ABSTRACT

of the dissertation titled

BILEVEL PROGRAMMING BASED MODELING FOR PRICING DECISIONS IN OFFSHORE MANUFACTURING CONTRACTS INVOLVING GREEN TAX

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In business parlance, *outsourcing* means contracting out a portion of the business activity to an external (foreign or domestic) party rather than doing it in-house. Outsourcing helps firms to reduce costs, increasing flexibility, access to advanced technology or expertise, focusing more on core competencies; whereas, *offshoring* refers to the relocation of jobs and production to a foreign country. The relocated jobs and production could be at a foreign office of the same multinational company or at a separate company located abroad. In contrast, the term does not necessarily imply that jobs and production are relocated to another country.

cost in order to reduce and control environmentally damaging discharges. In the concept of green tax, pollution is considered as a cost of production. Therefore, levying such tax reflects the true cost of production which internalizes all externalities of production activities. Unfortunately,

1. How long term offshore manufacturing contracts can be designed based on transfer price considering green tax between a single manufacturer and a single retailer?
2. How short term offshore manufacturing contracts can be designed considering green tax based not only on transfer price, but on the ordered quantity depending on the consumer demand between a single manufacturer and a single retailer?
3. How an offshore manufacturing contract based on transfer price and shipment quantity can be designed involving green tax between a single manufacturer and a single retailer when the manufacture is also involved in
    a. retailing the product in her domestic market as the sole franchise seller for the retailer?
    b. production and selling a local brand in her domestic market as a competitor of the retailer?
4. How ordering quantities can be allocated between two manufacturers supplying a single retailer in case of offshore manufacturing considering green tax?

The problem of offshore manufacturing contract design consists of an interactive hierarchical decision making process where the two firms are located in different countries and are owned by separate bodies. Hence, the firm owners can control their costing independently but they cannot take their pricing decisions independently; rather they influence each other in setting the prices (the transfer price as well as the retail price) of the product by involving in a *Stackelberg Game*. Actually, the price setting is sequential; based on the market power, either the manufacturer or the seller can act as the Stackelberg leader while the others follow suit. If the manufacturer acts as the leader, she first offers a per unit transfer price, which will maximize its net profit after paying green tax to its Government. Then the seller, as the follower, sets the per unit retail price after anticipating the consumer demand, which will maximize its net profit after paying the import duty to its Government. Whereas, when the seller acts as the leader, she must first set the per unit retail price and decide on the quantity to be ordered after anticipating the consumer demand, and then the manufacturer in its turn must set a per unit transfer price.

As explained above, the problem of offshore manufacturing contract design consists of interactive hierarchical decision making. As *Bilevel Programming* (BLP) is a nested optimization technique for solving decentralized planning problems involving hierarchical decision-making in

term and long-term offshore manufacturing contracts respectively. Chapter 3 presents two separate contracts for two different power structures. Chapter 4 assumes price leadership of the manufacturer and presents a long-term contract with some special cases. Both chapters give an experimental study where a US firm offshores its manufacturing activity to a Chinese manufacturer and compares the results obtained for different power structure and cases. All the contract designs in Chapters 3 and 4 assume that there is no demand and hence no market in the developing country. The fifth and the sixth chapters deal with