Experiments on Supply Chain Contracting: Effects of Contract Type, Existing Contract and Contract Duration

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In this paper we present laboratory experiments on a simple manufacturer-retailer supply chain where both firms are represented by human subjects. The manufacturer determines the contract parameters, and the retailer faces a newsvendor problem, the parameters of which are determined by the manufacturer's contract offer.

In the first part of the study, we compare the experimental results under wholesale price, buyback and revenue sharing contracts with theoretical expectations, and among each other. In parallel with some previous results in literature, we find that (1) the wholesale price contract turns out to be as efficient as the coordinating contracts, (2) buyback contract outperforms revenue sharing contracts, (3) firms share the profits more equitably than predicted by the theory.

In the second part of the study, we aim to understand the effects of certain contractual manipulations on the performance of the wholesale price contract. To this end, we compare results from a base treatment with the following treatments:

1. Existing contract treatment, where the players have to use a predetermined contract in the first five periods of the experiment. This contract allocates expected profit equally between the manufacturer and the retailer.
2. Standing contract treatment, where the manufacturer can change his contract offer once in every five periods.
3. Standing contract-and-order treatment, where both the manufacturer's contract offer and the retailer's stock quantity choice can be changed only once in every five periods.

We are the first to study the effects of these three manipulations in a human-to-human supply chain experiment. Note that standing orders was considered in literature before, albeit in retailer-only experiments. Contrary to our expectations, all three manipulations caused the manufacturers to act more aggressive (i.e., to offer higher wholesale prices), and also to capture a higher share of total profits. Meanwhile, the retailers' stock quantity reactions were not significantly different from the base scenario. We present analyses to explain the factors behind manufacturer and retailer decisions.