profit splitting?

3. (10 points) In Theorem 1 of Pasternack (1985), we know full returns with full credits will not coordinate the channel. In other words, the retailer will be induced to order an inefficient (i.e., system-suboptimal) inventory level. Is the equilibrium inventory level always too low, always too high, or both are possible? Explain your answer and provide derivations when needed.

4. (10 points) Find a real example of firms adopting return contracts in industry and then tell the story by yourself. You need to clearly indicate the source of your story (an academic paper, a newspaper article, a web page, etc.), tell the story in your own word (i.e., do not copy and paste), and focus on the return contracts. As long as your story is what we want, it needs not to be long. The first three paragraphs of Cachon and Lariviere (2005) form a good example of story-telling.

References

Cachon, G. P., M. A. Lariviere. 2005. Supply chain coordination with revenue-sharing contracts: strengths and limitations. *Management Science* **51**(1) 30–44.

Pasternack, B. 1985. Optimal pricing and return policies for perishable commodities. *Marketing Science* **4**(2) 166–176.

---

[1]A two-part tariff is a contract consisting of two contractual terms. For example, a revenue-sharing contract (w, ϕ) is also a two-part tariff.

[2]The fixed payment t in this contract is generally called a *transfer* in the economics literature.

[3]Such an offer is called a *take-it-or-leave-it* contract.